The Rosette Gazette

Volume 27, Issue 01 Newsletter of the Rose City Astronomers January, 2014

Discovering Astronomy through DSLR Photography

Ben Canales

The surge of DSLR photography has brought a unique opportunity to the world of astronomy. Ben Canales will speak about the ability of this growing night photography interest to connect newcomers to the expansive world of traditional astronomy. Ben will also share photos and timelapse videos of our night skies above the landscapes of our Pacific Northwest. Ben would like to end the talk with a short "workshop" on the settings and details of using a DSLR for star shots to be a "go forth" moment for anyone interested in trying it out.

Based out of Portland, Oregon, Ben Canales' night photography of the stars has been featured on OPB's Oregon Field Guide, NASA's Astronomy Picture of the Day, National Geographic Travel Photo of the Year, and is a winner of the contest The World At Night. Additionally, Ben's work will also be featured in an upcoming show in OMSI's Kendall Planetarium. Ben specializes in landscape photography at night, under the stars. His style pulls back the focus from traditional deep space astronomy, instead showcasing the expansive night sky from a human eye perspective.

His website: www.theStarTrail.com Facebook: www.Facebook.com/thestartrail

Everyone Welcome! Monday January 16th

New Members Meeting Begins: 6:30 pm. General Meeting 7:30 pm.

Location: OMSI Planetarium

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

First Quarter Moon	Full Moon	Last Quarter Moon	New Moon
Jan 08	Jan 15	Jan 23	Jan 30

A New Year's Message From The President…

As we begin the New Year of 2014, I think this is a good time to reflect back on 2013 and look-forward into 2014 – and beyond – from my perspective as your rookie-President.

2013 was by all accounts a very good year for the Rose City Astronomers.

- We grew our membership to over 400 member-families and students
- We remain financially healthy with reserve funds for special projects
- We reviewed and updated the RCA Bylaws
- We had a great line-up of speakers
- We launched the Youth Astronomy Academy
- We launched the Youth Telescope Making Project
- We established the Youth Education and Scholarship Fund
- We successfully completed our first full year of operating the Haggart Observatory
- We expanded our education and outreach audience
- We had some great star parties

Looking into my crystal ball for 2014, I see even more observing events for our members, more members volunteering for more outreach events than ever before, and increased public awareness and recognition for the contributions and accomplishments of RCA in astronomy outreach and education.

At our Board Meeting in January, we adopted an *Outreach and Education Vision Statement* that reflects this Board's recognition of the important role RCA can and needs to play in expanding astronomy outreach and education.

> *RCA shall use its resources, expertise, and member-volunteers to develop and implement programs and projects throughout our city, state and region that will serve to introduce and educate the general public on astronomy, and facilitate their participation in observing opportunities.*

As one of the largest amateur astronomy clubs in the country with a growing membership and an influx of new and active member-volunteers, my belief is that RCA can be a leader and major influence within our metropolitan home base in advancing the campaign to reduce light pollution, and also throughout our state and region in establishing a network of youth education programs and instructors.

At January's Board Meeting we also updated our *Sister Club Program Guidelines* with an eye towards establishing informal and formal relationships with other astronomers throughout the state, particularly in rural areas, to offer RCA's experience and resources to communities and groups wishing to create or grow astronomy clubs and/or promote astronomy in their communities through outreach and education. This won't reduce our interest in establishing international relationships but rather create an opportunity for us to make new friends in dark places around the state.

Our inaugural Youth Astronomy Class in 2013 was a big success with 10 students and our first 2014 Class will begin in February. In the fall of this year we hope to expand the program with a second level course and occasional technical lectures.

These are unquestionably some ambitious plans, but an example of how RCA is starting to take bigger and bolder steps towards fulfilling our mission spelled out in our original 1988 Articles of Incorporation: "***RCA is a non-profit, volunteer organization dedicated to promoting the enjoyment and education of astronomy and related subjects to members and the general public."*** We wouldn't be heading down this road if not for the enthusiastic response from members when we ask for volunteers and the positive feedback we are receive from participants.

At the same time, we have greatly expanded our observing calendar for members in 2014, with these highlights.

- 32 organized Star Parties
- Monthly events at Rooster Rock and Stub Stewart State Parks
- Monthly public Star Party at Haggart Observatory
- A special Star Party on Mt. St. Helens (that we hope will become an annual event)
- A Star Party at Indian Trail Spring in September
- And a first (that I know of) Summer Picnic and Star Party for all members and families

With some regret because of the long history of the event, we have decided not to return to Kah-Nee-Ta this year for a variety of reasons, such as: increased room rates, higher room guarantee and risk, low turnout in recent years and less than ideal observing logistics.

We also have a stellar lineup of speakers to look forward to in 2014, including Heidi Hammel, an accomplished planetary scientist and key figure in the development of the James Webb Space Telescope; renowned comet hunter Don Machholz; and Sky & Telescope *Deep Sky Wonders* columnist Sue French.

All of these activities would not be possible without the dedicated efforts of our volunteer Board members, Program Coordinators and club members – all giving of their time, talents, enthusiasm and passion to serve our membership, grow the astronomy-community and further enhance the reputation of the Rose City Astronomers. **To you all – a standing ovation!**

Heads Up in 2014!

David Nemo, RCA President

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, Feb 12th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Scheduled for 2014
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, Feb 7th, Noon
Location: McMenamin's
1504 NE Broadway, Portland
SIG Leader: Margaret McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members Special Interest Group

When: Monday, Jan 20th, 6:30pm
Location: OMSI Planetarium
Topic: TBD
SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/new_members.htm

Telescope Workshop

When: Saturday, Jan 18th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: No meeting in January
Topic: TBA

Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leaders: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

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Downtowners Lunch Special Interest Group	Margaret McCrea	downtown-sig	@ rosecityastronomers.org
Haggart Observatory	Rusty Baumberger	haggart	@ rosecityastronomers.org
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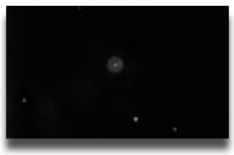
Sister Clubs	Jan Keiski	sisterclub	@ rosecityastronomers.org
Starlight Parade Float	Sameer Ruiwale	starlight	@ rosecityastronomers.org
Telescope Workshop	John DeLacy Don Peckham	tw-sig	@ rosecityastronomers.org
RCA Member Forum	Larry Godsey David Nemo	admin	@ rosecityastronomers.org
Webmaster	Larry Godsey	webmaster	@ rosecityastronomers.org
ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org



How to see IC 434

Everyone wants to see the Horsehead Nebula through their own scope, and the good news is that, given the proper circumstances, it's within the realm of possibility for many people. But to see the Horsehead, a dark nebula, you really need to be able to see IC 434, the "bright" nebula that the Horsehead is silhouetted against. Without IC 434 in the background, the Horsehead wouldn't be visible.

The catch - isn't there always a catch? - is that you'll need a few things to have decent chance of success:

Dark and transparent skies.
An h-beta filter.
Experience using averted vision.

And if you've never seen the Horsehead there are two more things you need to know:

The appropriate magnification to use.
What to expect.

Let's go over each item in more detail...

ESO image of B33, the Horsehead Nebula

Dark and Transparent skies

What exactly does "dark and transparent skies" mean? A good rule of thumb to use in this case is how well you can see the winter Milky Way. If you can't see it well – or at all – you either need to get further from city lights or the night just isn't transparent enough to take advantage of the darkness. The brighter and better defined the winter Milky Way appears, the greater the odds that you'll be able to see the Horsehead Nebula through your scope.

H-beta filter

The 'h' stands for hydrogen and h-beta filter isolates the wavelength of hydrogen-beta around 486 nanometers (nm) making it a narrow (8 to 10nm) pass-band filter. This is the very red color that shows up so beautifully in photographs. IC 434 is quite red because of hydrogen-beta emission, making an h-beta filter the best choice when trying to see IC 434 and observe the Horsehead.

Experience using averted vision

And what is averted vision? It's a common term in amateur astronomy, and most people realize that it involves looking off to one side of a faint object so the more areas of the eye most sensitive to faint light can be used to best advantage. Looking to the side of the object you want to see is counter-intuitive and takes practice to develop but it's also effective the first time you try it. Practice helps and soon you'll find the most sensitive areas of your eye to maximize your observations of faint objects like IC 434..

The appropriate magnification

So how do you find out the best magnification to use? Lumicon, the manufacturer of the leading h-beta filter, provides specific information on how to select magnifications that give you the best chance to see the Horsehead. They provide this info on their website for all their filters at http://www.lumicon.com/pdf/3filterspec_prnt.pdf . Here's what they say about their h-beta filter:

"As filter band pass decreases, optimum exit pupil size tends to increase. To determine the best eyepiece focal length to use with a given filter, simply multiply the Exit Pupil value shown (below) by your telescope's focal ratio. For example, if you are using the Lumicon H-Beta filter at a dark site and your telescope has an f/6 focal ratio, the best range of eyepiece focal lengths to use with this filter is [(4 to 7) x 6] = 24mm to 42mm."

"Optimum Exit Pupil (Light polluted sky) for Lumicon h-beta filter = 3 to 7mm

Optimum Exit Pupil (Dark sky) for Lumicon h-beta filter = 4 to 7mm"

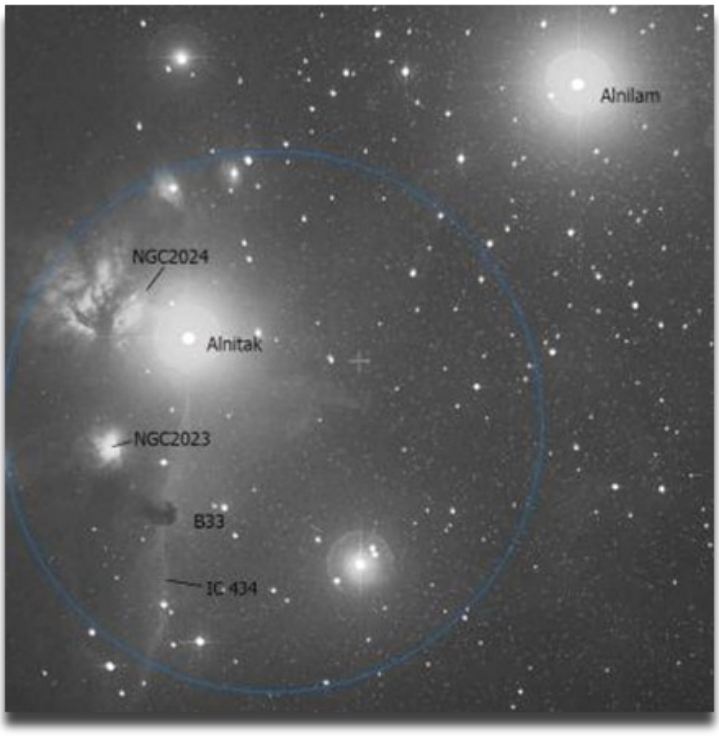
That means that for my f4 scopes I should use magnifications from 16mm to 28mm under a dark sky, and 12mm to 28mm under a light polluted sky. I've generally found that the Horsehead is most visible using a 13mm to 21mm eyepiece, so that fits quite well with Lumicon's advice.

What to expect

Surprising to many observers is the angular size of the Horsehead – they're looking for a small object and overlook the Horsehead because it's larger than expected. That was certainly the case for me and I'll address this in more detail further on.

What you don't need, although helpful, is a huge telescope. The biggest scope I've looked at the Horsehead with is my 28 inch f4 Newtonian, and not surprisingly, that gave the best view I've had of it so far. On the other hand, I've also seen the Horsehead through the 4.5 inch finder Chuck Dethloff has mounted on his 24 inch f4.1 Dobsonian.

Once you've taken care of as many of the variables as you can, and find yourself under a dark, transparent winter sky with the proper eyepieces, an h-beta filter and experience using averted vision, where exactly is the Horsehead and what might you see?



How to see IC 434 and the Horsehead

Here's a DSS image of the general region of the Horsehead Nebula, also known as Barnard 33, or B33 for short. Two of the three stars of Orion's belt are labeled, as are two NGC nebulae and IC 434. This is a big chunk of sky – approximately 2 degrees wide. It's important to understand the scale shown here so you get a good feel for how big the Horsehead will appear in your scope.

The Astronomy Picture of the Day site has a wonderful color photo of this area at http://apod.nasa.gov/apod/ap131212.html showing and even chunk of sky with all three of Orion's belt stars.

By the way, NGC 2024 is known by many names, such as the Flame or Tractor Tire Nebula and is a good reason to visit this neighborhood too.

The large circle in the black and white DSS image shows the field of view of a 13mm Ethos eyepiece in my 8 inch f4 scope. Notice how magnitude 1.9 Alnitak – the lower left star in Orion's Belt – dominates the view. It will completely hide the two NGC nebulae and the Horsehead unless you place it outside the field of view, like the next image.

Now that Alnitak is out of the field, look for NGC 2023. It may appear as a faint mist enveloping a moderately faint star, and if you can see it without too much trouble your chances for success with the Horsehead are pretty good.

Take this article with you so you can note the position of the Horsehead in relation to NGC 2023 and a few of the nearby field stars so you're looking in exactly the right spot. It's unlikely, but not impossible that you'll see the very faint streak of IC 434, and knowing its orientation to Alnitak and NGC 2023 will be a big help in keeping your bearings.

Now notice that although the Horsehead looks small in these photos, they depict a huge chunk of sky, so the Horsehead is actually fairly large in the field of view of the eyepiece. It's 6 x 8 arc minutes in size, which is a little larger than M27, the Dumbbell Nebula. This is important to keep in mind because this is often much larger than expected.

The next thing to remember is that the Horsehead has very low contrast with IC 434, the "bright" nebula behind it, and even with the h-beta filter IC 434 will be one of the faintest nebulae you'll barely see. More than likely you'll notice the sky is ever so slightly brighter in IC 434's region.

Ok, now it's time to look for the Horsehead itself. Excited? Good! That means you're alert and ready - but don't forget to breathe. Seriously, take a deep breathe or two and relax. A few slow, deep breaths will oxygenate your blood and will help your dark adapted eyesight be as sensitive as possible. It's surprisingly common to hold your breath while trying to make a difficult observation like this, so be aware of your breathing.

I've adjusted the previous DSS photo to mimic what I've seen in the eyepiece to give

you an idea of what to expect. It's typical to see the Horsehead as a notch in IC 434 that's ever so slightly darker than the surrounding sky. Although this adjusted photo is not a completely accurate depiction of what's seen through a telescope, it is fairly close.

See the dark notch?
Ok, but what about a bigger scope and how much better can the view become? I haven't sketched the Horsehead yet, so I've adjusted the same DSS image to show approximately what I've seen through my 28 inch f4 Newtonian using a 21mm Ethos eyepiece and an h-beta filter.

This image mimics my very best view of the Horsehead. IC434 was faint but easily seen as an elongated area with the eastern edge having a distinct boundary, while the western edge gradually faded away.

The best part was IC 434 outlined the horsehead shape with what seemed to be a slightly brighter border. The nose was seen quite well, making this one of the very few times the Horsehead Nebula looked like a horsehead instead of a dark notch. It was a "hey everyone, come over and look at THIS!" kind of view. Fabulous!

There's a wonderful sketch by Cindy Krach of the Haleakala Astronomers on Maui made with a 12.5 inch Newtonian posted on the Astronomy Sketch of the Day site at http://www.asod.info/?p=11148 that shows a similar view.

Whatever size scope you have, give the Horsehead Nebula a shot this winter, or failing that, wait until its high enough in the pre-dawn sky at the OSP next August. Be prepared and keep trying if you don't see it. If you come up empty, you either need a bit of practice and/or a better night.

Even though the Horsehead is never visually spectacular, even in large scopes and on the darkest, most transparent nights, seeing it at all makes it one of sky's more subtle and evocative pleasures. Just remember that you're really trying to see IC 434 and that the brighter it appears the better the Horsehead will look.

An Image and Reality

Margaret McCrae

This last summer, 2013, I was fortunate to travel in England, Scotland and Wales with my two sisters. When we arrived in London, I took the time to visit Greenwich Park, where the Royal Observatory and Flamsteed House, as well as the Prime Meridian marker, are all located. All of these can be looked up on Wikipedia, so this article is just a few of my impressions.

It takes a long time to walk through the park to get to the Royal Observatory, but that's okay, it's a lovely park and one of the largest green spaces in London. There is a wide panoramic view of the city, looking north across the Thames to the city proper, and that is partly why the observatory was built there. In 1675, this was a rural viewpoint and was a natural site for an observatory. The lights from the city would not have been a consideration in those days. And since the promontory is not right next to the river, but is set back a fair distance, evaporation and dew would not have been a problem either.

The observatory itself was a bit of a maze and once you get in, you have to follow signs that take you up, down, around and across, but you can't turn around and go back and a couple times I could barely squeeze around the displays. The observatory was being remodeled, so visiting was tricky - - and there were so many visitors! I didn't know there would be so many German high schools on school trips in London. But I can honestly say that I have [accidentally] touched the mount of the royal telescope that marks the prime meridian. The scope itself was not there. But I was surprised to learn that the Prime Meridian was designated to run exactly through the middle of that particular telescope. The Airy Transit Circle points right down the middle of that scope. And I was even more surprised to learn that the meridian had been moved from a previous line (the Bradley Line) just a few feet over to the left of this telescope when a new scope was installed. And I thought these measurements were absolutes!

The home of the Astronomers Royal, the Flamsteed House, sits just a few feet away from the Observatory, and was a much more pleasant place to visit. It is a small but nicely appointed house, suitable for a family with children and servants, who need places to play and work and study and get warm by the fireplace. It must have been fun to be a child growing up in that unique place, with a great view from the dining room. In the living room there was a timeline display of all the Astronomers Royal who had occupied that house, named for John Flamsteed who was the first (1675 – 1719) and the creator of the Flamsteed *Atlas Coelestis*. Edmund Halley was the second, followed by fourteen more distinguished occupants. By the 1920s, the functions of the observatory were being moved off site and since the 1950s, if I remember right, there is not really a royal astronomer any more, except as a ceremonial position. But there is real astronomy still being carried on - - at Cambridge University.

In the basement was a very nice display of the John Harrison clocks - - the series of clocks that he made to solve the problem of longitude. I'm a fan of Dava Sobel's book, *Longitude*, and suddenly, here in front of me, were the very timepieces she was talking about. I stayed a long time at the exhibit, called Time and Longitude, http://www.rmg.co.uk/whats-on/exhibitions/on-display/time-and-longitude, and read every single description of every single item in that display. My favorite line is " *This is the most important timekeeper ever made."* It was the label for Harrison's fourth and final marine timekeeper, now called H4 (photo left). The size and shape of the problem was right in front of us. How to tell time - - and thus know where you are - - at sea? On top of the observatory is a ball that was dropped at noon every day to help ships at sea - - if they happened to be close enough to see it. Sometime in the 1920s, I believe, a storm broke the ball off the roof. And earlier I had visited Edinburgh Castle, where at 1:00 o'clock daily, a canon is fired, again to let the ships at sea know what time it is in town. Neither method worked very well, obviously. H4 was a leap into the modern world. Very nice.

Then came the biggest surprise of all - - the Octagon Room at the top of the house. Imagine my surprise when I walked into a large, light, open, airy room and recognized it because I have seen the woodcut image of it at least a hundred times. You no doubt have seen this image. Here it is today.

It just took my breath away. First, I wasn't expecting it. And second, it was just so beautiful. I stayed a long time, then went to eat lunch and went back and started the whole visit over again. I went quickly through the observatory, quickly through the exhibit in the basement, and almost ran upstairs to see the Octagon Room again. It was designed to be a showplace and visitor center for the royalty who were paying for the observatory. I hated to leave.

I obligingly stood in line so I could stand in front of the marker for the Prime Meridian, with one foot in the western hemisphere and one in the eastern. Unfortunately, my sisters had gone shopping at Harrods that day so I was by myself and my camera was broken, so I have no memento of this important occasion, but I am satisfied that I was there.

I spent the rest of the afternoon visiting the rest of Greenwich Park: the Queen's House with its Tulip Stairs and amazing art collection, the Naval School and Hospital, and the endlessly lovely groomed grounds of the park. I thought I'd be there for two hours. I spent all day. And I was surprised by one more thing: for years I have not had much regard for King Charles II and his era, called the Restoration. England had experimented with a new form of government by beheading King Charles I and setting up a new parliament. Unfortunately, that was not a move toward openness and democracy; it was a form of religious absolutism and dictatorship, and it didn't last very long. When King Charles II and the aristocracy returned to claim their privileges, they came back with a vengeance. The Restoration was a time of riotous excess by the wealthy. But then I learned that Charles II was genuinely interested in science. He founded the Royal Observatory, created the position of Astronomer Royal and appointed Flamsteed to the position. He also granted funds to the collection of learned men who became the Royal Society of London, King Charles' scientific advisory body. Okay, he had twelve illegitimate children by seven mistresses, but he also reopened the pubs and listened to his scientific advisors. The Merry Monarch also had a brain.

Margaret McCrea
December 3, 2013

Planck: Revising the Universe

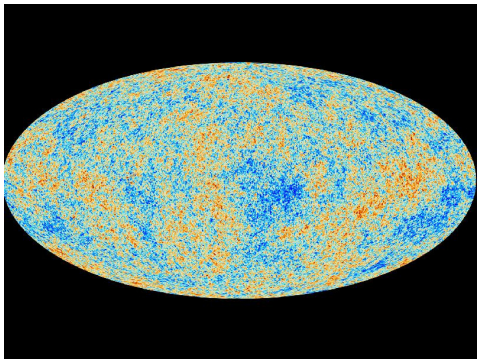
The Universe is about 100 million years older than previously estimated and is expanding slightly more slowly; it also has slightly more dark matter and a bit less dark energy than previously suspected. There is no evidence for an additional neutrino-like relativistic particle beyond the three families of neutrinos that have already been discovered; their total mass is not more than 0.23 electron volts, about half the upper limit from the earlier results from NASAs Wilkinson Microwave Anisotropy Probe (WMAP).

Those are the key findings revealed by the most accurate and detailed map of the cosmic microwave background (CMB)—the oldest light in the Universe, dating back to 370,000 years after the Big Bang—produced from the first 15.5 months of data from the Planck satellite and analyzed using one of the world's most powerful supercomputers.

The researchers included, among others, University of California faculty from Berkeley (George Smoot and Martin White), Berkeley Space Sciences Laboratory (R. Keskitalo), Davis (Lloyd Knox), the U.S. Department of Energy National Energy Research Scientific Computing Center (NERSC) at the Lawrence Berkeley National Laboratory (Julian Borrill and T.S. Kisner), and Santa Barbara (Philip Lubin, P. R. Meinhold, and Andrea Zonca).

A trillion data points

The Planck satellite, designed and built by the European Space Agency (ESA) with significant contributions from the U.S. National Aeronautics and Space Administration (NASA), was launched in May 2009 and began scientific observations in mid-August.



Planck map of the cosmic microwave background shows tiny fluctuations in temperature, which correspond to regions of different densities: denser regions eventually coalesced into today's galaxies and stars.
Credit: ESA and the Planck collaboration

Like its NASA predecessors the Cosmic Background Explorer (COBE) and WMAP, Planck's mission is to map tiny temperature fluctuations in the microwave background radiation bathing the heavens, left from the Big Bang. But both Planck's sensitivity and its resolution are unprecedented.

Planck is 930,000 miles away, on the opposite side of Earth from the sun, in the gravitationally semi-stable L2 libration point where it keeps up with Earth in its orbit. That orbit plus Plank's spinning on its axis allows the spacecraft's 72 detectors to scan successive narrow (2 arcminutes wide) strips or rings around the heavens, building up a map of rings covering the complete sky twice a year. As Planck measures some 10,000 samples per second, in its first 15.5 months of observing, it has gathered a trillion data points.

Analyzing such a massive data set is a monumental computational challenge. So in 2007, before the spacecraft was launched, NASA and the DOE negotiated a formal interagency agreement that provided the Planck mission multiyear access to NERSC.

Especially challenging is the task not only of separating the CMB from the unavoidable instrumental noise and foreground signals from our Milky Way galaxy, but also of then understanding precisely how well this separation has been done. Using a technique called Monte Carlo simulations, the data were crunched on NERSC's 150,000-core Cray XE6 supercomputer Hopper.

Refining our understanding

Although future data releases in 2014 and 2015 will add in results from polarization and other measurements, this first release of data reveals results that are already surprising.

Cray XE6 supercomputer Hopper, named for 20th-century computer scientist Grace Hopper, performed most of the Planck calculations. Hopper is at the DOE National Energy Scientific Computing Center at Lawrence Berkeley National Laboratory,
Credit: Roy Kaltschmidt

The Planck data reveal that the Universe is 13.8 billion years old, more precise than the previously accepted age of 13.7 billion years. The Hubble constant—the rate at which the Universe is expanding—is revised downward to only 67.80 plus or minus 0.77 kilometers per second per megaparsec (a megaparsec is about 3 million light-years).

Planck's results also indicate that dark energy makes up "only" 69.2 percent (plus or minus 1.0 percent) of the density of the Universe (instead of 71.4 percent as measured by WMAP). Thus, dark matter and ordinary matter make up a heftier 30.86 percent. *–Trudy E. Bell, M.A.*

***Further reading*:** The LBNL press release appears at http://newscenter.lbl.gov/news-releases/2013/03/14/massive-planck-simulations/, the NERSC release at http://www.nersc.gov/news-publications/news/science-news/2013/planck-results/, the Davis release at http://blogs.ucdavis.edu/egghead/2013/03/21/plancks-new-map-brings-universe-into-focus/, and the Santa Barbara release at http://www.ia.ucsb.edu/pa/display.aspx?pkey=2967.

Papers have been submitted to *Astronomy and Astrophysics;* preprints appear at http://www.sciops.esa.int/index.php?project=PLANCK&page=Planck_Published_Papers .

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three Department of Energy laboratories (Lawrence Berkeley Laboratory, Lawrence Livermore Laboratory, and Los Alamos National Laboratory). UC-HiPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at http://hipacc.ucsc.edu

The Big Picture: GOES-R and the Advanced Baseline Imager

By Kieran Mulvaney

The ability to watch the development of storm systems – ideally in real time, or as close as possible – has been an invaluable benefit of the Geostationary Operational Environmental Satellites (GOES) system, now entering its fortieth year in service. But it has sometimes come with a trade-off: when the equipment on the satellite is focused on such storms, it isn't always able to monitor weat her elsewhere.

"Right now, we have this kind of conflict," explains Tim Schmit of NOAA's National Environmental Satellite, Data, and Information Service (NESDIS). "Should we look at the broad scale, or look at the storm scale?" That should change with the upcoming launch of the first of the latest generation of GOES satellites, dubbed the GOES-R series, which will carry aloft a piece of equipment called the Advanced Baseline Imager (ABI).

According to Schmit, who has been working on its development since 1999, the ABI will provide images more frequently, at greater resolution and across more spectral bands (16, compared to five on existing GOES satellites). Perhaps most excitingly, it will also allow simultaneous scanning of both the broader view and not one but two concurrent storm systems or other small-scale patterns, such as wildfires, over areas of 1000km x 1000km.

Although the *spatial* resolution will not be any greater in the smaller areas than in the wider field of view, the significantly greater *temporal* resolution on the smaller scale (providing one image a minute) will allow meteorologists to see weather events unfold almost as if they were watching a movie.

So, for example, the ABI could be pointed at an area of Oklahoma where conditions seem primed for the formation of tornadoes. "And now you start getting one-minute data, so you can see small-scale clouds form, the convergence and growth," says Schmit.

In August, Schmit and colleagues enjoyed a brief taste of how that might look when they turned on the GOES-14 satellite, which serves as an orbiting backup for the existing generation of satellites.

"We were allowed to do some experimental imaging with this one -minute imagery," Schmit explains. "So we were able to simulate the temporal component of what we will get with ABI when it's launched."

The result was some imagery of cloud formation that, while not of the same resolution as the upcoming ABI images, unfolded on the same time scale. You can compare the difference between it and the existing GOES-13 imagery here: http://cimss.ssec.wisc.edu/goes/blog/wp-content/uploads/2013/08/GOES1314_VIS_21AUG2013loop.gif

Learn more about the GOES-R series of satellites here: http://www.goes-r.gov.

Kids should be sure to check out a new online game that's all about ABI! It's as exciting as it is educational. Check it out at http://scijinks.gov/abi

The Advanced Baseline Imager. Credit: NOAA/NASA.

Download photo at: http://www.goes-r.gov/spacesegment/images/ABI-complete.jpg.

RCA 2014 Star Party Calendar

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January

~~Jan 3 (Fri) Rooster Rock SP~~
~~Jan 4 (Sat) Haggart Public Night~~
Jan 24 (Fri) Rooster Rock SP
Jan 25 (Sat) Stub Stewart SP

February

Feb 1 (Sat) Haggart Public Night
Feb 28/Mar1 (Fri-Sat) Maupin SP
Feb 28 (Fri) Rooster Rock SP

March

Mar 1 (Sat) Stub Stewart SP
Mar 8 (Sat) Haggart Public Night
Mar 28/29 (Fri-Sat) Maupin SP
Mar 28 (Fri) Rooster Rock SP
Mar 29 (Sat) Stub Stewart SP

April

Apr 5 (Sat) Haggart Public Night
Apr 25/26 (Fri-Sat) Camp Hancock
Apr 25 (Fri) Rooster Rock SP
Apr 26 (Sat) Stub Stewart SP

May

May 17 (Sat) Haggart Public Night
May 23/24 (Fri-Sat) Maupin SP
May 23 (Fri) Rooster Rock SP
May 24 (Sat) Stub Stewart SP

June

Jun 14 (Sat) Haggart Public Night
Jun 27/28 (Fri-Sat) Maupin SP
Jun 27 (Fri) Rooster Rock SP
Jun 28 (Sat) Stub Stewart SP

July

Jul 18 (Fri) Haggart Public Night
Jul 19 (Sat) Stub Stewart SP /
RCA Summer Picnic
Jul 25/26 (Fri-Sat) Trout Lake SP

August

Aug 16 (Sat) Haggart Public Night
Aug 19-24 Oregon Star Party
Aug 29/30 (Fri/Sat) Mt. St. Helens SP

September

Sep 13 (Sat) Haggart Public Night
Sep 19/20 (Fri-Sat) Camp Hancock
Sep 25-27 (Thu-Sat) Indian Trail Spring SP
Sep 26 (Fri) Rooster Rock SP
Sep 27 (Sat) Stub Stewart SP

October

Oct 18 (Sat) Haggart Public Night
Oct 24/25 (Fri-Sat) Maupin SP
Oct 24 (Fri) Rooster Rock SP
Oct 25 (Sat) Stub Stewart SP

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

January 2014

Jan 03	Friday	Downtowner's Lunch	McMenamin's, 1504 NE Broadway, Portland	Noon
Jan 03	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
Jan 04	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Jan 06	Monday	Board Meeting	OMSI Classroom 1	7pm
Jan 08	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Jan 18	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Jan 20	Monday	New Members Orientation	OMSI Planetarium	6:30pm
Jan 20	**Monday**	**General Meeting**	**OMSI Planetarium**	**7:30pm**
Jan 22	Wednesday	Cosmology SIG	**No Meeting This Month**	7pm
Jan 24	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
Jan 25	Saturday	Stub Stewart Star Party	Stub Stewart State Park	Dusk

February 2014

Feb 01	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Feb 03	Monday	Board Meeting	OMSI Classroom 1	7pm
Feb 07	Friday	Downtowner's Lunch	McMenamin's, 1504 NE Broadway, Portland	Noon
Feb 12	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Feb 15	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Feb 17	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Feb 18	Wednesday	Cosmology SIG	TBD	7pm
Feb 28	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
Feb 28-Mar 02	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening

http://www.rosecityastronomers.org

Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356

The Rosette Gazette

Volume 27, Issue 02 Newsletter of the Rose City Astronomers February, 2014

James Webb Space Telescope: NASA's Next Great Observatory

Dr. Heidi B. Hammel

The James Webb Space Telescope (JWST) is NASA's next Great Observatory, the scientific successor to both the Hubble and Spitzer Space Telescopes. Its scientific equipment will include several cameras to produce amazing images in the tradition of Hubble. JWST will see the first galaxies to form in the universe, and explore how stars are born and develop planetary systems. It will examine planets around other stars to investigate their potential for life, and study planets within our own Solar System. This innovative telescope represents a major step forward in technology, with a segmented mirror three times larger than Hubble that operates a million miles away in the cold, dark environment of Earth's Lagrange 2 point. Dr. Heidi B. Hammel is one of the six Interdisciplinary Scientists for this cutting-edge facility, which is scheduled to launch in 2018. In this public lecture, Dr. Hammel will update you on the telescope's current status with images and videos. She will also give an update of JWST's anticipated science: JWST's potential for measuring water in the atmospheres of exoplanets, JWST's capacity to detect the light of the first galaxies to form in the Universe, the ability of JWST to study the coldest objects within our own Solar System, and much more.

Bio: Heidi B. Hammel
Planetary astronomer Heidi Hammel -- a world authority on the planets Neptune and Uranus -- is known for her many achievements probing the cosmos, often using the famous Hubble Space Telescope. In 1994 when comet Shoemaker-Levy 9 crashed into Jupiter, Heidi was the leader of the team that analyzed images of the event taken with Hubble. She was also a member of the research group that first spotted Neptune's Great Dark Spot (a raging storm as big as Earth) with the Voyager spacecraft, and led a Hubble team that later documented the Great Dark Spot's disappearance.

Today she is involved in another milestone: helping to develop the next great space observatory that will succeed Hubble -- the James Webb Space Telescope, scheduled to be launched later in 2018. "As much as I love Hubble, it's time to build an even more sophisticated tool that will enable us to see new things," says Dr. Hammel. "Webb will probe regions of the cosmos that are simply not visible to Hubble," she explains. "It's much bigger and it will be tuned to wavelengths that Hubble can't see. With Webb, we have the potential to answer questions about the origins of just about everything in the universe."

(Continued on page 2)

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Everyone Welcome! Monday February 17th

Intro to Astrophotography Meeting Begins: 6:30 pm. OMSI Planetarium.
General Meeting 7:30 pm Location: OMSI Auditorium

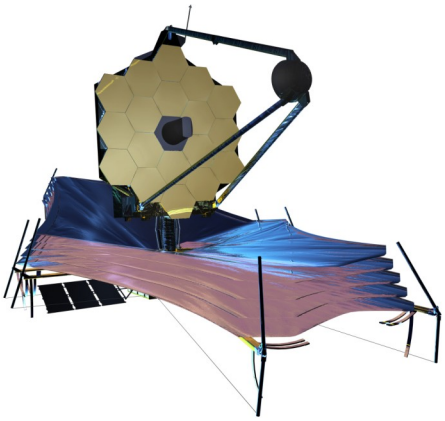
Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

First Quarter Moon	Full Moon	Last Quarter Moon	New Moon
Feb 06	Feb 14	Feb 22	Mar 01

She received her undergraduate degree from MIT in 1982 and her Ph.D. in physics and astronomy from the University of Hawaii in 1988. After a post-doctoral position at the Jet Propulsion Laboratory, she returned to MIT, where she spent nearly nine years as a Principal Research Scientist. She then worked as a Senior Research Scientist and co-Director of Research at the Space Science Institute until 2011. Dr. Hammel is now the Executive Vice President of the Association of Universities for Research in Astronomy (AURA). AURA -- a consortium of 39 U.S. universities and institutions, as well as seven international affiliates -- operates world-class astronomical observatories including Hubble, the National Optical Astronomy Observatory, the National Solar Observatory, and the Gemini Observatory.

Dr. Hammel primarily studies planets. Her current research involves studies of Uranus and Neptune with Hubble, the Keck 10-m telescope, and other Earth-based observatories. For the Planetary Decadal Survey released in 2011, Dr. Hammel led the Giant Planets Panel; in that role, she was involved in designing and characterizing a number of mission studies for outer solar system exploration.

Dr. Hammel has been widely recognized for her work. She was profiled by the New York Times in 2008[1], Newsweek Magazine in 2007[2], and was identified as one of the 50 most important women in science by Discover Magazine in 2002[3]. She was elected a Fellow of the American Association for the Advancement of Science in 2000. In 1996, she received the Urey Prize from the American Astronomical Society's Division for Planetary Sciences. Dr. Hammel has also been lauded for her work in public outreach, including the 2002 Sagan Medal for outstanding communication by an active planetary scientist to the general public, the 1996 "Spirit of American Women" National Award for encouraging young women to follow non-traditional career paths, and the San Francisco Exploratorium's 1998 Public Understanding of Science Award. Asteroid "1981 EC20" has been renamed 3530 Hammel in her honor.



[1] http://www.nytimes.com/2008/09/02/science/02conv.html
[2] http://www.newsweek.com/id/70975
[3] http://discovermagazine.com/2002/nov/feat50

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, Mar 12th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Scheduled for 2014
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Lunch

When: Friday, Mar 7th, Noon
Location: McMenamin's, 1504 NE Broadway, Portland

SIG Leader: Margaret McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members/Introduction to Astronomy

When: Monday, Mar 17th, 6:30pm
Location: OMSI Planetarium
Topic: Introduction to Astro-Imaging - Duncan Kitchin

SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org

Telescope Workshop

When: Saturday, Feb 15th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: Wednesday, Feb 19th
7:00pm
Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leaders: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

RCA Board of Directors			
Elected Officers	*Name*	*Email Address*	
President	David Nemo	president	@ rosecityastronomers.org
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Treasurer	Larry Godsey	treasurer	@ rosecityastronomers.org
VP Communications	Diana Fredlund	media	@ rosecityastronomers.org
VP Membership	Ken Hose	membership	@ rosecityastronomers.org
VP Observing	Steve Weiler	observing	@ rosecityastronomers.org
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VP Programming	Mark Martin	program	@ rosecityastronomers.org
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Director, Book Library (Books & Videos)	Jan Keiski	library	@ rosecityastronomers.org
Director, New Members	Howard Knytych	newmembers	@ rosecityastronomers.org
Director, Newsletter (Rosette Gazette)	Scott Kindt	editor	@ rosecityastronomers.org
Director, Merchandise Sales (Merchandise Sales)	Craig Hlady	sales	@ rosecityastronomers.org
Director, Telescope Library (Telescope Library)	David Horne	telescope	@ rosecityastronomers.org
Director, Youth Program (RCA Youth Program)	Kathy Kornei	youth	@ rosecityastronomers.org
Other Contacts			
Program / Project / Activity	*Name*	*Email Address*	
Astronomical Imaging Special Interest Group	Greg Marshall	ai-sig	@ rosecityastronomers.org
Cosmology Special Interest Group	Viktors Berstis	cosmology-sig	@ rosecityastronomers.org
Downtowners Lunch Special Interest Group	Margaret McCrea	downtown-sig	@ rosecityastronomers.org
Haggart Observatory	Rusty Baumberger	haggart	@ rosecityastronomers.org
Magazine Subscriptions (Discount Subscriptions)	Larry Godsey	magazines	@ rosecityastronomers.org
Observing Site Fund (Site Fund)	David Nemo	sitefund	@ rosecityastronomers.org
Sister Clubs	Margaret McCrea	Sisterclub	@ rosecityastronomers.org
Starlight Parade Float	Sameer Ruiwale	starlight	@ rosecityastronomers.org
Telescope Workshop	John DeLacy Don Peckham	tw-sig	@ rosecityastronomers.org
RCA Member Forum	Larry Godsey David Nemo	admin	@ rosecityastronomers.org
Webmaster	Larry Godsey	webmaster	@ rosecityastronomers.org
ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org

We are going to be starting an "Introduction to Astronomy" series of educational and instructional tutorials focused on basic astronomy, equipment and observing skills, geared towards beginners wanting to learn the fundamentals of astronomical observing and imaging. Series will be every-other month (alternating with New Member Orientation) in the OMSI Planetarium 6:30 - 7:15 p.m. preceding General Membership Meeting (third Monday of month). Instructors will be RCA member-volunteers. Format will be interactive presentation and lots of time devoted to Q & A. The first tutorial "Introduction to Astro-Imaging" will be on Feb. 17 @ 6:30 presented by Duncan Kitchin. Future topics will be based on feedback from New Member Orientation meetings and keeping our ears open to what new members and other beginners are asking about. Please let David Nemo or Howard Knytych (above) of interest in any topic.

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January

~~Jan 3 (Fri) Rooster Rock SP~~
~~Jan 4 (Sat) Haggart Public Night~~
~~Jan 24 (Fri) Rooster Rock SP~~
~~Jan 25 (Sat) Stub Stewart SP~~

February

~~Feb 1 (Sat) Haggart Public Night~~
Feb 28/Mar1 (Fri-Sat) Maupin SP
Feb 28 (Fri) Rooster Rock SP

March

Mar 1 (Sat) Stub Stewart SP
Mar 8 (Sat) Haggart Public Night
Mar 22 (Sat) OMSI Vernal Equinox SP
Mar 28/29 (Fri-Sat) Maupin SP
Mar 28 (Fri) Rooster Rock SP
Mar 29 (Sat) Stub Stewart SP

April

Apr 5 (Sat) Haggart Public Night
Apr 14 (Mon) OMSI Lunar Eclipse SP
Apr 19 (Sat) OMSI Planet Parade SP
Apr 25/26 (Fri-Sat) Camp Hancock
Apr 25 (Fri) Rooster Rock SP
Apr 26 (Sat) Stub Stewart SP

May

May 10 (Sat) OMSI Astronomy Day SP
May 17 (Sat) Haggart Public Night
May 23/24 (Fri-Sat) Maupin SP
May 23 (Fri) Rooster Rock SP
May 24 (Sat) Stub Stewart SP

June

Jun 14 (Sat) Haggart Public Night
Jun 21 (Sat) OMSI Summer Solstice SP
Jun 27/28 (Fri-Sat) Maupin SP
Jun 27 (Fri) Rooster Rock SP
Jun 28 (Sat) Stub Stewart SP

July

Jul 12 (Sat) OMSI Lunar Viewing SP
Jul 18 (Fri) Haggart Public Night
Jul 19 (Sat) Stub Stewart SP /
RCA Summer Picnic
Jul 25/26 (Fri-Sat) Trout Lake SP

August

Aug 12 (Sat) OMSI Perseid Meteor SP
Aug 16 (Sat) Haggart Public Night
Aug 19-24 Oregon Star Party
Aug 29/30 (Fri/Sat) Mt. St. Helens SP

September

Sep 13 (Sat) Haggart Public Night
Sep 19/20 (Fri-Sat) Camp Hancock
Sep 20 (Sat) OMSI Autumnal Equinox SP
Sep 25-27 (Thu-Sat) Indian Trail Spring SP
Sep 26 (Fri) Rooster Rock SP
Sep 27 (Sat) Stub Stewart SP

October

Oct 08 (Sat) OMSI Total Lunar Eclipse SP
Oct 18 (Sat) Haggart Public Night
Oct 23 (Sat) OMSI Partial Solar Eclipse
Oct 24/25 (Fri-Sat) Maupin SP
Oct 24 (Fri) Rooster Rock SP
Oct 25 (Sat) Stub Stewart SP

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

The Great Nebula in Orion

Travel to the Hunter's Sword for a fabulous look at the sky's most popular nebula.

By John W. Siple

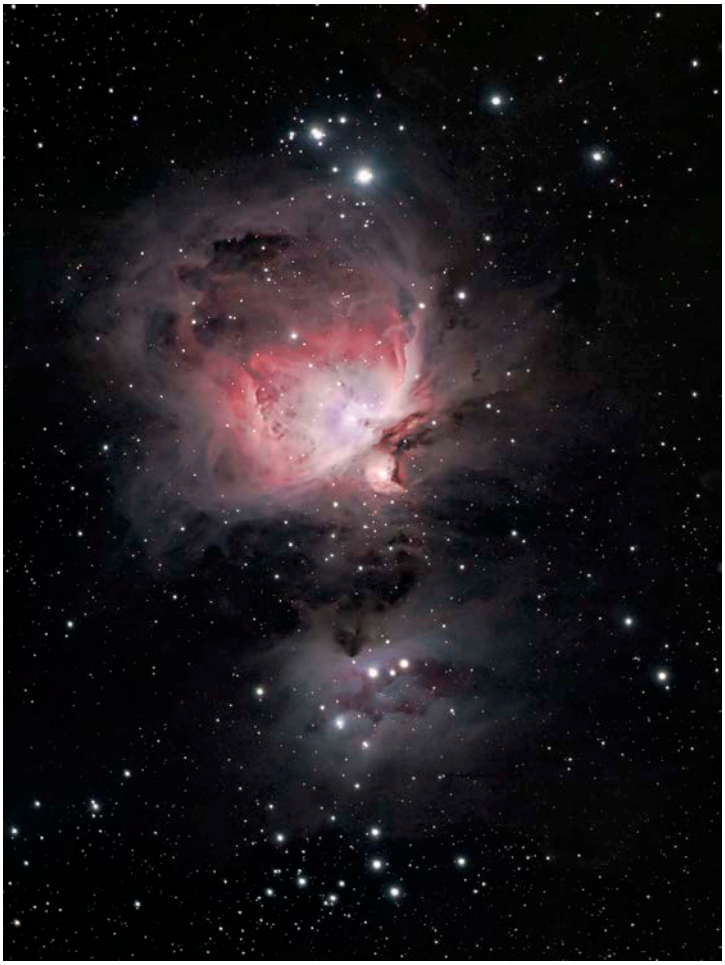
A mid-winter's session at the telescope often involves long glances at M42, the spectacular nebula that inhabits Orion's Sword. Known by every beginner, it is the middle star in his blade, appearing as a fuzzy spot to the unaided eye. Designated by the Greek letter theta (θ), the area, over one degree wide, is covered in greenish and rose colored mist. Near its chaotic heart is a wonderful multiple star called the Trapezium (θ^1 Orionis). Four-fold in small telescopes and binoculars, the individual stars range in brightness from fifth to seventh magnitude. Bewitching as it may seem, the deep-sky terrain around this little trapezoid holds many more pleasant visual surprises.

Most of the truly great discoveries in astronomy came shortly after the invention of the telescope. In 1610, Nicholas Peiresc became the first person to properly characterize M42. Later on in that same century, G. B. Hodierna and famed Dutch optician/horologist Christiaan Huyghens both made primitive sketches of the 2.9 magnitude nebula. Observations in the following years mushroomed, making this legendary wintertime showpiece a top destination for newcomers and experienced astronomers.

Messier's drawing from 1771 accurately portrays the appearance through minor instruments. Naturally, it has the Trapezium along with the nebula's filamentary extensions and infamous dark intrusion or "Fish's Mouth." John Herschel's fine rendition, made with a considerably larger 18-inch reflector, echoes the viewing sentiment through modern equipment. In that black and white sketch, delicate cobwebs of fossilized light branch outward from a textured center. Today's Internet is overflowing with evocative drawings by skilled amateurs, and offers a vast database of beautiful photographic images and plates.

There are many ways of reading M42's appearance, but all are aperture dependent. Large telescopes show a wealth of intricate detail. Mottling, a distinctive pinkish or red color, and numerous eddies and rifts characterize the diffuse nebula. Patrick Moore, in his book *The New Atlas of the Universe*, displays a wonderfully complex picture taken by the Anglo-Australian Telescope. Others, including John Mallas (*The Messier Album*) who used a classic 4-inch Unitron refractor for his observations, suggest a plain greenish-gray ring structure, bounded by great luminous bands or winged arcs. Individuals with a more creative imagination see the feathery nebula as a kind of celestial bat, cupped hand or incandescent rose.

One of the most telling descriptions comes from 19th century master observer George P. Bond, who wrote: "It is now impossible to see in it any other aspect than as a maze of radiating, spiral-like wreaths of nebulosity, or filamentous tentacles; the centre of the vortex being about the trapezium."



Greg Marshall's exceptional image of M42 shows the nebula's complexity. South is up and east to the right in this view.

According to the distance measurements provided by scientists, M42 lies roughly 1,300 light-years away. Its forceful stellar wind has carved out a deep cavity some 30 light-years across in the Orion Complex, a huge molecular cloud that engulfs virtually the entire region.

The strong ultraviolet radiation from hot newborn stars in the Trapezium has caused the surrounding gas to fluoresce, imparting the familiar colors seen through the telescope. A maelstrom of primordial hydrogen — star stuff — gives substance to M42. Enough of this rarified element exists to form over 10,000 future suns like our own. However, the greenish tinge owes its origin to doubly ionized oxygen, a minor but telltale constituent scattered throughout M42's cottony domain.

Of all the winter's emission nebulae, it undoubtedly has the finest center or core, which John Herschel referred to as "the breaking up of a mackerel sky." Appearing as a fabulous vortex of patterned swirls and nebulous loops, the "Huyghenian Region" also contains a long protrusion of black interstellar dust known as the Fish's Mouth.

Toward the southeast is Theta[2], an easily split telescopic double — through most any instrument its two components form a quaint

little straight line with the erratic variable star V361.

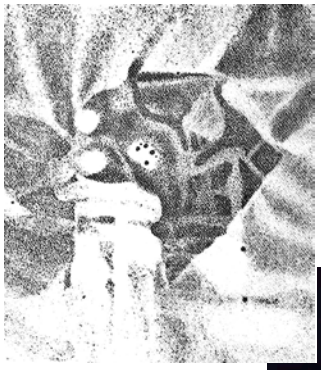
By definition, M42 (NGC 1976) is the fan-shaped glow that spreads southward from Theta[1]. The outer ramparts eventually curl against Iota (ι) Orionis, a lavish trio of bluish-white and orange suns. Positioned at the very bottom of the sword, it has 3rd and 7th magnitude components separated by 11"; another 11th-magnitude companion lies 50" away. A disordered collection of stars are strategically placed around Iota — the binaries 745 and 747 in Wilhelm Struve's catalog are the most noticeable. Although enjoying strong competition from the Trapezium, each of these pairs is too pretty to ignore.

Struve 747 (Σ747), just to the southwest of Iota, is perhaps the most inviting. The two-sun system, with 4.7 and 5.5 magnitude members spaced 36" apart, is wide enough to be resolved in binoculars. Σ745 is a compromise in brightness. The magnitudes of this still eye-catching duet are 8.4 and 8.7, separation an easy 28".

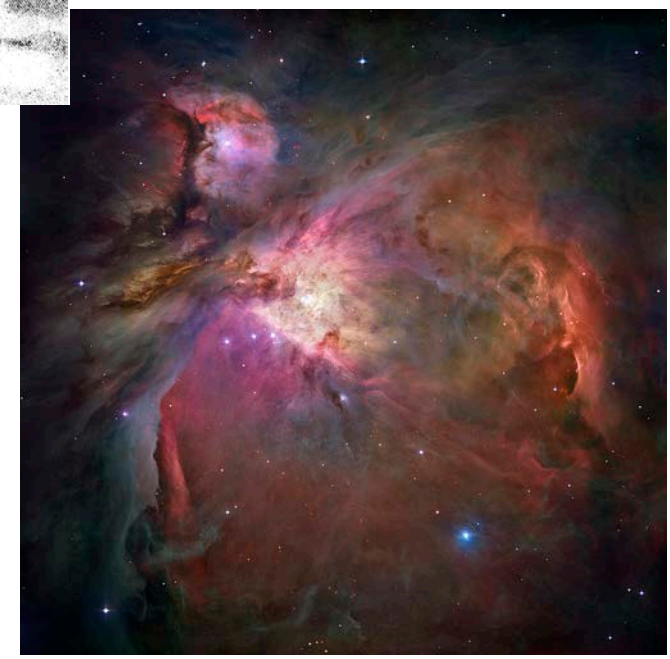
Adorning the northern portion of the grand emission nebula is Messier 43 (NGC 1982). An identifying 7th-magnitude star sits close to its round, fuzzy heart. In appearance, M43 differs significantly from its more famous neighbor: Unlike M42's broad, if bright, glow, M43 possesses a stubby, comma-shaped outline. A sinuous trough, vacant of light, runs along its eastern border and connects with the Fish's Mouth. (In reality, M43 is not an isolated cloudscape but an appendage of the greater structure.)

A dramatic end to an evening's tour is found only a few short hops to the north. Several of the remaining objects are familiar to novices, like the maverick "Running Man" reflection nebula (NGC 1977) and equally figurative "Coal Car Cluster" (NGC 1981). These two cloaked treasures emphasize the continued blend of stars and iridescent dust throughout the sword region. NGC 1977, sparse in stellar membership but rich in nebular material, is just ½° north of M43. At 6th-magnitude, it can be chronicled as three gleaming banks or ridges with a judicious sprinkling of 15 or so individual stars. NGC 1981, located another 25' to the north and at the sword's hilt, is a loose gathering of mainly bright stars enmeshed in a nondescript glow; the Y-shaped western portion of the 28' diameter cluster contrasts nicely with the tight arc of stars in its eastern half.

The Great Nebula in Orion is a timeless paradise for visual observation and contemplation. Borrowing from a variety of sources, it has been repeatedly described as "magnificent" and "the most remarkable nebula in the heavens." Whether using a small pair of binoculars, dime store telescope or expensive piece of equipment, it is a never-to-be forgotten sight, one that is returned to time and again on clear winter nights.



In this scientifically balanced piece from 1852, Bindon Stoney successfully captures the key features of the Huyghenian Region. The famous multiple star Theta[1], at the center of the drawing, appears as a little trapezoid. The "Trapezium" has relatively bright components that are designated A through D. A dimmer fifth star, called "E," can be seen in a 90mm telescope.



The Orion Nebula's flaming colors are completely beyond the reach of ordinary telescopes unless tested photographically. Resembling a wild abstractive painting, the image presented at right is remarkably structured and, at the same time, astronomically elegant. Polychromatic clouds of ionized gas, attributed to lighter elements such as hydrogen, account for its surrealistic appearance.

Courtesy of M. Robberto / NASA / ESA / STScI / Hubble Space Telescope Orion Treasury Project

Etienne Leopold Trouvelot (1827-95) was a marvelous artist and staff astronomer at Harvard College Observatory. Many of his enduring paper drawings were made through the college's large 15-inch Mertz refractor. His impression of M42's nebulous environment is displayed below, which dates from the 1870s. Aside from its inherent accuracy, Trouvelot's detailed drawing has been an inspiration for future generations of stargazers and sketch artists.

A Black Hole is Born—and Caught in the Act!

The moment photons began arriving at Earth shortly after midnight New Mexico time on Saturday, April 27, 2013, from the spectacular suicide of a massive star and resultant birth of a black hole, cameras began clicking on telescopes both on the ground and in space. Exultant astronomers worldwide captured data at visible, X-ray, gamma-ray, and radio wavelengths from telescopes both on the ground and in space.

Three independent RAPTOR (Rapid Telescopes for Optical Response) full-sky monitoring telescopes—two in New Mexico and one in Hawaii—caught an optical flash that within seconds brightened up to a peak of 7th magnitude (yes, bright enough to have been seen in an amateur astronomer's telescope had it been pointed north of the triangle in the constellation Leo), and then faded over the next minute and a half to below 10th magnitude. Simultaneously, the Gamma Ray Burst Monitor (GBM) on the Fermi satellite, the Burst Alert Telescope (BAT) on the Swift satellite, and a veritable armada of other instruments caught the cataclysmic stellar explosion in the act, as did radio telescopes around the world.

Los Alamos National Laboratory astrophysicist Tom Vestrand poses with the fast-slew array of telescopes for RAPTOR (RAPid Telescopes for Optical Response) system. RAPTOR is an intelligent visual system that scans the skies for optical anomalies and zeroes in on them when it detects them. This unique capability allowed astronomers to witness the birth of a black hole in the constellation Leo.
Credit: Los Alamos National Laboratory

Even more unusual, the explosion left an afterglow across the electromagnetic spectrum that persisted for weeks following the initial burst. Now, a host of papers in the January 3, 2014, issue of *Science* magazine reveal in detail just what happened.

'The burst of the century'

"This was the burst of the century!" exclaimed James A. Wren, an engineer at Los Alamos National Laboratory and co-author of one of the papers. Indeed, GRB 130427A (as it is now called) was the most powerful gamma-ray burst and the second-brightest optical flash measured in 18 years.

The supernova detonated in a tiny, inconspicuous galaxy with no name some 3.8 billion light-years away. Partly it was so bright because that point of origin is actually five times closer to the Milky Way than typical long-duration gamma-ray bursts monitored by Swift, which are from galaxies that are now more than 17 billion light years away from us (thanks to the faster-than-light expansion of the distant universe according to General Relativity). But partly it was so bright because of the explosion's intrinsic power: it released 10^{54} ergs of energy in all directions, making GRB 130427A one of the most powerful gamma-ray bursts ever detected.

The comparatively long life of the gamma-ray burst points to the death of a star perhaps 25 to 30 times more massive than the Sun, whose internal core of iron abruptly collapsed in on itself, creating a highly magnetized neutron star or black hole. Somehow, this fast-spinning, compact object launches a powerful jet of particles traveling at nearly the speed of light along its axis of rotation. Internal shockwaves within this relativistic jet creates the initial burst of what is called "prompt" emission spanning from optical to gamma-ray wavelengths; in the case of GRB 130427A, the prompt emission lasted about 5 minutes.

Then, when the jet starts colliding with the surrounding outer layers of the star and interstellar medium, external shock waves give rise to a longer-lasting afterglow emission. The afterglow of GRB 130427A—which spanned from radio waves to gamma rays—persisted for weeks.

'A Rosetta-Stone event'

What made this burst different from most others is that the sheer power of the explosion so comparatively nearby allowed astronomers to follow the star's decline in brightness over many wavelengths for weeks, giving them a glimpse into details of the explosion's physics usually too faint to observe.

"It is the link between the optical phenomenon and the gamma rays we haven't seen before," observed another Los Alamos co-author Przemek Wozniak.

"This was a Rosetta-Stone event that illuminates so many things—literally," affirmed lead author, Los Alamos astrophysicist W. Thomas Vestrand. "These are data that astrophysicists will be looking at for a long time to come." *–Trudy E. Bell, M.A.*

***Further reading*:** Link to the paper "The Bright Optical flash and Afterglow from the Gamma-Ray Burst GRB 130427A" by Vestrand *et al.* published in *Science* is at http://arxiv.org/abs/1311.5489 . A LANL press release "Black hole birth caught by cosmic voyeurs," is at https://www.lanl.gov/newsroom/news-releases/2013/November/11.21-black-hole-birth.php .

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three affiliated Department of Energy laboratories (Lawrence Berkeley Lab, Lawrence Livermore Lab, and Los Alamos National Lab). UC-HiPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at http://hipacc.ucsc.edu

A Two-Toned Wonder from the Saturnian Outskirts

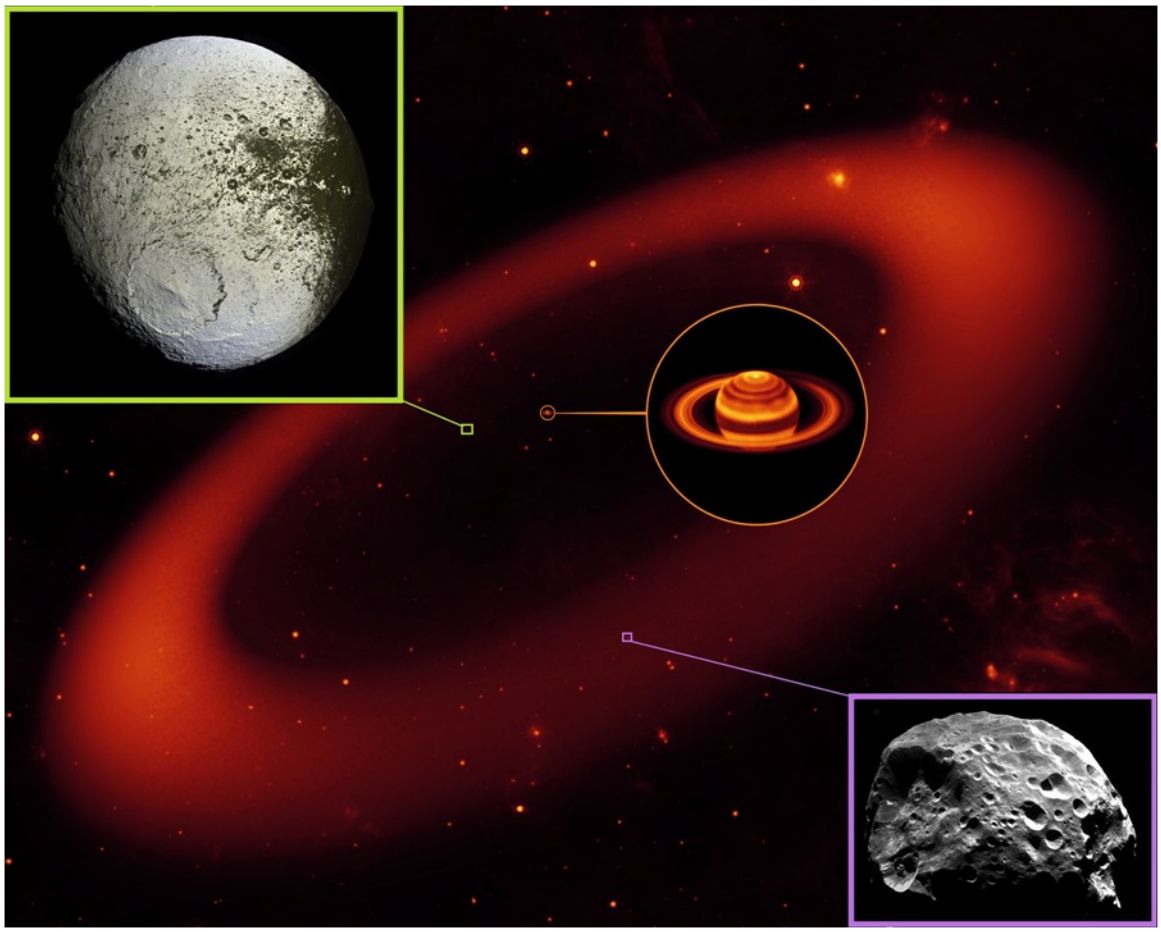
By Dr. Ethan Siegel

Although Saturn has been known as long as humans have been watching the night sky, it's only since the invention of the telescope that we've learned about the rings and moons of this giant, gaseous world. You might know that the largest of Saturn's moons is Titan, the second largest moon in the entire Solar System, discovered by Christiaan Huygens in 1655. It was just 16 years later, in 1671, that Giovanni Cassini (for whom the famed division in Saturn's rings—and the NASA mission now in orbit there—is named) discovered the second of Saturn's moons: Iapetus. Unlike Titan, Iapetus could only be seen when it was on the west side of Saturn, leading Cassini to correctly conclude that not only was Iapetus tidally locked to Saturn, but that its trailing hemisphere was intrinsically brighter than its darker, leading hemisphere. This has very much been confirmed in modern times!

In fact, the darkness of the leading side is comparable to coal, while the rest of Iapetus is as white as thick sea ice. Iapetus is the most distant of all of Saturn's large moons, with an average orbital distance of 3.5 million km, but the culprit of the mysterious dark side is *four times* as distant: Saturn's remote, captured moon, the dark, heavily cratered Phoebe!

Orbiting Saturn in retrograde, or the opposite direction to Saturn's rotation and most of its other Moons, Phoebe most probably originated in the Kuiper Belt, migrating inwards and eventually succumbing to gravitational capture. Due to its orbit, Phoebe is constantly bombarded by micrometeoroid-sized (and larger) objects, responsible for not only its dented and cavity-riddled surface, but also for a huge, diffuse ring of dust grains spanning *quadrillions* of cubic kilometers! The presence of the "Phoebe Ring" was only discovered in 2009, by NASA's infrared-sensitive Spitzer Space Telescope. As the Phoebe Ring's dust grains absorb and re-emit solar radiation, they spiral inwards towards Saturn, where they smash into Iapetus—orbiting in the opposite direction—like bugs on a highway windshield. Was the dark, leading edge of Iapetus due to it being plastered with material from Phoebe? Did those impacts erode the bright surface layer away, revealing a darker substrate?

In reality, the dark particles picked up by Iapetus aren't enough to explain the incredible brightness differences alone, but they absorb and retain *just enough* extra heat from the Sun during Iapetus' day to sublimate the ice around it, which resolidifies preferentially on the trailing side, lightening it even further. So it's not just a thin, dark layer from an alien moon that turns Iapetus dark; it's the fact that surface ice sublimates and can no longer reform atop the leading side that darkens it so severely over time. And that story—only confirmed by observations in the last few years—is the reason for the one-of-a-kind appearance of Saturn's incredible two-toned moon, Iapetus!



Learn more about Iapetus here: http://saturn.jpl.nasa.gov/science/moons/iapetus.

Kids can learn more about Saturn's rings at NASA's Space Place: http://spaceplace.nasa.gov/saturn-rings.

Images credit: Saturn & the Phoebe Ring (middle) - NASA / JPL-Caltech / Keck; Iapetus (top left) - NASA / JPL / Space Science Institute / Cassini Imaging Team; Phoebe (bottom right) - NASA / ESA / JPL / Space Science Institute / Cassini Imaging Team.

February 2014

Feb 01	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Feb 03	Monday	Board Meeting	OMSI Classroom 1	7pm
Feb 07	Friday	Downtowner's Lunch	Cancelled	Noon
Feb 12	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Feb 15	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Feb 17	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Feb 18	Wednesday	Cosmology SIG	Firlands Apt Community Room	7pm
Feb 28	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
Feb 28-Mar 02	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening

March 2014

Mar 01	Saturday	Stub Stewart Star Party	Stub Stewart State Park	Dusk
Mar 03	Monday	Board Meeting	OMSI Classroom 1	7pm
Mar 07	Friday	Downtowner's Lunch	TBD	Noon
Mar 08	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Mar 12	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Mar 15	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Mar 17	Monday	New Members SIG	OMSI Planetarium	6:30pm
Mar 17	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Mar 19	Wednesday	Cosmology SIG	**Firlands Apt Community Room**	7pm
Mar 22	Saturday	OMSI Public Star Party	Rooster Rock and Stub Stewart State Parks	Dusk
Mar 28-Apr 02	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening
Mar 28	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
Mar 29	Saturday	Stub Stewart Star Party	Stub Stewart State Park	Dusk

James Martin
Alan Papesh
Monique Soiseth
Barbara Norin
Michael Smith
Anthony Teso

to all of our new members!

Gary Brockway
Todd Duncan
Vincent Huynh
Lance Caldwell
Phil Henderson
Sylvan Lovejoy

http://www.rosecityastronomers.org

Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356

The Rosette Gazette

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Star Formation and Galactic Winds

Dr. Katherine Kornei

Star formation is pervasive across the universe. Understanding why some galaxies form stars more quickly and in a greater quantity than other galaxies is a fundamental question in astronomy. I use a sample of distant galaxies to investigate how star formation proceeds and how the process of star formation affects the shape of galaxies. Specifically, I use data from the Hubble and Keck telescopes to study how star formation can cause bubbles of gas and dust to be blown out of galaxies ("galactic winds"). I investigate the prevalence of these galactic winds as a function of galaxy properties and find that galaxies with a higher surface density of star formation possess more galactic winds. These findings imply that high densities of stars (i.e., clusters of stars) are necessary in order to expel gas and dust from galaxies. By removing gas and dust from galaxies, the fuel necessary for star formation is removed. Galactic winds accordingly act as a feedback mechanism that regulates star formation in galaxies.

Katherine Kornei earned her Bachelor's degree in astrophysics from Yale University in 2006 and her doctorate in astronomy from the University of California, Los Angeles in 2012. Her doctoral thesis focused on star formation in distant galaxies and the morphologies of galaxies. Katherine has worked at NASA Ames Research Center as a research assistant and has obtained data from the Hubble and Keck telescopes. Katherine currently works as a science educator for OMSI and The Lawrence Hall of Science (at UC Berkeley). Katherine also works as an editor for The Astrophysical Journal, where she has edited over 150 research manuscripts. Since joining the RCA in January 2013, Katherine has helped to develop the RCA Youth Astronomy Academy.

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Everyone Welcome! Monday Mar 17th

New Members Begins: 6:30 pm. Location: OMSI Planetarium
General Meeting 7:30 pm. Location: OMSI Auditorium

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

First Quarter Moon	Full Moon	Last Quarter Moon	New Moon
Mar 08	Mar 16	Mar 23	Mar 30

Outreach star party held at Washington State University Vancouver on 03/11/14.
Photo: Mark Seibold

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, Apr 09th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Scheduled for 2014
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, Apr 4th, Noon
Location: McMenanims's
1504 NE Broadway, Portland
SIG Leader: Margaret McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members/Introduction to Astronomy

When: Monday, Apr 21st, 6:30pm
Location: OMSI Planetarium
Topic: TBD

SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org

Telescope Workshop

When: Saturday, Apr 12th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: Wednesday, Mar 23rd
7:00pm
Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leader: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

RCA Board of Directors			
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Other Contacts			
Program / Project / Activity	*Name*	*Email Address*	
Astronomical Imaging Special Interest Group	Greg Marshall	ai-sig	@ rosecityastronomers.org
Cosmology Special Interest Group	Viktors Berstis	cosmology-sig	@ rosecityastronomers.org
Downtowners Lunch Special Interest Group	Margaret McCrea	downtown-sig	@ rosecityastronomers.org
Haggart Observatory	Rusty Baumberger	haggart	@ rosecityastronomers.org
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Observing Site Fund (Site Fund)	David Nemo	sitefund	@ rosecityastronomers.org
Sister Clubs	Jan Keiski	sisterclub	@ rosecityastronomers.org
Starlight Parade Float	Sameer Ruiwale	starlight	@ rosecityastronomers.org
Telescope Workshop	John DeLacy Don Peckham	tw-sig	@ rosecityastronomers.org
RCA Member Forum	Larry Godsey David Nemo	admin	@ rosecityastronomers.org
Webmaster	Larry Godsey	webmaster	@ rosecityastronomers.org
ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org

We are going to be starting an "Introduction to Astronomy" series of educational and instructional tutorials focused on basic astronomy, equipment and observing skills, geared towards beginners wanting to learn the fundamentals of astronomical observing and imaging. Series will be every-other month (alternating with New Member Orientation) in the OMSI Planetarium 6:30 - 7:15 p.m. preceding General Membership Meeting (third Monday of month). Instructors will be RCA member-volunteers. Format will be interactive presentation and lots of time devoted to Q & A. The first tutorial "Introduction to Astro-Imaging" will be on Feb. 17 @ 6:30 presented by Duncan Kitchin. Future topics will be based on feedback from New Member Orientation meetings and keeping our ears open to what new members and other beginners are asking about. Please let David Nemo or Howard Knytych (above) of interest in any topic.

RCA 2014 Star Party Calendar

These are the currently scheduled star parties for the Rose City Astronomers club for 2014. As always, these are weather dependent. Star parties may be rescheduled or cancelled due to various factors. Reschedules may be found here in the newsletter if enough advance notice is given. All updates will be posted to the online calendar and on the forum. Last minute cancellations are handled through the forum and it's email system. Directions for star party locations can be found online as well.

January

~~Jan 3 (Fri) Rooster Rock SP~~
~~Jan 4 (Sat) Haggart Public Night~~
~~Jan 24 (Fri) Rooster Rock SP~~
~~Jan 25 (Sat) Stub Stewart SP~~

February

~~Feb 1 (Sat) Haggart Public Night~~
~~Feb 28/Mar1 (Fri-Sat) Maupin SP~~
~~Feb 28 (Fri) Rooster Rock SP~~

March

~~Mar 1 (Sat) Stub Stewart SP~~
~~Mar 8 (Sat) Haggart Public Night~~
Mar 22 (Sat) OMSI Vernal Equinox SP
Mar 28/29 (Fri-Sat) Maupin SP
Mar 28 (Fri) Rooster Rock SP
Mar 29 (Sat) Stub Stewart SP

April

Apr 5 (Sat) Haggart Public Night
Apr 14 (Mon) OMSI Lunar Eclipse SP
Apr 19 (Sat) OMSI Planet Parade SP
Apr 25/26 (Fri-Sat) Camp Hancock
Apr 25 (Fri) Rooster Rock SP
Apr 26 (Sat) Stub Stewart SP

May

May 10 (Sat) OMSI Astronomy Day SP
May 17 (Sat) Haggart Public Night
May 23/24 (Fri-Sat) Maupin SP
May 23 (Fri) Rooster Rock SP
May 24 (Sat) Stub Stewart SP

June

Jun 14 (Sat) Haggart Public Night
Jun 21 (Sat) OMSI Summer Solstice SP
Jun 27/28 (Fri-Sat) Maupin SP
Jun 27 (Fri) Rooster Rock SP
Jun 28 (Sat) Stub Stewart SP

July

Jul 12 (Sat) OMSI Lunar Viewing SP
Jul 18 (Fri) Haggart Public Night
Jul 19 (Sat) Stub Stewart SP /
RCA Summer Picnic
Jul 25/26 (Fri-Sat) Trout Lake SP

August

Aug 12 (Sat) OMSI Perseid Meteor SP
Aug 16 (Sat) Haggart Public Night
Aug 19-24 Oregon Star Party
Aug 29/30 (Fri/Sat) Mt. St. Helens SP

September

Sep 13 (Sat) Haggart Public Night
Sep 19/20 (Fri-Sat) Camp Hancock
Sep 20 (Sat) OMSI Autumnal Equinox SP
Sep 25-27 (Thu-Sat) Indian Trail Spring SP
Sep 26 (Fri) Rooster Rock SP
Sep 27 (Sat) Stub Stewart SP

October

Oct 08 (Sat) OMSI Total Lunar Eclipse SP
Oct 18 (Sat) Haggart Public Night
Oct 23 (Sat) OMSI Partial Solar Eclipse
Oct 24/25 (Fri-Sat) Maupin SP
Oct 24 (Fri) Rooster Rock SP
Oct 25 (Sat) Stub Stewart SP

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

Thor's Helmet

Canis Major's skullcap emission nebula is worth the hunt.

By John W. Siple

NGC 2359 is an odd-shaped emission nebula found in the rich winter Milky Way. Known by astronomers as Thor's Helmet, this distant object was created by the fierce stellar wind of its central Wolf-Rayet star. The packed field has north to the left and west up. Courtesy of SSRO/PROMPT/CTIO.

People are accustomed to seeing Canis Major's popular star clusters. Although spectacular, you've never really explored the constellation until you've paid a visit to the emission nebula called Thor's Helmet (NGC 2359) — or attempted to capture images from your telescope's camera. A symbolic interpretation of this important celestial sight leans toward Scandinavian lore, where its nebulous loops trace out the margins of a horned Viking helmet. Thor himself, god of thunder and war, is sometimes pictured wearing the headdress, the lightning-blue streamers representing his vented wrath and anger.

Located in a majestic setting, it lies directly northeast of the dog star Sirius and next to the beautiful naked-eye cluster pair of M46 and M47. This rich expanse of the winter Milky Way contains an astonishing number of stellar associations and other galactic objects. Because of the emission nebula's soft or muted glow, it's normally missed during a casual telescopic search. When finally found, it appears as an indistinct 9th-magnitude patch of haze, having rotund dimensions of 13' X 11'. The surface brightness is quite low for an object of this caliber, but detail improves significantly through the use of select astro-filters.

In normal light, Thor's Helmet is hardly more than a weak brightening of the sky background, but of course its strength grows with each step in aperture. A miraculous transformation occurs when an oxygen III or narrowband filter is placed in the telescope. (The benefit of using appropriate filters cannot be overstated, especially when applied to certain types of emission and planetary nebulae. They operate on the principle of passing and blocking discrete wavelengths of light.)

A 4-inch scope will show a heavily mottled midsection along with two main upraised extensions. Doubling or tripling the aperture brings out considerably more fine detail. It now becomes a riveting structure of otherworldly design, where twisted strands of thicker nebulosity — the pointed horns — curve outward from a once amorphous center. A gauzy framework of electrifying coils embellishes the lemon-shaped core, swirling in haphazard fashion about an 11½-magnitude central star.

When the nebula complex is oriented nearly north and south, telescope owners may perceive a large "numeral 2" figure from its brightest lit portions. The most prominent gilded spike, other than the long gradual curve at the crosshatched center, bends toward the west-southwest, splitting eventually into two streams of milky luminescence. Fat topical glows are also clearly visible opposite the sharp horns, gourd-like features that meander counterclockwise against a rich backdrop of intervening stars.

At a distance of 15,000 light-years, the bubble-like structure is over ten times as remote as the famous Orion Nebula. The illuminating powerhouse is an extremely hot and unstable star that belongs to the Wolf-Rayet spectral class. This category is reserved for massive, highly luminous stars that possess temperatures between 25,000 °K and 50,000 °K — rare and rapidly changing occupants on the chart of stellar evolution. The blazing central star, a prime supernova candidate, has spewed out repeated waves of hot ionized material; the crackle-glass shockwave pattern is especially evident through 14-inch and larger backyard instruments.

Several exemplary open clusters inhabit the same general area, worthwhile distractions while scanning for NGC 2359. The best sight is probably NGC 2360, a rich mass of stardust easily spotted 3.4° east of Gamma (γ) Canis Majoris. An attractive assemblage, it consists of over one hundred shimmering stars in a disarmingly tight 12' area. Bound to its western edge is a solitary 5.5 magnitude sun. The less organized but charismatic groups of NGC 2345 and NGC 2374 are unveiled in low power flanking sweeps west and east of our target nebula. Two remaining clusters, Haffner 6 and Basel 11A, appear as small irregular splotches in the crowded Milky Way field. Both loom within a degree's distance of the warrior's headgear.

A clear evening in either February or early March offers the best opportunity for recording Canis Major's showpieces. Planning a restive outing with your telescope almost certainly involves an honorary encounter with the Viking god's luminous crown. Amateur astronomers will find that, contrary to preconceived notions about relatively obscure emission nebulae, Thor's Helmet actually lives up to its reputation as a dramatic "hidden treasure." Its hardened outline is perfect for those who collect odd galactic profiles and unusual shapes. (Aficionados should also look for IC 2118, the notorious Witch Head Nebula in Eridanus.)

Seeing Deep
Part I

Perhaps you've seen this quote before:

"You must not expect to see at sight…Seeing is some respects an art which must be learned. Many a night have I been practicing to see, and it would be strange if one did not acquire certain dexterity by such constant practice."

Sir William Herschel wrote these words over two hundred and sixty years ago and they're just as true now. At first it may seem odd that it takes practice to see things well through a telescope because they're designed to makes things appear brighter, larger and easier to see. What's to learn?

Remember when you learned to tie your shoes? Write your name? Ride a bicycle?

Although we do these things without thinking now, at first they took a good deal of practice to master. But like any skill, with practice they became second nature and the same is true with learning to see through a telescope.

This series of articles examines what it takes to see the faintest possible objects through any size telescope no matter where you observe. Before getting into specifics it's important to understand that it takes practice and patience to see as much as you're capable of and that there are no shortcuts. You can't hurry experience so relax, know that the learning curve will take time, and enjoy yourself as you learn to see deep.

Dark adaptation
n.
The physical and chemical adjustments of the eye, including dilation of the pupil and increased activity of rods in the retina, that makes vision possible in relative darkness.
(http://www.thefreedictionary.com/dark+adaptation)

The first thing you need to do when you want to observe deep sky objects is to make sure your eyes are dark adapted. All that means is that you allow your eyes to become accustomed to the darkness of night long enough that they are as sensitive as possible. This is a process your eyes go through every night when you're asleep. Have you ever gotten out of bed in the middle of the night and noticed how well you can see in your supposedly dark bedroom and wondered why that is? Your eyes dark adapted while you slept.

As long as you don't expose your eyes to any bright lights it only takes about 30 minutes or so to become dark adapted when you're outside at a dark sky site. Fortunately, dark adaptation is barely diminished by dim red light and that's why we use it when observing. Emphasis on "dim" though. A bright red light will diminish your dark adaptation almost as fast as an unfiltered light.

So how does dark adaptation work? The first thing that happens is that your eye's pupils dilate to let in

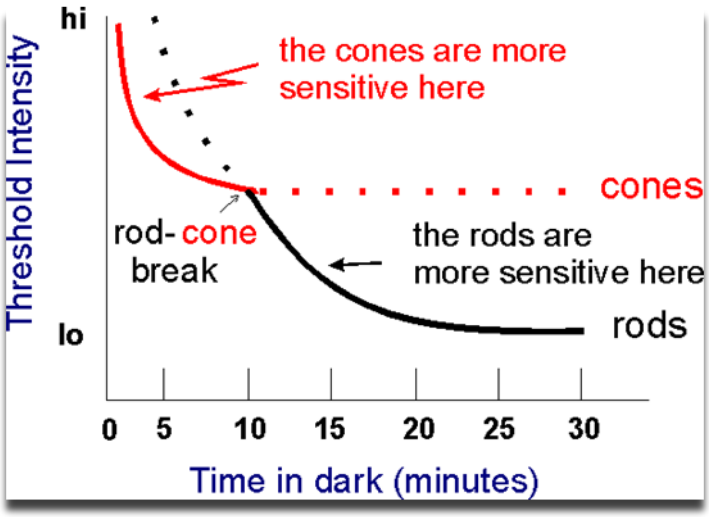
the most light as possible. At the same time, the light and color detecting parts of the eye – rods and cones - start adapting as well.

http://www.buzzle.com/articles/dilated-pupils-causes.html

Rods and cones are the two types of light sensitive elements in our eyes. Cones distinguish colors and work best in daylight, and are what we use when looking directly at something. They're most sensitive to the green light at 5600 angstroms and don't work very well at night. Ever notice that you can't see colors in the dark?

Rods can't detect color but work best in low-light conditions, and are most sensitive to the blue-green light at 5100 angstroms. They are also excellent motion detectors in low light conditions. Rods make up the bulk of our peripheral vision and are what we use when trying to see a faint deep sky object.

For additional information about rods and cones, and some nice graphics, check out: http://www.webexhibits.org/causesofcolor/1G.html.



If you're interested in finding out more about the physiological underpinnings of how our eyes detect light with Rhodopsin, otherwise known as Visual Purple, have at look at these two pages:
http://en.wikipedia.org/wiki/Adaptation_(eye)

http://en.wikipedia.org/wiki/Rhodopsin.

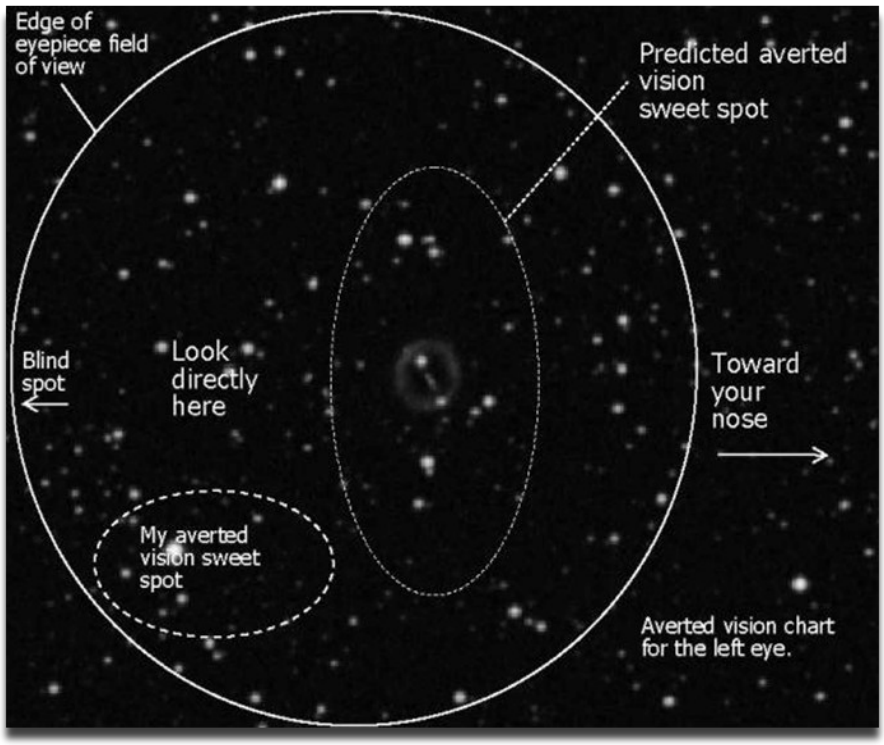
Although becoming fully dark adapted is crucial to seeing faint objects through your telescope, it isn't a skill per se. However, knowledge of how it works, how long it takes, and how to protect it throughout an observing session has a direct bearing on how well the primary skill of averted vision can be used.

Averted Vision

Ok, so let's assume your eyes have become as dark adapted as they can, and you're ready to observe a faint object with your telescope. You've found its location but when you look in the eyepiece there are only a few stars visible. After double checking that your scope is pointing at exactly the right spot, it's now time to use the low light and motion sensitive rods in your eyes. Essentially, this involves paying attention to what you can see with the most sensitive portion of your peripheral vision. This is what we call averted vision.

That means the faintest objects are counter-intuitively best seen when you look slightly away from them. Based on how the human eye is laid out, it works best for most people to place what they want to see somewhere between where their direct vision is looking – see the "look directly here" area in the diagram below - and their nose. We're all slightly different in exactly where the most sensitive area of

our rods is located, so you'll have to discover your own sweet spot. For example, my averted vision sweet spot is essentially directly below my direct vision.



This averted vision chart is for the left eye, and note that your sweet spot may be in a different spot than indicated. This is a DSS image of NGC 6337.

As a side note, your blind spot, which is of no use for observing, is on the opposite side of your direct vision. You can investigate the properties of your blind spot at this interesting site: http://serendip.brynmawr.edu/bb/blindspot1.html

Because our eyes are constantly shifting their gaze, you'll probably discover your averted vision sweet spot in fits and starts as your eye moves around on its own. You can also do much the same thing by slowly rocking your scope back and forth. As your scope is moving it will stimulate the motion detection ability of your eye's rods, momentarily letting you glimpse the object of your search as it moves into your averted vision sweet spot.

A classic object to see the effects of averted vision is the Blinking Planetary, NGC 6826. When you look directly at it (cones) you see the central star. Look away slightly (rods) and the planetary nebula becomes visible. Switching back and forth between direct vision and averted vision makes the planetary nebula blink off and on, giving this nebula its memorable name. However, the same process works on all faint objects.

In practice, your initial glimpse of a faint nebulosity may be uncertain at first glance, but with continued application of averted vision it will soon become more obvious. Take your time, move the object around in your peripheral vision to find your sweet spot, and give yourself a good ten to fifteen minutes to get a taste of what averted vision can do. This isn't only for faint deep sky objects though, because when used on bright nebulous objects like M42 averted vision will show an amazing amount of fainter extensions.

Averted Vision Scale

There are levels of averted vision that describe how much effort was needed to see an object. Ron Morales of the Sonoran Desert Observatory developed a scale that's a useful way to describe how easy or difficult an object was to see (next page):

Averted Vision Scale Developed by Ron Morales of the Sonoran Desert Observatory

AV1 - Object can be seen with averted vision but once found, the object can occasionally be seen with direct vision. If an object is first noticed with averted vision but once found this object can then be seen steadily with direct vision it is considered a direct vision object as opposed to an averted vision object.

AV2 - Object can be seen only with averted vision but it is held steady. Here the sweep of one's vision makes the object detectable.

AV3 - Object can only occasionally be seen with averted vision as it "comes & goes" with the seeing conditions. In this case the object is seen more than 50 % of the time.

AV4 - Object can only occasionally be seen with averted vision as it "comes & goes" with the seeing conditions. In this case the object is seen less than 50 % of the time.

AV5 - Object can only be glimpsed with averted vision after a continuously viewing the field for a few minutes or more. This level of averted vision usually occurs when one carefully observes a field for a lengthy period of time. This might occur within the first 3 to 5 minutes of viewing the field. ***In this level it is important that the observer has no knowledge of the exact location of a possible object. Having such knowledge prior to viewing could mislead some observers into believing that they saw something they did not actually see.*** One problem associated with viewing extremely faint galaxies it that sometimes an extremely faint star could be misidentified as an extremely faint galaxy. For this level of averted vision it is suggested that the observer make a field sketch showing faint stars as well as the object in question. This field sketch can then, at a later time, be compared to an actual photograph or chart. At this level of detection are you seeing or just detecting the presence of an object.

However, the sentence I've underlined in the AV5 section puzzles me. Unless you're intent on rediscovering objects on your own, there's no reason to not know their exact locations. More power to you if that's what you like to do, but for everyone else knowing the exact location, not to mention the size and surface brightness of a faint object is often essential to successfully seeing it. So I encourage you to use detailed charts and photographs to help pinpoint exactly where objects are located, as well as using them as guides to any potential details. Knowing where to concentrate your averted vision can make all the difference sometimes.

Also, the size, surface brightness and physical nature of the object you're looking for will suggest the best range of magnifications to try, and the possible use of a filter. Doing a little research before observing will give you an idea of what's best for the objects on your observing list. If after giving it your best shot you're not sure you saw something, just note your uncertainty in your notes or make a mental note to yourself, and try again in the future. If you do think you saw something, you probably did, but knowing the exact location of the object will help you decide if you did see it.

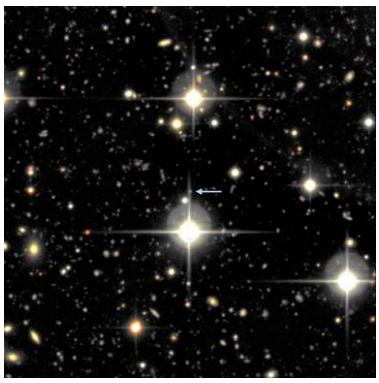
A rule of thumb is that three detections ("pops") within about five minutes count as a positive observation for a really faint object. However, the pops have to be strong sightings, even if they are fleeting. For threshold observations like this I like to test myself by trying to see the same thing in a different part of the field of view where I know there are no faint objects. If I see something there too then my eyes are playing tricks - and it's time to move on to brighter objects!

Part II of this article will examine how to get the most from using averted vision, how to protect your dark adaptation while observing, and other important factors that contribute to seeing deep.

Discovered: Stellar Dinosaurs!

"We had no idea what these things were," recounted D. Andrew Howell, staff scientist at Las Cumbres Observatory Global Telescope Network and adjunct assistant professor at UC Santa Barbara.

In 2006 and 2007, two objects caught by the detectors of the Supernova Legacy Survey looked like supernovae—stars exploding in cataclysmic stellar suicide—but did not act like familiar supernovae. Instead of brightening over a period of maybe three weeks (about 20 days), they seemed to take nearly three months (about 80 days). At first, no host galaxy could be found, so Howell and his colleagues didn't know "even whether they were supernovae or whether they were in our galaxy or a distant one." And when their visible light was spread out into a rainbow, their spectra revealed mysterious broad lines never seen before.



Arrow points to supernova SNLS 06D4eu and its host galaxy, both about 10 billion light-years away. Big objects with spikes are stars in our own Milky Way; every other bright dot is a distant galaxy. Credit: University of California, Santa Barbara

Over the next year or so, a handful of similar objects discovered by the Palomar Transient Factory and the Texas Supernova Search revealed that they actually were incredibly distant supernovae—ones dating from beyond a redshift of z = 1, that is, more than halfway back to the Big Bang. The mysterious lines in the visible spectra were actually ultraviolet emission redshifted—their short UV wavelengths expanded by the expanding universe—into the longer visible region of the electromagnetic spectrum.

Indeed, the supernovae were so distant that not only was light expanded in wavelength, but also *time* was dilated or expanded (per Einstein's theory of relativity). That time dilation stretched out the duration of the event so that, as seen from telescopes on Earth, the explosions seemed to unfold in slow motion.

But another big mystery remained: how could those supernovae be so phenomenally brilliant?

Power source?

Supernovae are not alike. For decades, astronomers had known that supernovae fell into different types based on their light curves, that is, their pattern of rising and falling brightness. Later, they found these types actually corresponded to different physical circumstances triggering the explosions. Even those types have fine distinctions based on their spectra, giving rise to the categorization of supernovae by roman numerals, with sub-classes given lower-case letters. For example, Type Ia supernovae originate from white dwarfs in binary star systems, whereas Type II supernovae originate in an implosion-explosion event when a massive star's core collapses and the star blows off its outer layers.

But the new supernovae did not correspond to any known type. Moreover, based on their distances, they had to be extraordinarily energetic. Their luminosity was roughly "10 times brighter than a thermonuclear [Type Ia] and 100 times brighter than a typical core-collapse supernova," state Howell and his 17 co-authors in a paper published in the December 20, 2013 issue of *The Astrophysical Journal*.

For help in understanding the observations, Howell turned to computational astrophysicist Daniel Kasen, UC Berkeley and the Lawrence Berkeley National Laboratory, to see whether computer simulations could shed light on physics that could produce such unimaginable energies.

Hydrogen-free superluminous?

The simulations suggested that one object, designated SNLS 06D4eu, was "unlike a traditional core-collapse, thermonuclear or interaction-powered supernova." Instead, it resembled an emerging class of supernovae classed as superluminous supernovae, a handful of which have been discovered.

The data suggest a star originally 20 to 40 times more massive than the sun first blew off its outer hydrogen-rich layers. Then the dense naked core— still having a mass five times that of the sun and composed of carbon, oxygen, and other heavy elements—precipitously collapsed into a highly magnetized neutron star only tens of miles across, spinning hundreds of times per second, triggering the super-energetic explosion. In short, SNLS 06D4eu is one of a new sub-class of hydrogen-free superluminous supernovae.

"As the most distant superluminous supernova with a spectrum (z = 1.588), SNLS 06D4eu provides a rare glimpse of the chemical composition and lightcurve evolution of an early-universe supernova," write Howell and Kasen, and coauthors. It is also one of the most luminous supernovae known. Thus, they conclude, "it could be a relic of an earlier form of supernovae that is all but extinct today."

"These are the dinosaurs of supernovae!" Howell exclaimed. SNLS 06D4eu exploded before the sun was even born, when the universe was only 4 billion years old. "We were lucky to be pointing telescopes in the right direction when the photons hit Earth after their 10-billion-year journey." *–Trudy E. Bell, M.A.*

***Further reading*:** The paper "Two superluminous supernovae from the early universe discovered by the Supernova Legacy Survey"—which, by the way, reads like a scientific detective story in detailing the discovery and sleuthing—is at http://arxiv.org/abs/1310.0470. A UC Santa Barbara press release is at http://www.news.ucsb.edu/2013/013826/powerful-ancient-explosions-explain-new-class-supernovae . The Palomar Transient Survey is described in the earlier UC-HiPACC AstroShort "Stars That Go *BANG!*" at http://hipacc.ucsc.edu/AstroShorts/February2012AstroShort.html .

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three affiliated Department of Energy laboratories (Lawrence Berkeley Lab, Lawrence Livermore Lab, and Los Alamos National Lab). UC-HiPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at http://hipacc.ucsc.edu

Old Tool, New Use: GPS and the Terrestrial Reference Frame

By Alex H. Kasprak

Flying over 1300 kilometers above Earth, the Jason 2 satellite knows its distance from the ocean down to a matter of centimeters, allowing for the creation of detailed maps of the ocean's surface. This information is invaluable to oceanographers and climate scientists. By understanding the ocean's complex topography—its barely perceptible hills and troughs—these scientists can monitor the pace of sea level rise, unravel the intricacies of ocean currents, and project the effects of future climate change.

But these measurements would be useless if there were not some frame of reference to put them in context. A terrestrial reference frame, ratified by an international group of scientists, serves that purpose. "It's a lot like air," says JPL scientist Jan Weiss. "It's all around us and is vitally important, but people don't really think about it." Creating such a frame of reference is more of a challenge than you might think, though. No point on the surface of Earth is truly fixed.

To create a terrestrial reference frame, you need to know the distance between as many points as possible. Two methods help achieve that goal. Very-long baseline interferometry uses multiple radio antennas to monitor the signal from something very far away in space, like a quasar. The distance between the antennas can be calculated based on tiny changes in the time it takes the signal to reach them. Satellite laser ranging, the second method, bounces lasers off of satellites and measures the two-way travel time to calculate distance between ground stations.

Weiss and his colleagues would like to add a third method into the mix—GPS. At the moment, GPS measurements are used only to tie together the points created by very long baseline interferometry and satellite laser ranging together, not to directly calculate a terrestrial reference frame.

"There hasn't been a whole lot of serious effort to include GPS directly," says Weiss. His goal is to show that GPS can be used to create a terrestrial reference frame on its own. "The thing about GPS that's different from very-long baseline interferometry and satellite laser ranging is that you don't need complex and expensive infrastructure and can deploy many stations all around the world."

Feeding GPS data directly into the calculation of a terrestrial reference frame could lead to an even more accurate and cost effective way to reference points geospatially. This could be good news for missions like Jason 2. Slight errors in the terrestrial reference frame can create significant errors where precise measurements are required. GPS stations could prove to be a vital and untapped resource in the quest to create the most accurate terrestrial reference frame possible. "The thing about GPS," says Weiss, "is that you are just so data rich when compared to these other techniques."

You can learn more about NASA's efforts to create an accurate terrestrial reference frame here: http://space-geodesy.nasa.gov/.

Kids can learn all about GPS by visiting http://spaceplace.nasa.gov/gps and watching a fun animation about finding pizza here: http://spaceplace.nasa.gov/gps-pizza.

Artist's interpretation of the Jason 2 satellite. To do its job properly, satellites like Jason 2 require as accurate a terrestrial reference frame as possible. Image courtesy: NASA/JPL-Caltech.

March 2014

Mar 01	Saturday	Stub Stewart Star Party	Stub Stewart State Park	Dusk
Mar 03	Monday	Board Meeting	OMSI Classroom 1	7pm
Mar 07	Friday	Downtowner's Lunch	McMenamin's, 1504 NE Broadway, Portland	Noon
Mar 08	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Mar 12	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Mar 15	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Mar 17	Monday	New Members Orientation	OMSI Planetarium	6:30pm
Mar 17	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Mar 19	Wednesday	Cosmology SIG	Firlands Community Room	7pm
Mar 22	Saturday	OMSI Public Star Party	Rooster Rock and Stub Stewart State Parks	Dusk
Mar 28-Apr 02	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening
Mar 28	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
Mar 29	Saturday	Stub Stewart Star Party	Stub Stewart State Park	Dusk

April 2014

Apr 04	Friday	Downtowner's Lunch	McMenamin's, 1504 NE Broadway, Portland	Noon
Apr 05	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Apr 07	Monday	Board Meeting	OMSI Classroom 1	7pm
Apr 09	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Apr 12	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Apr 14	Monday	OMSI Lunar Eclipse SP	Milo McIver State Park	9:30pm
Apr 19	Saturday	OMSI Planet Parade SP	Stub Stewart and Rooster Rock State Parks	Dusk
Apr 21	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Apr 23	Wednesday	Cosmology SIG	Firlands Community Room	7pm
Apr 25	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
Apr 25-27	Fri-Sun	Camp Hancock Star Party	OMSI's Camp Hancock in Eastern Oregon	
Apr 26	Saturday	Stub Stewart Star Party	Stub Stewart State Park	Dusk

Üdvözöljük

WELCOME

Välkomna

to all of our new members!

Casey Barnes
Beckah De Pry
Kristine Morrison
Ray Byers
Mike Ebers
Erin Mercer

Καλώς ήρθατε

Bienvenue

Linda Wold
Ari Strauss
Ace Koch
I-Jin Lin

Vitejte

Matthew Sottile
Isa Roberts
Tyler Mapes
William Wallace
Kawika Keaulana
Zachary Robinson

Willkommen

http://www.rosecityastronomers.org

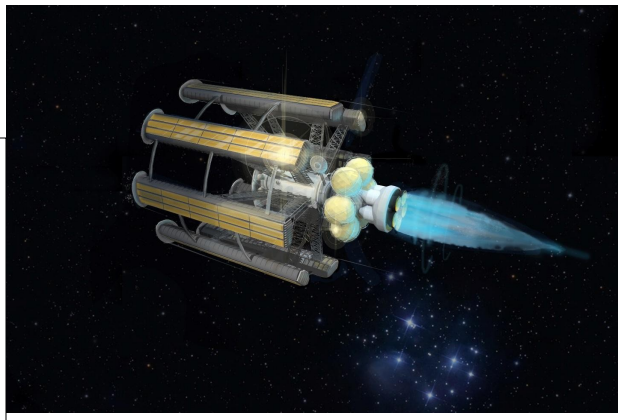
Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356

The Rosette Gazette

Volume 27, Issue 04 Newsletter of the Rose City Astronomers April, 2014

Distant Lands Unknown: Biological and Cultural Evolution In Human Migration to Exoplanets

Dr. Cameron M. Smith



When populations of humans eventually make multigenerational, interstellar voyages to settle an exoplanet, they will not be chisel-chinned astronauts living by checklists; they will be families, communities, entire cultures. How can we give them the best chance to succeed? We can begin by researching how humanity has adapted to global environments in the last 50,000 years. Both biology and culture will evolve beyond Earth. Genetic studies tell us that we must be numerous and diverse in such migrations, and cultural anthropology shows that while we cannot predict precisely how humanity will change, we can be sure that it will, in universal concerns including how we measure kinship, our rules of inheritance, gender and age categories, and how we structure our families. There is plenty to consider. We might as well begin now.

Bio:
Dr. Cameron M. Smith of Portland State University's Department of Anthropology studies human evolution past, present and future. As a member of the international research group Icarus Insterstellar (icarusinterstellar.org), he is currently investigating the biological and cultural implications of multigenerational interstellar voyaging, recently authoring "Emigrating Beyond Earth: Human Adaptation and Space Colonization" (Springer 2012). Why? Because the increasing ease of space access, a generation and a half of human familiarity with traveling to space and living there, and the astounding discovery of thousands of exoplanets have all made thoughts of space colonization and even interstellar migration somewhat less outlandish than in the past.

(Continued on page 2)

Everyone Welcome! Monday Apr 21st

Introduction to Astronomy Begins: 6:30 pm. Location: OMSI Planetarium
General Meeting 7:30 pm. Location: OMSI Auditorium

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

Last Quarter Moon	New Moon	First Quarter Moon	Full Moon
Apr 22	Apr 29	May 06	May 14

Recently Dr. Smith published a technical review of the genetic issues involved in low-multigenerational interstellar voyaging in Acta Astronautica, suggesting that populations for such projects should number in the tens of thousands rather than the low hundreds or low thousands as proposed by some other authors. He is currently writing a complimentary article on the cultural implications of such voyages, also for peer-reviewed publication, and a foundation book on the technical aspects of human space colonization, tentatively titled "Principles of Space Anthropology". Dr. Smith has also written extensively about space colonization and evolution for many magazines including Scientific American, Scientific American MIND, Spaceflight, and in the books "The Fact of Evolution" (Prometheus 2011) and "The Top Ten Myths About Evolution" (Prometheus 2006). He has lectured on human evolution in space colonization at the NASA-DARPA 100 Year Starship Study Conference in Houston, Texas and as a Plenary Speaker for the Mars Society.

Dr. Smith's interest in the distant human future derives directly from his investigation of the distant human past, which beg an as a student of the Leakey research team searching for million-year-old hominin fossils in East Africa. Acutely aware that most civilizations have failed in the long term, resulting in dissolution, disintegration and essentially Medieval conditions, Dr. Smith has decided to provide options for humanity with realistic data on humans-in-space; space migration as a responsible investment for humanity, rather than a costly luxury.

Links to some of Professor Smith's recent publications on humans-in-space can be found on the RCA website.

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, May 14th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Started for 2014, more to come.
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, May 2nd, Noon
Location: McMenamin's on Broadway,
1504 NE Broadway, PDX
SIG Leader: Margaret Campbell-McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members/Introduction to Astronomy

When: Monday, Apr 21st, 6:30pm
Location: OMSI Planetarium
Topic: Preparing for an observing session, star party etiquette. Presented by David Nemo.
SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org

Telescope Workshop

When: Saturday, May 17th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: Wednesday, Apr 23rd
7:00pm
Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leader: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

RCA Board of Directors			
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Other Contacts			
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Cosmology Special Interest Group	Viktors Berstis	cosmology-sig	@ rosecityastronomers.org
Downtowners Lunch Special Interest Group	Margaret McCrea	downtown-sig	@ rosecityastronomers.org
Haggart Observatory	Rusty Baumberger	haggart	@ rosecityastronomers.org
Magazine Subscriptions (Discount Subscriptions)	Larry Godsey	magazines	@ rosecityastronomers.org
Observing Site Fund (Site Fund)	David Nemo	sitefund	@ rosecityastronomers.org
Sister Clubs	Jan Keiski	sisterclub	@ rosecityastronomers.org
Starlight Parade Float	Sameer Ruiwale	starlight	@ rosecityastronomers.org
Telescope Workshop	John DeLacy Don Peckham	tw-sig	@ rosecityastronomers.org
RCA Member Forum	Larry Godsey David Nemo	admin	@ rosecityastronomers.org
Webmaster	Larry Godsey	webmaster	@ rosecityastronomers.org
ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org

We are going to be starting an "Introduction to Astronomy" series of educational and instructional tutorials focused on basic astronomy, equipment and observing skills, geared towards beginners wanting to learn the fundamentals of astronomical observing and imaging. Series will be every-other month (alternating with New Member Orientation) in the OMSI Planetarium 6:30 - 7:15 p.m. preceding General Membership Meeting (third Monday of month). Instructors will be RCA member-volunteers. Format will be interactive presentation and lots of time devoted to Q & A. The next tutorial "Introduction to Star Parties" will be on Apr. 21 @ 6:30. Future topics will be based on feedback from New Member Orientation meetings and keeping our ears open to what new members and other beginners are asking about. Please lets us know if you have questions.

RCA 2014 Star Party Calendar

These are the currently scheduled star parties for the Rose City Astronomers club for 2014. As always, these are weather dependent. Star parties may be rescheduled or cancelled due to various factors. Reschedules may be found here in the newsletter if enough advance notice is given. All updates will be posted to the online calendar and on the forum. Last minute cancellations are handled through the forum and it's email system. Directions for star party locations can be found online as well.

January

~~Jan 3 (Fri) Rooster Rock SP~~
~~Jan 4 (Sat) Haggart Public Night~~
~~Jan 24 (Fri) Rooster Rock SP~~
~~Jan 25 (Sat) Stub Stewart SP~~

February

~~Feb 1 (Sat) Haggart Public Night~~
~~Feb 28/Mar1 (Fri-Sat) Maupin SP~~
~~Feb 28 (Fri) Rooster Rock SP~~

March

~~Mar 1 (Sat) Stub Stewart SP~~
~~Mar 8 (Sat) Haggart Public Night~~
~~Mar 22 (Sat) OMSI Vernal Equinox~~ SP
~~Mar 28/29 (Fri-Sat) Maupin SP~~
~~Mar 28 (Fri) Rooster Rock SP~~
~~Mar 29 (Sat) Stub Stewart SP~~

April

~~Apr 5 (Sat) Haggart Public Night~~
~~Apr 14 (Sat) OMSI Lunar Eclipse~~ SP
Apr 19 (Sat) OMSI Planet Parade SP
Apr 25/26 (Fri-Sat) Camp Hancock
Apr 25 (Fri) Rooster Rock SP
Apr 26 (Sat) Stub Stewart SP

May

May 10 (Sat) OMSI Astronomy Day SP
May 17 (Sat) Haggart Public Night
May 23/24 (Fri-Sat) Maupin SP
May 23 (Fri) Rooster Rock SP
May 24 (Sat) Stub Stewart SP

June

Jun 14 (Sat) Haggart Public Night
Jun 21 (Sat) OMSI Summer Solstice SP
Jun 27/28 (Fri-Sat) Maupin SP
Jun 27 (Fri) Rooster Rock SP
Jun 28 (Sat) Stub Stewart SP

July

Jul 12 (Sat) OMSI Lunar Viewing SP
Jul 18 (Fri) Haggart Public Night
Jul 19 (Sat) Stub Stewart SP /
RCA Summer Picnic
Jul 25/26 (Fri-Sat) Trout Lake SP

August

Aug 12 (Sat) OMSI Perseid Meteor SP
Aug 16 (Sat) Haggart Public Night
Aug 19-24 Oregon Star Party
Aug 29/30 (Fri/Sat) Mt. St. Helens SP

September

Sep 13 (Sat) Haggart Public Night
Sep 19/20 (Fri-Sat) Camp Hancock
Sep 20 (Sat) OMSI Autumnal Equinox SP
Sep 25-27 (Thu-Sat) Indian Trail Spring SP
Sep 26 (Fri) Rooster Rock SP
Sep 27 (Sat) Stub Stewart SP

October

Oct 08 (Sat) OMSI Total Lunar Eclipse SP
Oct 18 (Sat) Haggart Public Night
Oct 23 (Sat) OMSI Partial Solar Eclipse
Oct 24/25 (Fri-Sat) Maupin SP
Oct 24 (Fri) Rooster Rock SP
Oct 25 (Sat) Stub Stewart SP

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

The Whirlpool Galaxy

Discover spiral architecture in Messier 51, the famous island universe of northern spring skies.

By John W. Siple

Canes Venatici is home to an imperial galaxy. An aura of duality, open spiral structure, and strong luminescence has made Messier 51 a popular stopover in spring skies. Observed and photographed countless times, the 8th-magnitude Whirlpool Galaxy is a familiar figure in scientific literature and throughout the world of astronomy.

Positioning the telescope 3.6° southwest of the Big Dipper's handle star Alkaid reveals Messier's twinned treasure. The NGC catalog calls them 5194 and 5195, high numbered sequential listings in a compendium of almost 8000 deep-sky objects. Contemporary literature often lumps the two separate objects together, referring to the dual condensations as M51. The bulk of astronomical libraries, however, discriminate between the single galaxies, applying only the M51 label to the big broadside system NGC 5194.

Discovery came on the historical night of October 13, 1773. The French comet hunter Charles Messier documented a classic double nebula through his small telescope, devoid of any features and with touching "atmospheres." First hints of an iconic pinwheel form were recorded early in the 19th century by the British scientist Sir John Herschel, who saw a curious split ring structure. In actuality he observed several of M51's four existing concentric coils, drawing their incomplete outlines as simple circles.

M51's magnificent whorled architecture was fully revealed in 1845 by the 3rd Earl of Rosse. He viewed a tantalizing amount of detail through his estate's huge 72-inch speculum mirror reflector, far exceeding the best observations of the time period. Across the broad glowing face and in the shaded recesses he saw "spiral convolutions" and noted that "the connection of the companion with the greater nebula is not to be doubted."

Few galaxies in the heavens meld spiral architecture and companion objects so extravagantly. The larger "Whirlpool" system boasts an overall apparent diameter of 11' X 8' while its oblong neighbor, 4' 35" off to the north, measures just 5' X 4'. In brightness, M51 outshines its satellite galaxy NGC 5195 by several orders of magnitude.

A premeditated approach for making your own critical observation requires thorough dark adaptation and transparent skies. Commonly available 2.4- and 3-inch refractor telescope models affirm the double nature of the object but normally won't disclose any further detail. Among deep-sky hunters, it's widely acknowledged that the acclaimed geometry can be seen in a properly-tuned instrument of about 10-inches. However, larger light buckets are the venue of choice for capturing photograph-like vistas of the graceful arms and extended bridge.

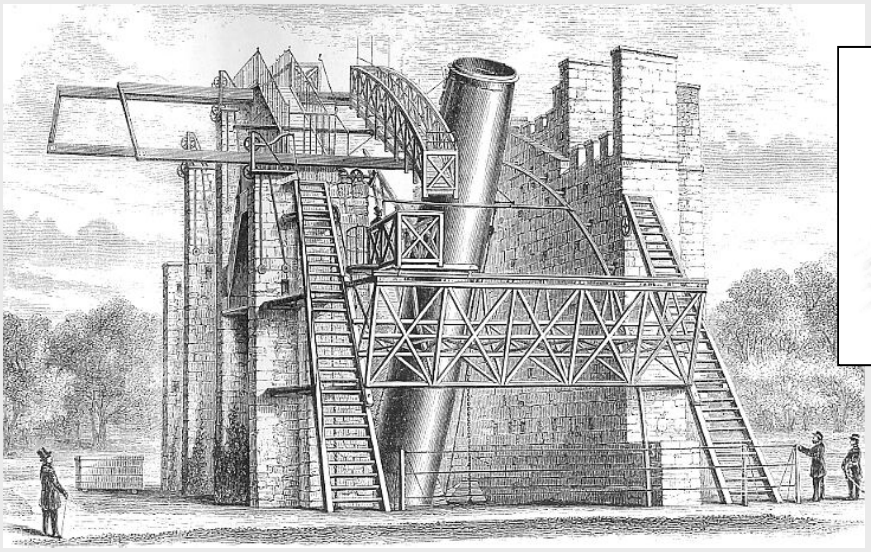
A big Dobsonian telescope transforms the major galaxy into a luminous cauldron of bluish-gray swirls, where the two most conspicuous arms unwind clockwise toward the south and north. M51's dust laden bridge is a ghostly phenomenon. The slender causeway of light exhibits sensitivity to atmospheric conditions and is best viewed using averted vision. (Experts strongly warn about a subconscious influence from published images.)

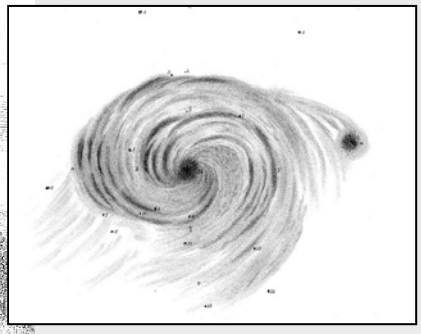
A peppered colony of field stars is scattered across the big spiral's disk. Shielded against easy detection by the mottled background glow of the galaxy's hydrogen rich clouds, many of the suns are dim, hovering at around 14th-magnitude. At least ten standout luminaries emblazon the Whirlpool's inner halo and surrounding areas; a very obvious star is visible superimposed in the southwestern quadrant between two curled arms.

Above: M51 is the undisputed king of face-on spiral galaxies. Its elegant form is evident in this image by Adam Block/Mount Lemmon SkyCenter/University of Arizona.

The distorted outline of NGC 5195 is the result of intense gravitational tugging from its more massive neighbor to the south. Research focused on their cosmology proves that the lesser galaxy is being severely disrupted by its giant Sc-type partner. Eons from today both galaxies may collide, triggering new rounds of star formation and a drastic change in their patterned appearance.

NGC 5194 was the first island universe in which spiral structure was detected. The great astronomer William Henry Smyth vividly stated, "A stellar universe, similar to that which we belong, whose vast amplitudes are in no doubt peopled with countless numbers of percipient beings." The Whirlpool Galaxy, 25 million light years distant, commands considerable attention. Uncover its profound beauty this next spring with your telescope!





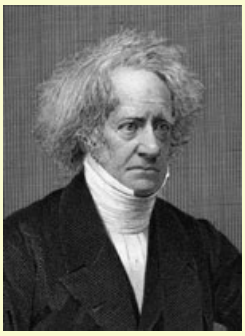
Birr Castle was a major center for astronomical activity during the mid-19th century. The Irish estate of Lord Rosse housed the "Leviathan," a monumental optical instrument with a 72-inch diameter mirror. A sketch of the Whirlpool Galaxy's famous spiral structure was recorded at the helm of the big reflector in 1850.

Historical images are courtesy of the Royal Astronomical Society.

M51 AND NGC 5195

JOHN FREDERICK WILLIAM HERSCHEL (March 7, 1792-May 11, 1871) was a great man of science. His contributions to the fields of mathematics, chemistry, botany, and astronomy are well-documented. Many of the Englishman's experiments are of historical importance, including innovative research into photography and the polarizing properties of crystals. He excelled in all endeavors, but is best known for his careful studies of the heavens. John's reputation had a profound effect on intellectual society in Great Britain. Befriending many of the top people in government and industry, he was ultimately responsible for providing guidance and direction to London's hierarchy.

A systematic study and cataloguing of celestial objects began in 1816 at his birthplace in Slough, England. John continued the meticulous astronomical measurements of his famous parent, which consisted of making zonal surveys and collating deep-sky information. A fascination with double star astrometry resulted in the detection of orbital movement and proof that Newton's law of gravitation worked far beyond the confines of the Solar System. A collaborator and close friend, James South (1785-1867), helped in the critical binary star study.



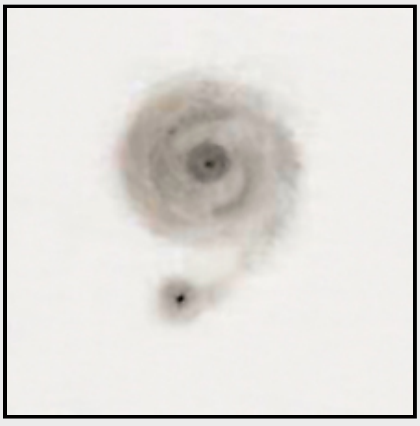
JOHN HERSCHEL'S PORTRAIT

John's stay at Slough was highly productive. He zealously determined the underlying properties of certain materials and eventually deduced the latent secrets of photography. In 1821, his bold mathematical contributions earned him the coveted Copley Medal of the Royal Society. Two important catalogues about astronomy were published during this time period. One contained precise data on some 2300 star clusters and nebulae. (The sketch of M51 was made during this era.) The other was a comprehensive six-volume set on binary star systems, carefully observed and then indexed according to equinoctial position. A graphical method was subsequently used to determine specific orbits. The Royal Society bestowed upon him its Gold Medal for the latter accomplishment.

In the year 1834 he applied his vast astronomical expertise to the southern hemisphere. Embarking from England with his young wife, they traveled along with an odd assortment of telescopes to the Cape of Good Hope, South Africa. Lodging was at Feldhausen, a Dutch colonial home in the secluded shadow of Table Mountain. Skies were incredibly dark and relatively unexplored. John's four year stewardship produced phenomenal results. The venture earned him another Copley Medal, and he documented thousands of foreign objects.

Life in England resumed at Collingwood, the new family residence. Much of the data at Feldhausen was tabulated here. Later on, the extremely popular 700-page tome *Outlines of Astronomy* showed a masters' touch in editing. A break from science led to his appointment as Master of the Mint from 1850-1855. Symbols of John Herschel's power in astronomy are in evidence today. He suggested the permanent names of seven of Saturn's moons and four of the planet Uranus. Constellation reform, research into terrestrial magnetism and the invention of the actinometer are a few remaining highlights of his long and brilliant career.

The author's drawing of M51 was made on the night of March 8th, 2014 through a classic Edmund 6-inch reflector telescope.



Seeing Deep
Part II

Getting the most from Averted Vision

Because dark adaptation and the effective use of averted vision are so sensitive, protecting them by using a faint red light while observing is important. However, to maximize your use of averted vision you'll also want to prevent ambient light from entering your peripheral vision while looking through the eyepiece.

There's a surprising amount of ambient light at even the darkest locations from starlight and airglow. Cupping your hands around the eyepiece, or using an observing hood or dark towel over your head can make a significant improvement while observing faint objects simply by blocking ambient light from getting into your eye.

But using a dark towel or an observing hood when the relative humidity is high can be problematic because they make it easier for your eyepiece to fog over by trapping your breath, which increases the humidity even more inside the hood or towel. However, if you observe in low humidity conditions this won't be a problem.

The downside to using your hands cupped around the eyepiece is that it's difficult to fully protect your peripheral vision by cupping your hands around the eyepiece. It's usually better than nothing, but often not very satisfactory.

My favorite way to block ambient light is with a Dethloff Eyepiece Shade (DES) which was designed by Chuck Dethloff several years ago. Made from a dollar store plastic salad bowl and a few pieces of thick black felt, it looks rather like a Darth Vader helmet with a hole in the top.

A Paracorr or eyepiece fits through the hole of the DES, and the combo is inserted into the focuser so it's in place for the entire evening. It's easily rotated to account for any orientation of the scope. The DES works better than an observing hood or towel for three reasons - the humidity from your breath can escape, your peripheral and direct vision are protected, and you're because looking *into* the DES – which is very black – instead of looking out of a hood or towel.

To be clear, the DES doesn't prevent eyepieces from fogging up but it doesn't *cause* fogging like an observing hood

or a towel over your head can. However, it may be too large on small scopes so it's not for everyone. It also makes reaching the focusing knobs a little more difficult because you have to reach behind the DES. By the way, the photos show a DES on an 8 inch Newtonian.

Dethloff Eyepiece Shade with a 12 inch ruler for scale.

Protecting Dark Adaptation

After taking all these precautions, how do you protect your dark adaptation while writing observing notes or drawing a sketch? Writing or sketching in true darkness isn't feasible so you'll need to use your faint red flashlight, but prolonged exposure to it might degrade your dark adaptation. One solution is as straightforward as it is difficult to master – closing your observing eye while taking notes and sketching. You'll probably find this is much easier said than done, but once mastered is a valuable observing skill. Or use an observing patch - arrrgghh matey! Plus, you'll be all set for Talk like a Pirate Day on September 19th.

For a surprising theory about why pirates may have worn eye patches, see: http://mentalfloss.com/article/52493/why- -did-pirates-wear-eye-patches

A popular method of recording observation notes without needing a red flashlight is using a digital recorder. The downside is transcribing the recorded voice notes to more easily access them later. But this works great for many observers so you may want to give it a try.

Some experienced observers have found that a dim light in non-red colors works better because they have trouble seeing star charts or writing notes in red light, but any color light has to be very dim indeed. A good rule of thumb is that the light should to be dim enough that you can barely tell what color it is. By the way, if you can see well enough to write or sketch at this low level of illumination you probably don't need to worry about losing your dark adaption.

Another technique to protect your dark adaptation is to switch back and forth between both eyes every few minutes. The eye that's closed is dark adapting more deeply than if it were left open, and is ready for action when the other eye has lost its peak sensitivity.

A related technique is to use one eye for observing deep sky objects and the other for planetary observing. This also takes some getting used to, but dedicating one eye to dim objects and the other to bright objects allows you to observe both throughout an observing session without degrading either eye's ability to see them.

Something else to be aware of is fatigue. You may find that after several minutes of intense averted vision observing that you're not seeing as much as at first glance, and that's because the Rhodopsin (visual purple) in your observing eye is being photo bleached. Give your eyes a break – look up at the starry sky, chat with fellow observers, have a snack – or whatever - and then resume observing with refreshed vision. For maximum effect, keep your observing eye closed for the last few minutes of your break. Or as mentioned above, use an eye patch matey.

Although it takes 45 minutes for Rhodopsin to fully recover, in practice you'll find that a 10 minute break can be quite effective. For instance, it's not uncommon for me to take a last look at an object and seeing more after I'd just finished sketching, writing my notes and having a snack.

Enhancing Averted Vision

Although it may sound a little too easy, there's no better way to squeeze every faint detail from an observation than making a sketch. A sketch doesn't have to be a masterpiece, but something as simple as a rough layout with a few notes goes a long way toward focusing your attention on the object you're observing. That's important because the more attention you give an object the more time you'll spend observing it and the more you're likely to see. Any type of sketching makes it a near certainty that you'll see more detail than you would have otherwise, thus maximizing your use of dark adaptation and averted vision.

Sketching not only records what you've observed, it's also a tool that pushes you to see as much as you're able to. But there are few things more difficult than sketching in the dark, and getting results you find pleasing may feel like more trouble than it's worth for quite a while. But if you stick with it, compare your sketches of the same objects made a year or two apart. You'll be impressed by how much more you've learned to see.

Comfort

All the observing skill in the world will be compromised if you're not comfortable enough to observe for ten to fifteen minutes at a time so you can take full advantage of your dark adaptation and use of averted vision.

Being comfortable means your attention isn't compromised by a twisted neck or aching back. Much of that and you'll start looking for a new hobby. An adjustable observing chair, or a sturdy ladder if you have a large Dob, go a long way toward insuring your comfort so you can concentrate on what you're seeing in the eyepiece.

There are several models of adjustable observing chairs you can purchase and if you're handy it's not difficult to make your own, so don't put up with an uncomfortable observing setup because there are many reasonable solutions at hand. Search for "adjustable astronomy observing chair" on line and you'll find a surprisingly wide selection.

If you have a large Dob, a three legged orchard ladder is far more stable than any four legged ladder, especially on uneven terrain. But even on a flat surface three legged ladders feel more secure.

You may be wondering how three legs can possibly be more stable than four, but remember that a plane is defined by three points. That's why telescopes almost always have only three contact points with the ground. A four legged ladder can work well on a flat surface, but put it on uneven ground and you find out how unsteady it can be. That's the main reason orchard ladders have three instead of four legs. Another reason is that it's easier to place a three legged ladder closer to a tree or a big telescope.

Heck, you can even order an *astronomer* orchard ladder with the steps 8 inches apart rather than the normal 12 inches. Seriously, and they're made in Hood River, Oregon:
http://www.tallmanladders.com/astronomer.html

"Dress for Stargazing Success"
Tony Flanders' article "Dress for Stargazing Success" in the December 2013 issue of Sky & Telescope magazine does a thorough job covering this important topic. Read Tony's excellent article and take his advice. My philosophy is that it's always better to have too many warm clothes than too few. I like to joke that I'm prepared to ice fish at the North Pole, but really, that's not far from the truth.

I should also note that as we age, we feel the cold more as we lose muscle mass, so what seemed like too many warm clothes in the past may be barely enough at some point. Add an extra set of thermals to your observing clothes bag so you're not caught short on some future beautifully clear but frightfully cold night.

Snacks and Drinks
Snacks and a refreshing drink help keep you functioning at a high level throughout an observing session. Staying away from high sugar snacks and drinks will help you avoid the roller coaster of sugar rushes and crashes, but of course this is an entirely personal preference. I've come to enjoy hot soup in a thermos, although you'll never see me turn down a cookie! Staying hydrated is also important, so water is highly recommended too. Coffee, tea, juice and soda are good for more than just hydration, but it's hard to beat plain water.

Breathing
And finally, breathing. It's surprisingly common to unconsciously hold your breath while concentrating on an observation, but doing so lowers the oxygen content in your blood stream and can diminish the sensitivity of your vision. http://www.ehow.com/info_8320423_negative-effects-holding-breath.html

Take a few deep, relaxing breaths before and during an observation to keep your blood oxygen level up. Also be careful to not make yourself dizzy by hyperventilating - slow and easy breaths are the way to go.

Also, purposely exhaling away from the eyepiece will help insure that you don't fog up the field lens of your eyepiece by inadvertently breathing on it. Breathing out the side of your mouth, down and away from the eyepiece, is easy to do and can sometimes greatly prolong the time you can observe without having to de-fog your eyepiece. Of course, the warmer you can keep your eyepieces while not looking through them the longer they'll stay clear, but that's a topic for another day.

The third and final part of this article will go through an example of how to integrate all the information and skills presented in the first two parts. I'll use an imaginary observing session to pull everything together to show how you can see deep.

AGORA: Seeing the Invisible Elephant

You know the familiar fable about the blind men trying to discern the nature of an elephant simply from feeling the animal with their hands: one at the side of the elephant thought it was like a wall, one at the trunk thought it was like a snake, and one at the tail thought it was like a rope. Each accurately perceived the elephant in part, but their tactile observations were inconsistent with one another.

Astronomers are much in the same position in trying to discern the nature of the Universe. Most of the gravitating mass in the cosmos is cold dark matter—a slowly moving, weakly interacting elementary particle that holds together both individual galaxies such as our own Milky Way as well as entire clusters of hundreds of galaxies. But humans are blind to it: dark matter does not emit light or other electromagnetic radiation.

Thus, astrophysicists must rely on two tools to discern dark matter's nature: 1) observations of visible ordinary matter (which scientists call baryonic matter) that reveal dark matter's effects, and 2) supercomputer simulations to "reverse engineer" and test ideas of how dark matter might interact with ordinary matter to form galaxies.

Just one big problem: like the blind men studying only parts of the elephant but whose observational results are not consistent for the entire animal, astrophysicists have been able to model only parts of the universe because of limits to computational power. And the computer models have been inconsistent. Yet reproducibility is a fundamental principle of the scientific method: only if a result from an experiment can be independently reproduced by other scientists can it be regarded as robust.

Now, a new ambitious multiyear international project AGORA is figuring out how to reveal the entire elephant—and also discern which of the inconsistencies are due to complexities of astrophysics versus computational issues.

The challenge of scales

One major challenge, for example, has been numerically modeling astrophysical processes over the vast range of size scales in the Universe—all the way from the formation of individual stars to the formation of galaxies to the formation of the cosmic web of large-scale structure in the cosmos. At small scales, computational models can calculate such details as shock waves from supernova explosions, turbulence, and chemical composition of gas and dust with a resolution (ability to discern details) the size of our solar system. At gigantic scales, cosmological simulations trace the evolution of the cosmic web in volumes hundreds of millions of lightyears across. At such scale, even the biggest supercomputers have been limited to handling just gravitational interactions of dark matter, if calculations are to be completed in reasonable time (months) and at affordable cost.

And in the real Universe, both size scales interact: local star formation within individual galaxies is activated or quenched by the way galaxies "breathe" in and out the gaseous intergalactic medium. Often computational simulations do not create realistic-looking galaxies with the right proportion of stars in the central bulge compared with the flat disk or the right amount of clumpiness.

Major international collaboration

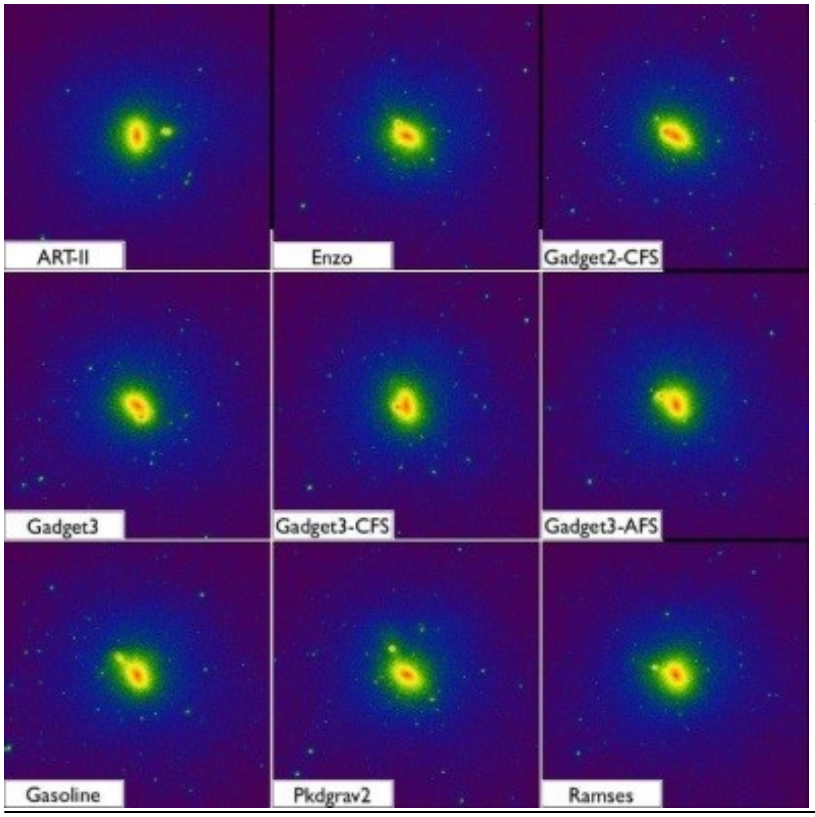
Now supercomputers are starting to have the computational power to simulate large regions of the cosmos with sufficient resolution and realism to create galaxies that look like ones actually observed. AGORA—an ancient Greek word for meeting place, and an acronym for Assembling Galaxies of Resolved Anatomy—aims to understand and resolve inconsistencies revealed among simulations.

AGORA got its start in a kick-off workshop at the University of California, Santa Cruz, in August 2012, under the sponsorship of the University of California High-Performance AstroComputing Center (UC-HiPACC). A second workshop was held at UCSC in August 2013.

AGORA, a collaboration of more than 90 astrophysicists and computational modelers in over 40 institutions in eight nations, is described in a flagship paper by Ji-hoon Kim and 45 co-authors that has been accepted for publication in *The Astrophysical Journal Supplement.* The collaborators have set up methodology to compare and contrast the results with nine variants of different codes (programs for computer simulations), which numerically handle the physics and the computation in significantly different ways. Although not the first comparison of supercomputer simulations of galaxy evolution, AGORA is the most comprehensive and the highest-resolution (finest detail). The project is expected to be completed in 2015 and result in many papers. Stay tuned! *–Trudy E. Bell, M.A.*

***Further reading*:** The AGORA website is at https://sites.google.com/site/santacruzcomparisonproject/. A UC-HiPACC press release is at http://hipacc.ucsc.edu/PressRelease/AGORA.html. A UC Santa Cruz press release at http://news.ucsc.edu/2013/12/agora-project.html. The flagship paper preprint "The *AGORA* High-Resolution Galaxy Simulations Comparison Project," for *Astrophysical Journal Supplement,* is at http://arxiv.org/abs/1308.2669/.

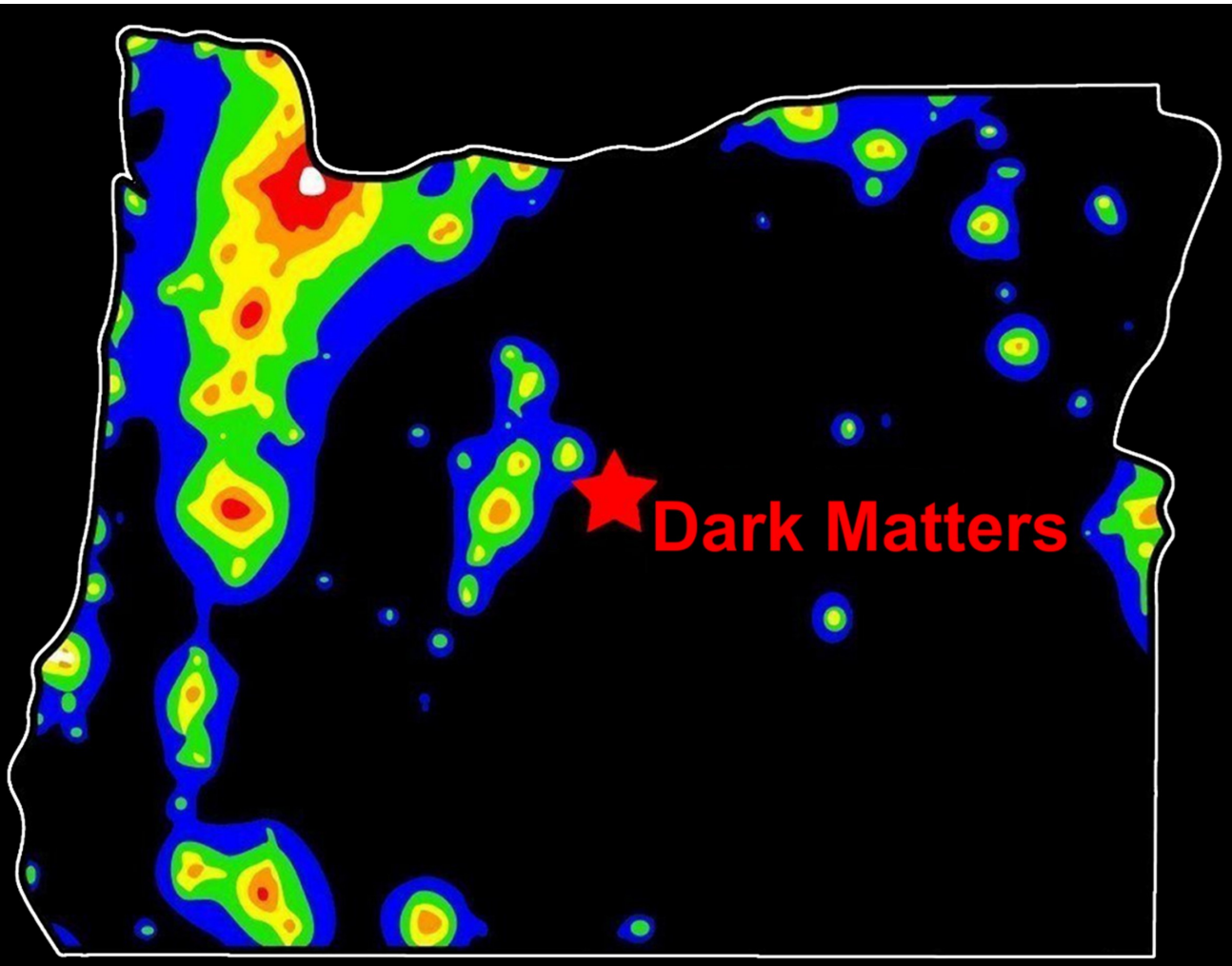
The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three affiliated Department of Energy laboratories (Lawrence Berkeley Lab, Lawrence Livermore Lab, and Los Alamos National Lab). UC-HiPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at http://hipacc.ucsc.edu



Differences in supercomputer simulations to be compared in the AGORA project are clearly evident in this test galaxy produced by each of nine different versions of participating codes using the same astrophysics and starting with the same initial conditions. The goal of AGORA is to analyze such differences to improve the realism and predictive power of supercomputer simulations, and thus astronomers' understanding of astrophysical processes.

Credit: Simulations performed by Samuel Leitner (ART-II), Jihoon Kim (ENZO), Oliver Hahn (GADGET-2-CFS), Keita Todoroki (GADGET-3), Alexander Hobbs (GADGET-3-CFS and GADGET-3-AFS), Sijing Shen (GASOLINE), Michael Kuhlen (PKDGRAV-2), and Romain Teyssier (RAMSES)

On April 5, RCA members Kathy Kornei (above), Matt Vartanian and David Nemo volunteered at the 2014 Oregon Science Olympiad held at George Fox University. Kathy administered a test on the Solar System that she created for 21 Middle School teams. Matt was responsible for the High School Astronomy test for 14 teams. Teams participated in a variety of tests during the day with the overall winning teams in the different school divisions qualifying for the National Science Olympiad to be held in Florida next month.



Oregon Star Party

Indian Trail Spring + Ochoco National Forest
August 19 - 24, 2014

OMSI
Everyday Encounters with Science

ROSE CITY ASTRONOMERS

Registration Begins May 1, 2014

For More Information go to

www.OregonStarParty.org

April 2014

Apr 04	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
Apr 05	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Apr 07	Monday	Board Meeting	OMSI Classroom 1	7pm
Apr 09	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Apr 12	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Apr 14	Monday	OMSI Lunar Eclipse SP	Milo McIver State Park	9:30pm
Apr 19	Saturday	OMSI Planet Parade SP	Stub Stewart and Rooster Rock State Parks	Dusk
Apr 21	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Apr 23	Wednesday	Cosmology SIG	TBD	7pm
Apr 25	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
Apr 25-27	Fri-Sun	Camp Hancock Star Party	OMSI's Camp Hancock in Eastern Oregon	
Apr 26	Saturday	Stub Stewart Star Party	Stub Stewart State Park	Dusk

May 2014

May 02	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
May 05	Monday	Board Meeting	OMSI Classroom 1	7pm
May 10	Saturday	OMSI Public Star Party	Rooster Rock and Stub Stewart State Parks	Dusk
May 14	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
May 17	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
May 17	Saturday	Haggart Public Night	Haggart Observatory	Dusk
May 19	Monday	New Members	OMSI Planetarium	6:30pm
May **19**	**Monday**	**General Meeting**	**OMSI Planetarium**	**7:30pm**
May 21	Wednesday	Cosmology SIG	**No Meeting This Month**	7pm
May 23	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
May 23-May 25	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening
May 24	Saturday	Stub Stewart Star Party	Stub Stewart State Park	Dusk

http://www.rosecityastronomers.org

Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356

The Rosette Gazette

Volume 27, Issue 05 Newsletter of the Rose City Astronomers May, 2014

Astronomy Fair and Swap Meet

The RCA General Membership meeting on May 19th will feature the Club's annual Astronomy Fair. This is an opportunity for members and the general public to learn about the many programs and activities of the RCA, as well as participate in hands-on demonstrations and instructions on common telescope usage and maintenance.

The event will be held at OMSI and is open to the general public, and especially anyone with an interest in learning more about telescopes and astronomy. Doors open at 7:00 p.m. with activities and demonstrations from 7:30 - 9:00 p.m.

The Rose City Astronomers is one of the largest amateur astronomy clubs in the country, with an active year-long calendar of observing, lectures and special interest groups.

The Astronomy Fair will also feature a Swap Meet for members to liquidate surplus equipment and acquire other stuff.

Officers, program directors and SIG leaders will be on hand to answer questions about their activities and help connect you to whatever advice or resources you might need.

Here is the schedule for the evening:
6:30 p.m. New Member Orientation (Planetarium)
7:00 p.m. Exhibitors and swap meet start set up (Auditorium)
7:30 p.m. Exhibitors and swap meet open (Auditorium)
7:30 p.m. Announcements (Auditorium)
7:45 p.m. Demonstration: Telescope Collimation (Auditorium: Main Stage)
7:45 p.m. Workshop: Intro to Astro-Imaging (Planetarium)
8:10 p.m. Workshop: Star Party Basics (Planetarium)
8:20 p.m. Demonstration: Astro-Imaging (Auditorium: Main Stage)
8:35 p.m. Workshop: SkyTools Software (Planetarium)
9:00 Meeting Adjourned

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Everyone Welcome! Monday May 19th

New Members Meeting Begins: 6:30 pm. Location: OMSI Planetarium
General Meeting 7:30 pm. Location: OMSI Auditorium

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

Last Quarter Moon	New Moon	First Quarter Moon	Full Moon
May 21	May 28	Jun 05	Jun 12

Welcome:

RCA is powered by volunteers. If you are interested in volunteering for a single event or ongoing program, contact the RCA program director. If you have some time and skills but aren't sure where we need help, contact volunteer@rosecityastronomers.org and we'll find something for you to do. To learn about public outreach events and volunteer needs, check out upcoming events on the RCA Forum.

We have begun an "Introduction to Astronomy" series of educational and instructional tutorials focused on basic astronomy, equipment and observing skills, geared towards beginners wanting to learn the fundamentals of astronomical observing and imaging. Series will be every-other month (alternating with New Member Orientation) in the OMSI Planetarium 6:30 - 7:15 p.m. preceding General Membership Meeting (third Monday of month). Instructors will be RCA member-volunteers. Format will be interactive presentation and lots of time devoted to Q & A. The next tutorial "Introduction to Astro-Imaging" will be on June 16 @ 6:30 presented by Duncan Kitchin. Future topics will be based on feedback from New Member Orientation meetings and keeping our ears open to what new members and other beginners are asking about.

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, Jun 11th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Started for 2014, more to come.
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, Jun 6th, Noon
Location: McMenamin's on Broadway,
1504 NE Broadway, PDX
SIG Leader: Margaret Campbell-McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members/Introduction to Astronomy

When: Monday, May 19th, 6:30pm
Location: OMSI Planetarium
Topic: TBD

SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org

Telescope Workshop

When: Saturday, Jun 14th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: Wednesday, May 21st
7:00pm
Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leader: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

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ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org

RCA 2014 Star Party Calendar

These are the currently scheduled star parties for the Rose City Astronomers club for 2014. As always, these are weather dependent. Star parties may be rescheduled or cancelled due to various factors. Re-schedules may be found here in the newsletter if enough advance notice is given. All updates will be posted to the online calendar and on the forum. Last minute cancellations are handled through the forum and it's email system. Directions for star party locations can be found online as well.

January

~~Jan 3 (Fri) Rooster Rock SP~~
~~Jan 4 (Sat) Haggart Public Night~~
~~Jan 24 (Fri) Rooster Rock SP~~
~~Jan 25 (Sat) Stub Stewart SP~~

February

~~Feb 1 (Sat) Haggart Public Night~~
~~Feb 28/Mar1 (Fri-Sat) Maupin SP~~
~~Feb 28 (Fri) Rooster Rock SP~~

March

~~Mar 1 (Sat) Stub Stewart SP~~
~~Mar 8 (Sat) Haggart Public Night~~
~~Mar 22 (Sat) OMSI Vernal Equinox~~ SP
~~Mar 28/29 (Fri-Sat) Maupin SP~~
~~Mar 28 (Fri) Rooster Rock SP~~
~~Mar 29 (Sat) Stub Stewart SP~~

April

~~Apr 5 (Sat) Haggart Public Night~~
~~Apr 14 (Sat) OMSI Lunar Eclipse~~ SP
~~Apr 19 (Sat) OMSI Planet Parade~~ SP
~~Apr 25/26 (Fri-Sat) Camp Hancock~~
~~Apr 25 (Fri) Rooster Rock SP~~
~~Apr 26 (Sat) Stub Stewart SP~~

May

~~May 10 (Sat) OMSI Astronomy Day~~ SP
~~May 17 (Sat) Haggart Public Night~~
May 23/24 (Fri-Sat) Maupin SP
May 23 (Fri) Rooster Rock SP
May 24 (Sat) Stub Stewart SP

June

Jun 14 (Sat) Haggart Public Night
Jun 21 (Sat) OMSI Summer Solstice SP
Jun 27/28 (Fri-Sat) Maupin SP
Jun 27 (Fri) Rooster Rock SP
Jun 28 (Sat) Stub Stewart SP

July

Jul 12 (Sat) OMSI Lunar Viewing SP
Jul 18 (Fri) Haggart Public Night
Jul 19 (Sat) Stub Stewart SP /
RCA Summer Picnic
Jul 25/26 (Fri-Sat) Trout Lake SP

August

Aug 12 (Sat) OMSI Perseid Meteor SP
Aug 16 (Sat) Haggart Public Night
Aug 19-24 Oregon Star Party
Aug 29/30 (Fri/Sat) Mt. St. Helens SP

September

Sep 13 (Sat) Haggart Public Night
Sep 19/20 (Fri-Sat) Camp Hancock
Sep 20 (Sat) OMSI Autumnal Equinox SP
Sep 25-27 (Thu-Sat) Indian Trail Spring SP
Sep 26 (Fri) Rooster Rock SP
Sep 27 (Sat) Stub Stewart SP

October

Oct 08 (Sat) OMSI Total Lunar Eclipse SP
Oct 18 (Sat) Haggart Public Night
Oct 23 (Sat) OMSI Partial Solar Eclipse
Oct 24/25 (Fri-Sat) Maupin SP
Oct 24 (Fri) Rooster Rock SP
Oct 25 (Sat) Stub Stewart SP

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

Pocket Binoculars

Versatility is a key feature of these little optical favorites.

By John W. Siple

Never before in the history of astronomy has there been such a fantastic selection of classic binoculars. Authentic models that were once mass-produced now occupy the shelves and display cases of secondhand establishments. All sizes and types are represented but the most common have single front lens openings of less than two inches. Pocket binoculars are defined as those with the smallest diameters, cumulatively restricted to between 15mm and 30mm in objective size.* Designed to fit into the palm of your hand, these little units are suitable for a wide range of outdoor leisure activities.

As perfect traveling companions, they offer quick and simple peeks of the overhead universe. Bird watchers love them for their lightweight handling, while seafarers on occasion use them for celestial navigation. Mountaineering, nature expeditions and watching sports events are a few other specialized uses. A variety of field, theater and sports glasses fall under this designation.

A huge percentage of the vast stocks available in today's marketplace were manufactured in Japan. Company marks abound on this popular optical product, and may include works by such acknowledged business masters as Fujinon, Canon, Kowa, Nippon Kogaku, Miyauchi, Pentax, Vixen, Olympus, and Takahashi. Numerous solo industries scattered throughout Japan have also tried their hand at binocular assembly, though their merchandise is somewhat less common in overseas shops.

*This is a broad definition. Overlap between the different classes of binoculars is common. Normal hand-held models usually begin with a 30mm size, equal to the pocket glass upper range limit.

Top: A compact pair of boxed 3 X 28 artisan binoculars by Traq makes the perfect gift. Above: Czechoslovakia is the source of these relatively rare 4 X 20mm Meopta glasses. Left: Tasco's "Voyager" roof-prism model is a quality go-anywhere pocket binocular.

Germany has an especially long tradition of exporting super-quality binoculars. Carl Zeiss-Jena has been a reliable source of fine custom optics since 1846. Others, like Steiner, Hensoldt, and Leitz have also churned out many different models and types of equipment. However, because of the trend toward higher prices, these well-made units are often commercially exclusive.

Familiar American brands such as Swift, Tasco, and Bushnell have extensive catalog placements, where entire pages are sometimes devoted to this single item. In the 1970 Tasco catalog, for instance, pocket glasses take center stage in the 40-page release. Priced between $2.95 and $39.95, potential customers could choose from a varied selection that had such cute model names as "Chic," "Act One," and "Mascot."

Sears offered comparable merchandise in its storewide catalogs. "Airguide" sport and utility binoculars are favored in these technical recollections. Their caravan of affordable domestic and imported binocular products promised "added thrills" and "downright low prices." Each of their basic models has a soft leather carrying case and matching neck strap.

Besides the distributors' name, every binocular sold is stamped with a unique set of numeric data. Obvious to any owner is the magnifying power and aperture. Expressed as 10 X 25 or similar, these two crucial numbers signify how close an object will appear and the relative brightness to expect. Almost always present is the linear value for the field of view. This number combination indicates in feet width the "angle spread" at 1,000 yards. For example, a pocket glass marked with "393FT/1000YDS" implies that

the field of vision at 1,000 yards is 393 feet. This range measurement may also have a degree value, such as 7.1°.

Serial numbers and international trademarks are automatically placed on the body of the binocular. The firm's identifying symbol is very distinctive and can take many elaborate forms. Company artists showed their talent by drawing loops, curls, and other figurative characters in miniature. Binocular insignia normally includes a dignified model name. Depending on the intended use,

sales catalogs show a bevy of frivolous titles. Bushnell once had its representative "Ensign" and "Broadfield" models, while the more uncommon vintage Leitz 8 X 20's are called "Trinovids."

There are only two prism styles in binocular construction. Internally, the reflecting element may be either of Porro or roof-prism design. The latter technical strategy has a straight-line optical system and must be perfectly aligned for top performance. Binoculars that use Porro prisms are squatter in appearance. Those with fully coated BaK-4 (barium crown) optical glass prisms are the best, while cheaper off-the-shelf models are supplied with lesser grade BK-7 (borosilicate) sets.

Focusing may also be done in two clearly separate ways. Center focusing (C.F.), which is accomplished by turning a small wheel or dial between the eyepieces, is the most convenient. Individual focusing (I.F.) is more elaborate and requires hand adjustment of each divided ocular. Bushnell's patented "Insta-Focus" mechanism is an ingenious off-shoot of center focusing. It works by pressing down on either side of a large rocker arm; images snap into focus quickly and conveniently.

Non-stop shopping opportunities exist for individuals wishing to acquire a pre-owned set of binoculars. A regional walk-through of thrift stores and other money conscious establishments has revealed a solid price range for older pocket glasses. Customers can expect to pay anywhere between $5 and $30 for a used pair, irrespective of the point of manufacture. This monetary bracket includes some stunning models by select Japanese makers. One of the author's favorite finds is the $14 white pair of Tasco "Binocolors" (shown below) that was made more recently in Hong Kong.

Secondhand stores have an obvious oversupply of Tasco and Bushnell models. Unfortunately rare and very desirable glasses by Zeiss and other German makers were almost never seen; scouting upscale antique shops and online auctions are probably the best sources for finding these little beauties.

Estate sales are another matter entirely. Expect anything in the way of binoculars at these widely attended events. A serendipitous stop at a professionally held sale garnered a nice pair of Meopta pocket binoculars for $10. Another visit resulted in the acquisition of an older pair of leather bound Turtle theater glasses. Comparable items are seen fairly regularly, and cash in at a surprisingly low $15. Undoubtedly the best bargain was a like new in the box Traq "Compact-28" sport glass. It was snapped up by the author for a paltry $4.

Guidebooks on the general principles and use of binoculars are available in a variety of formats. In the particular field of astronomy, articles written by Phil Harrington are widely accepted as some of the best. Advanced techniques for lunar observation are found in the tome *Exploring the Moon Through Binoculars* by Ernest H. Cherrington, Jr. One compelling book that also includes detailed telescope tours was written by noted astronomical columnist Alan M. MacRobert. In his wonderful guide *Star-Hopping for Backyard Astronomers*, he has excellently organized chapters on binocular basics and highlights a number of appropriate deep-sky objects for each aperture class.

Drawing praise from all collectors is Dr. Henry Paul's *Binoculars and All-Purpose Telescopes*. The author was a well-known telescope builder and binocular specialist during the 1960s and '70s. The 1980 soft cover edition, revised by Greg Stone, contains 96 pages of images plus many important charts and diagrams.

Clockwise from top right: A vintage "Turtle" theater glass by Shinko Seisakusho. Bushnell's metal 6 X 25mm "Broadfield" binoculars are of especially solid construction. The durable Tasco 21mm model with its "triangle K" manufacturers' stamp has especially good optics and balance. The 7 X 25mm "Ensign" field glasses by Bushnell are also of great design, and carry the same proud trademark. All of the binocular photographs shown throughout this article are from the author.

Pocket binoculars are cheap and ubiquitous. Quite a few households have one or two pairs tucked away, ready for the next sporting or theatrical event. Popularity also runs high in nature study. The number of astronomical uses covers a broad swath too — nightly activities range from deep-space exploration, based on limited light grasp, to the local solar system, which involves zooming to the Moon and beyond. With a fine selection, new and old glasses have played a major role in furthering the enjoyment of stereoscopic viewing. Combining the virtues of low cost and versatility, these little optical gems are great to own.

M97 — The Owl Nebula

The Bowl of the Big Dipper displays a single deep-sky planetary of unusual character.

By John W. Siple

Ursa Major, the constellation of the Great Bear, is flush with distant galaxies. To stage a deep-sky exploration one might consider beginning at the Bowl of the Big Dipper, an easily identified naked-eye asterism of seven stars. This wide group contains a number of freewheeling galaxies plus one novel globe-shaped planetary nebula. If you're looking for a good challenge, the "Owl Nebula" is an ideal object to search out and study.

Messier's famous watch list calls the round glow M97. Good fortune places it close to the 2nd-magnitude star Merak (β Ursae Majoris) at the southwestern corner of the Big Dipper's Bowl. This is one of the constellation's familiar Pointers, which direct skywatchers to the north celestial pole and Polaris. A slight shift 2½° southeast from Merak centers the planetary nebula in a low power ocular. The expanding shell of gas shines at magnitude 9.9 and has a diameter of 194", or just over four times the apparent size of Jupiter at favorable opposition.

M97 is backed by considerable history. Shortly after its discovery on February 16, 1781, Pierre Méchain reported his find to astronomical colleague Charles Messier. After confirming its location, the newfound object was honored as the 97th entry in his premium deep-sky catalog. It was later resurrected in Lord Rosse's fantastical drawing from 1848, which gave rise to the now familiar moniker. Less whimsical and more exact interpretations were made by 19th- and 20th-century astronomers, who after review saw a plain structure of gaseous construction.

A silvery-gray surface with eminently pronounced "eyes," a halo of attractive field stars and a round fuzzy outline greets the potential observer. Applauding the visual process is the soft luminescence of M108, a cigar-shaped spiral galaxy that lies just 48' to the northwest. These two neighboring objects not only have conflicting shapes, but are also at radically different distances.

A symbolic approach to recording the Owl's appearance is found in many published sketches. For example, in the 1978 hardcover edition of *The Messier Album* author John H. Mallas presents a slightly exaggerated but entirely plausible telescopic analysis. Although drawn using only a 4-inch model Unitron, it closely parallels the view through much larger professional instruments. Modern day astronomical expert Stephen James O'Meara essentially mimics Mallas' observation in *The Messier Objects*, this time using a Tele Vue Genesis refractor from the clear skies of Hawaii for the accurate artwork. Each painting has properly placed adjacent oval patches and a gradual brightening at the nebula's center, demonstrating skill in telescope use. Other renditions show slightly more internal detail, but still look much like the photograph below by the NOAO team sans color.

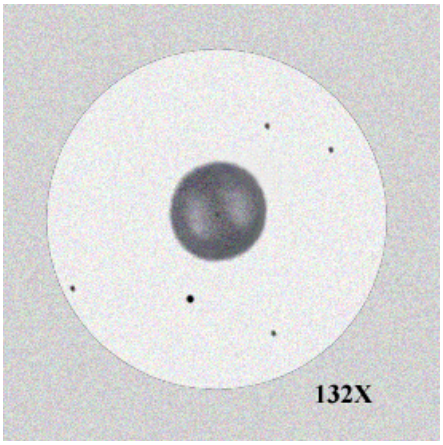
The anticipated dark cavities can be somewhat of a disappointment in small telescopes. Limited light grasp combined with lack of deep-sky know-how has caused many individuals to miss the opportunity to see the eye-like features. In such cases only a grayish bland disk has been reported. Discerning vague detail in low surface brightness planetary nebulae can be difficult at times, even for experienced observers.

After examining the Owl, attention is often drawn to several nearby field stars. A 12th-magnitude star that sits 2.5' to the north-northeast is especially obvious. A few other anonymous stars surround the ball-shaped nebula, including one that is united with the blurry glow of an extremely remote 17th-magnitude galaxy. A skeptical footnote about a missing star inside one the dusky eyes is recorded in the writings of Rosse. As he told it, the supposed star on the northwestern side of central bridge was seen in March of 1850. Five weeks later the tiny eye dot had mysteriously vanished, even though the telescope master pursued it "about forty times" during the next quarter of a century.

Above: The famous 1848 etching of the Owl Nebula by the 3rd Earl of Rosse.
Below left: M97's colorful glow is obvious in this fine image by Gary White / Verlenne Monroe / Adam Block / NOAO / AURA / NSF.

Fueling the Owl's nebular glow is an evolutionarily advanced star of high temperature and density. The original solar powerhouse has shed its outer layers, creating a thin shell of expelled gas approximately 3 light-years in diameter. (The intense greenish color so often seen in long exposure photographs is the result of doubly ionized oxygen. Hydrogen accounts for the peripheral ring of reddish light.) A feeble output of photons and veil of nebulous material plus a 2,000 light-year distance has resulted in a difficult-to-detect 16th-magnitude object. People have been known to catch glimpses of the star in minor telescopes, but a 12-inch reflector is normally needed to get a positive sighting.

In the distant realm of planetary nebulae, M97 (NGC 3587) ranks as one of the all-time best. It is not difficult for amateurs to see — deep-sky patriarch Walter Scott Houston easily spied it through a pair of 15 X 65 binoculars. The constellation Ursa Major rides high overhead in the polar sky of spring. Experience the magic of the Owl when facing north with your telescope!



The author's own sketch of M97 as perceived through a 15-inch telescope. A First Quarter Moon was just setting when it was recorded after midnight on April 7, 2014.

The Observer's Corner *Howard Banich*

Seeing Deep
Part III

I presented a lot of information about dark adaptation, averted vision and how to get the most from them in the first two parts of this article. Not to mention observing comfort, snacking, sketching and breathing. It probably came across somewhat like describing how to juggle a chain saw, a bowling ball and an egg while standing on one leg, but fortunately seeing deep is easier to do than describe.

In this third and final part I'm pulling everything together to illustrate how using the information previously discussed might look like when actually observing, and using a series of sketches to illustrate the power of well-used averted vision. This example portrays a relatively positive example to show why these skills are so widely used.

However, it's not meant to suggest that this works equally well on every object every time. The variables of sky quality, your experience and skill along with the size and quality of your equipment will always be important, as is selecting targets that are within your range.

The example: M51

Who wants a better view of M51, the Whirlpool Galaxy? Everyone, of course, which is one reason I've selected it for this imaginary observing session. The other reason is that you have a realistic chance of seeing more in this classic object regardless of what size scope you're using by developing your observing skills.

As famous as M51 is, it isn't an easy object to see well from less than pristine skies, even with a large telescope. In this example we're imagining that you're observing from a place that would register about 20.0 to 21.0 with a Sky Quality Meter (SQM) and the faintest naked eye star might be around magnitude 5.5 to 6.0. In the Portland area, a place like Stub Stewart Park would fit the bill. Fairly dark, but the sky is still brightened somewhat by light pollution.

In heavily light polluted skies M51 will always show less detail than you'd like it to, but that's not to say that good observing techniques are wasted under any conditions. Given the same atmospheric conditions, you'll always get more satisfying views from a darker location, which is why you're willing to drive an hour or so to observe under a darker sky than your backyard offers. That doesn't mean observing from home isn't worthwhile, only that you have set your expectations accordingly.

Putting it all together

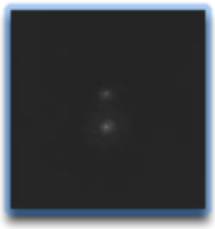
Let's say you've practiced using averted vision techniques the last few times you've observed and feel like you're starting to get the hang of how to use and preserve it. Let's also say that you're out on a decent, but not great night with a few of your observing buddies, your 12 inch scope is set up, complete with either a Dethloff Eyepiece

Shade (DES), observing hood or dark towel. You have plenty of warm clothes, snacks, something to drink, a notebook and an adjustable observing chair. And yes, you didn't forget your eyepieces like last time – you'll never do that again!

You just measured how dark the sky is with your SQM and got a series of readings that average out to 20.75 - about average for this spot.

You're ready to observe.

You've been chatting with your buddies while setting up, and looking at a bright object like M5 and its Type II Cepheid's while your eyes become dark adapted. But now it's time to track down the number one object on your observing list tonight – M51, the iconic interacting galaxy pair in Canes Venatici. Finding M51 is fairly easy because of its location near the end of the Big Dipper's handle, plus it shows up in your finder scope as a small fuzzy spot.



Looking through the main scope, you center the surprisingly small, soft double glow in your low power eyepiece (somewhere in the 40x to 75x range) and see the two galactic cores, NGC's 5194 and 5195. But where are the spiral arms? There's a faint, round mist around one of the two galactic cores, which must be the spiral arms of NGC 5194.

Your first thought is that this is about all you saw last year when you observed M51 for the first time. The sky is fairly transparent though, and it seems pretty dark so what the heck, you'll keep observing and use your new averted vision and other observing techniques to find out just how much of M51 you really can see. You put a medium power eyepiece (somewhere in the 100x to 150x range) in the focuser, being careful to not ruin your dark adaptation with your red flashlight, and then reach for the focuser….

Rats, the eyepiece is now too far away to sit comfortably in your observing chair while looking through the eyepiece, so you quickly move it to enjoy the view for a good long look. "No need to give myself a sore back".

Going Deep

Back at the eyepiece, and almost without thinking about it, you try averted vision and see… something more. Is that a bit of spiral arm? "Hey, this is cool!" you say softly to yourself, while continuing to look with averted vision. You also notice that holding M51 in your averted vision sweet spot takes effort because your gaze seems to wander all over the field of view.

What's this? It looks like there is more than one bit of the spiral arms visible now, plus there's a faint star within the spiral arms that you hadn't noticed at low power. The thought it be a supernova runs through your thoughts but conclude "I'll have to check that online later." Oddly, the spiral arms now look like a ring which reminds you of John Herschel's sketch from the early 1800's.

Deeper

You keep observing, breathing regularly, exhaling away from the eyepiece and decide to try a little more magnification (somewhere in the 190x to 250x range). And what the heck, you'll start a sketch to see if it really does help pull out more detail. While changing the eyepiece you again keep your observing eye closed to help preserve

its dark adaptation. After refocusing, you automatically start observing with averted vision, and once you have M51 in your sweet spot, you see the spiral arms don't look like a ring after all, but have a definite spiral shape.

But you wonder "am I seeing the spiral shape because I know it's there? Would I have thought they were a ring like the Herschel's if I hadn't seen photos showing the spiral arms?" After a moment's pause you decide there's no way to know now and begin your sketch.

You start by plotting the locations of the two galactic cores in your notebook, going back and forth between the eyepiece and your sketch several times to make sure you've got them plotted fairly well in your notebook. It's difficult to keep your observing eye closed while sketching, but you remind yourself that you're trying to preserve as much of your dark adaptation as possible. It's not easy but you keep at it. You also plot a nearby field star on your sketch.

After getting the general layout of your sketch onto paper you take a couple of relaxing, deep breaths and place M51 in your averted vision sweet spot, and in a flash that's as exciting as it was brief, you clearly see the two main spiral arms. A quick glance with direct vision makes the arms disappear, but that's ok, averted vision brings them right back. You excitedly add them to your sketch.

Deeper still...

Then you slowly move your scope back and forth, utilizing the motion detecting ability of your dark adapted eyes, and see that the slowly moving view makes it slightly easier to see the spiral arms. You also notice that the arm extending toward NGC 5195, the smaller galaxy, seems to almost connect the two – the famous "bridge". But you decide after careful examination that you're not seeing the entire bridge, there's a portion that's a bit too faint to see. Plus, you've noticed that NGC 5195 has an elongated shape. "Hmm, looks like it points right at the core of the Whirlpool…" You've also noticed that the spiral arm that wraps between the cores of NGC 5194 and 5195 isn't a smooth curve but bends at an nearly 90 degree angle. You add all this to your sketch, careful to protect your dark adaptation, and then note that a few more faint stars have become visible. You also notice that you need to adjust the proportions of the spiral arms to get them looking more like what you're seeing in the eyepiece.

Then you notice that you need to adjust your observing chair again and wonder "how long have I been observing to have to move my chair again?" While moving your chair you decide you'd rather look in the eyepiece rather than at your watch, and to also try more magnification to see if more power reveals additional details. But you quickly decide the more satisfying view is back at the previous magnification even though it was easier see the faint stars in and around M51 at the higher power.

After observing for what turns out to be another 15 minutes you notice that you're not seeing as much as you had previously, and your eyes feel a little tired. "This must be what happens when the Visual Purple in my observing eye starts to bleach out" so you write a few notes to go with your sketch.

At this point the thought of using an eye patch seems a lot more attractive and you add a final line in your notes to look into getting one before your next observing session. "Got to be easier than keeping one eye closed…"

Finished with your notes, you decide it's time to celebrate your great observation with a snack and something to drink. Realizing you're getting cold, you head for your car to get the extra layers of clothes and some hand warmers you brought along.

Deep as you can go - for tonight.

After zipping up your heavy coat and putting a handwarmer inside each glove, you take a last look at M51 before moving on to your next object – and stop the presses, the connecting arm does seem to reach all the way to NGC 5195 now! Yes!

Ah, but you can't duplicate that instant impression of the seeing the entire bridge, even though it looked like it was there for a moment. Intrigued, you keep looking, hoping another moment of clarity will bring the complete bridge into view again, but no luck, at least not tonight. You wonder if your impression was an optical illusion, or if for just a moment you really did perceive the entire length of the bridge. There's no way to know and decide you won't count your one impression as a definite observation. But you're pretty sure that in a darker sky you'd be able to see the entire bridge.

Even so you just have to share this great view of M51 and you holler to your buddies "you guys just have to see M51 over here in my scope!"

At least one guy can't tear himself away from whatever he's looking at, one won't see as much as you have because he'll look for only a minute or two through your scope, and the third will see everything you did and maybe a bit more - but then she's been an observer for 30 years and always sees more than anyone else.

At least one of them will then head back to their own scope to find out how much of M51 they can see with their own equipment. Whether they end up seeing as much as you have depends on all the same variables you've just dealt with, but regardless of what they see you're satisfied not only with the awesome view you've just enjoyed but also with your increasingly powerful observing skills. Feeling energized, you move on to your next object and end up having a fabulous night of observing.

The next day at home you look at your sketch and clean up the stray lines, erase a few smudges and tighten up the squiggles that were supposed to be stars. After scanning your final sketch you invert it using GIMP

or Photoshop so it looks more like what you saw last night through your scope. "Not bad!" you think, "maybe I'll post it on Cloudy Nights later…"

But before going online, you look up your M51 observations from last year and can barely believe how little you saw using the same scope from the same place. "How about that" you mutter to yourself, "So that's what Herschel meant by ' ***You must not expect to see at sight."***

The Mass of Life

By: G. E. Austin, RCA Student Member

The Higgs Boson, first theorized in 1964, is the evasive particle of the century and a fundamental component to our existence. Though Peter Higgs, Francois Englert and others predicted its existence in 1964, scientists did not receive their first glimpse of this long-sought particle until 2012. Scientists world-wide worked together to operate the 17 mile long Large Hadron (particle) Collider (LHC) at CERN, the world's largest particle physics laboratory, that staged this fateful glimpse. On July 4, 2012, scientists observed unknown particles in the collider believed to be the Higgs Boson. When the particles were confirmed to be the Higgs Boson in March 2013, the world burst into applause.

One reason the Higgs Boson eluded scientists for so many decades is that it decays in a matter of milliseconds before scientists are able to identify it. Often, it decays into quarks (fundamental particles that make up all basic particles such as protons, neutrons, and electrons). Quarks are commonly found in the LHC so when a Higgs Boson decays into quarks, the particles are lost in a sea of identical quarks. It's like trying to distinguish one candle from another on the birthday cake of the Methu selah bristle cone pine tree (almost 4800 years old!). It's impossible to tell one candle from another.

Thankfully, the boson decays into other particles as well. One in one thousand times, the Higgs decays into two photons. Photons are different from quarks in that they have differing energy levels from each other. In the LHC, the photons emitted have different energy levels from other sources of the same kind. The Higgs' photons protruded off this curve thus making it possible for scientists to identify these photons as the products of the Higgs Boson decay.

Much like a photon is a carrier of light for the electromagnetic field, the Higgs Boson carries the Higgs Field to other particles. The Higgs Field works to exaggerate the mass of particles, allowing them to slow enough to combine with other particles and form more complicated structures such as atoms, molecules, cells, stars and even human beings. The field acts as the glue of the cosmos. Let's say we have an endless number of little pieces of paper sliding on a sheet of cardboard in a kindergarten art class. There is nothing to stop the pieces from sliding around. Only when the teacher adds glue do the pieces of paper stay in a fixed spot creating an image of a star or a human being. The same applies to the universe. Without the Higgs Field, the universe would be a jumbled mess of particles, endlessly floating without the ability to assemble and create actual stars and human beings.

While we know more about the Higgs Boson, Higgs Field, our universe and even ourselves with this discovery, unanswered questions remain. Each breakthrough leads to more questions and the pursuit for knowledge continues.

[Editor's Note: This essay was recently entered in competition for the 2014 Astronomical League Horkheimer/O'Meara Youth Journalism Award.]

May 2014

May 02	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
May 05	Monday	Board Meeting	OMSI Classroom 1	7pm
May 10	Saturday	OMSI Public Star Party	Rooster Rock and Stub Stewart State Parks	Dusk
May 14	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
May 17	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
May 17	Saturday	Haggart Public Night	Haggart Observatory	Dusk
May 19	Monday	New Members SIG	OMSI Planetarium	6:30pm
May **19**	**Monday**	**General Meeting**	**OMSI Planetarium**	**7:30pm**
May 21	Wednesday	Cosmology SIG	**Firlands Community Room**	7pm
May 23	Friday	Rooster Rock Star Party	Rooster Rock State Park	Dusk
May 23-May 25	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening
May 24	Saturday	Stub Stewart Star Party	Stub Stewart State Park	Dusk

June 2014

Jun 02	Monday	Board Meeting	OMSI Classroom 1	7pm
Jun 06	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
Jun 11	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
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http://www.rosecityastronomers.org

Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356

The Rosette Gazette

Volume 27, Issue 06 Newsletter of the Rose City Astronomers June, 2014

A Visual Comet Hunting Program

Don Machholz

Donald Edward Machholz is the most successful living visual comet hunter in the United States, being credited with the discovery of 11 comets, including the periodic comets 96P/Machholz, 141P/Machholz, the non-periodic C/2004 Q2 (Machholz) that was easily visible in binoculars in the northern sky in 2004 and 2005, and most recently, C/2010 F4 (Machholz). Machholz is also considered to be one of the inventors of the Messier marathon, which is a race to observe all the Messier objects in a single night.

It was 33 years ago that he decided to pursue a systematic search for comets. This decision came at a pivotal time in his life. He had just finished serving three years in the military, had moved back home, and he wanted a project that would encourage him to spend more time viewing the heavens. Over the previous decade he spent considerable time viewing all the planets and a half-dozen comets, found every Messier Object in one year (1969-70), and photographed the skies. He has always enjoyed the view of the night sky through the telescope.

The projects that he considered were: variable stars, asteroid studies, and comet hunting. Comet hunting seemed most appealing to him. He also knew that very few Americans were searching for comets, because most visual discoveries were being made from foreign lands.

According to James Muirden ("The Amateur Astronomer's Handbook"), the average comet hunter took 300 hours to find a new comet. This was confirmed to him when he read an interview with William Bradfield appearing in the magazine Eclipse. There he said his first discovery took 260 hours and his second took an additional 306 hours. Don's early philosophy developed: he would attempt systematic comet hunting for as long as he found it enjoyable. If he did not find it enjoyable, he could quit my comet hunting program and move on to something else, his only "loss" being the time spent looking through the telescope. And if he enjoyed it, he'd continue his comet hunting program. Finally, he wanted his comet hunting program, as extensive as it might become, to be only a part of his life, not to consume it. He did not want to exclude other activities or people from his life just because he wanted to hunt comets.

Everyone Welcome! Monday June 16th

Intro to Astronomy Begins: 6:30 pm. Location: OMSI Planetarium
General Meeting 7:30 pm. Location: OMSI Auditorium

In This Issue:

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http://www.astroleague.org

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

First Quarter Moon	Full Moon	Last Quarter Moon	New Moon
Jun 05	Jun 12	Jun 19	Jun 27

Outreach star party held at Washington State University Vancouver on 03/11/14. Photo: Mark Seibold

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, June 11th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Scheduled for August 2014
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, June 6th, Noon
Location: Kell's
112 SW 2nd Ave, PDX
SIG Leader: Margaret Campbell-McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members/Introduction to Astronomy

When: Monday, June 16th, 6:30pm
Location: OMSI Planetarium
Topic: TBD

SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org

Telescope Workshop

When: Saturday, June 14th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: Wednesday, June 18th,
7:00pm
Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leader: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

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We are going to be starting an "Introduction to Astronomy" series of educational and instructional tutorials focused on basic astronomy, equipment and observing skills, geared towards beginners wanting to learn the fundamentals of astronomical observing and imaging. Series will be every-other month (alternating with New Member Orientation) in the OMSI Planetarium 6:30 - 7:15 p.m. preceding General Membership Meeting (third Monday of month). Instructors will be RCA member-volunteers. Format will be interactive presentation and lots of time devoted to Q & A. The first tutorial "Introduction to Astro-Imaging" will be on Feb. 17 @ 6:30 presented by Duncan Kitchin. Future topics will be based on feedback from New Member Orientation meetings and keeping our ears open to what new members and other beginners are asking about. Please let David Nemo or Howard Knytych (above) of interest in any topic.

RCA 2014 Star Party Calendar

These are the currently scheduled star parties for the Rose City Astronomers club for 2014. As always, these are weather dependent. Star parties may be rescheduled or cancelled due to various factors. Reschedules may be found here in the newsletter if enough advance notice is given. All updates will be posted to the online calendar and on the forum. Last minute cancellations are handled through the forum and it's email system. Directions for star party locations can be found online as well.

January

~~Jan 3 (Fri) Rooster Rock SP~~
~~Jan 4 (Sat) Haggart Public Night~~
~~Jan 24 (Fri) Rooster Rock SP~~
~~Jan 25 (Sat) Stub Stewart SP~~

February

~~Feb 1 (Sat) Haggart Public Night~~
~~Feb 28/Mar1 (Fri-Sat) Maupin SP~~
~~Feb 28 (Fri) Rooster Rock SP~~

March

~~Mar 1 (Sat) Stub Stewart SP~~
~~Mar 8 (Sat) Haggart Public Night~~
~~Mar 22 (Sat) OMSI Vernal Equinox SP~~
~~Mar 28/29 (Fri-Sat) Maupin SP~~
~~Mar 28 (Fri) Rooster Rock SP~~
~~Mar 29 (Sat) Stub Stewart SP~~

April

~~Apr 5 (Sat) Haggart Public Night~~
~~Apr 14 (Mon) OMSI Lunar Eclipse SP~~
~~Apr 19 (Sat) OMSI Planet Parade SP~~
~~Apr 25/26 (Fri-Sat) Camp Hancock~~
~~Apr 25 (Fri) Rooster Rock SP~~
~~Apr 26 (Sat) Stub Stewart SP~~

May

~~May 10 (Sat) OMSI Astronomy Day SP~~
~~May 17 (Sat) Haggart Public Night~~
~~May 23/24 (Fri-Sat) Maupin SP~~
~~May 23 (Fri) Rooster Rock SP~~
~~May 24 (Sat) Stub Stewart SP~~

June

~~Jun 14 (Sat) Haggart Public Night~~
Jun 21 (Sat) OMSI Summer Solstice SP
Jun 27/28 (Fri-Sat) Maupin SP
Jun 27 (Fri) Rooster Rock SP
Jun 28 (Sat) Stub Stewart SP

July

Jul 12 (Sat) OMSI Lunar Viewing SP
Jul 18 (Fri) Haggart Public Night
Jul 19 (Sat) Stub Stewart SP /
RCA Summer Picnic
Jul 25/26 (Fri-Sat) Trout Lake SP

August

Aug 12 (Sat) OMSI Perseid Meteor SP
Aug 16 (Sat) Haggart Public Night
Aug 19-24 Oregon Star Party
Aug 29/30 (Fri/Sat) Mt. St. Helens SP

September

Sep 13 (Sat) Haggart Public Night
Sep 19/20 (Fri-Sat) Camp Hancock
Sep 20 (Sat) OMSI Autumnal Equinox SP
Sep 25-27 (Thu-Sat) Indian Trail Spring SP
Sep 26 (Fri) Rooster Rock SP
Sep 27 (Sat) Stub Stewart SP

October

Oct 08 (Sat) OMSI Total Lunar Eclipse SP
Oct 18 (Sat) Haggart Public Night
Oct 23 (Sat) OMSI Partial Solar Eclipse
Oct 24/25 (Fri-Sat) Maupin SP
Oct 24 (Fri) Rooster Rock SP
Oct 25 (Sat) Stub Stewart SP

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

June 2014

June 02	Monday	Board Meeting	OMSI Classroom 1	7pm
June 06	Friday	Downtowner's	Kell's 112 SW 2nd Ave, Portland, OR 97204	Noon
June 11	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
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June 14	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
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June 27-28	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening
June 27	Friday	RCA Member Star Party	Rooster Rock State Park	Dusk
June 28	Saturday	RCA Member Star Party	Stub Stewart State Park	Dusk

July 2014

July 07	Monday	Board Meeting	OMSI Classroom 1	7pm
July 09	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
July 11	Friday	Downtowner's	Kell's 112 SW 2nd Ave, Portland, OR 97204	Noon
July 12	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
July 12	Saturday	OMSI Public Star Parties	Stub Stewart and Rooster Rock State Parks	Dusk
July 18	Friday	Haggart Public Night	Haggart Observatory	Dusk
July 19	Saturday	RCA Member Star Party	Stub Stewart State Park	Dusk
June 16	Monday	New Members Orientation	OMSI Planetarium	6:30pm
July 21	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
July 23	Wednesday	Cosmology SIG	Firlands Community Room	7pm
July 25-26	Fri-Sat	RCA Member Star Party	Trout Lake Flattop Sno-Park	Dusk

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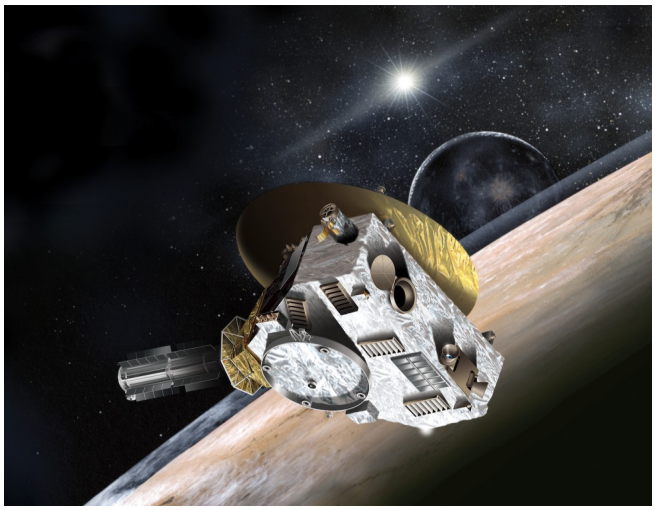
The Rosette Gazette

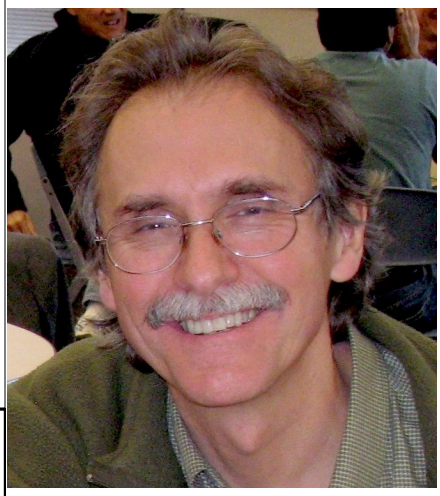
Volume 27, Issue 07 Newsletter of the Rose City Astronomers July, 2014

New Horizons: On the Threshold of the Pluto System

John Spencer

On July 14th 2015, NASA's New Horizons spacecraft will make the first-ever encounter with Pluto, its giant moon Charon, and retinue of four smaller satellites. The Pluto system is unlike any place previously explored, and promises a harvest of spectacular discoveries. I will discuss the many remarkable things that we already know about the Pluto system, the long journey of New Horizons from conception to the launchpad and to Pluto and beyond, and how we will use the spacecraft to revolutionize our understanding of Pluto and its surroundings.





John Spencer is an Institute Scientist at the Southwest Research Institute in Boulder, Colorado, and a member of the New Horizons science team. A native of England, he obtained his PhD in Planetary Sciences from the University of Arizona in 1987, and has since worked at the University of Hawaii and at Lowell Observatory in Flagstaff, Arizona (where Pluto was discovered) before joining Southwest Research Institute in 2004. He studies the moons and other small bodies of the outer solar system using ground-based telescopes, the Hubble Space Telescope, and close-up spacecraft observations. He was a science team member on the Galileo Jupiter orbiter and continues to work on the science team of the Cassini Saturn orbiter. Among other work, he was involved in the discovery of current activity on Saturn's moon Enceladus, solving the mystery of the black-and-white appearance of Saturn's moon Iapetus, and the discovery of oxygen on the surfaces of Jupiter's icy moons.

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Everyone Welcome! Monday July 21st

New Members Orientation Begins: 6:30 pm. Location: OMSI Planetarium
General Meeting 7:30 pm. Location: OMSI Auditorium

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

Last Quarter Moon	New Moon	First Quarter Moon	Full Moon
Jul 19	Jul 26	Aug 03	Aug 10

Welcome:

RCA is powered by volunteers. If you are interested in volunteering for a single event or ongoing program, contact the RCA program director. If you have some time and skills but aren't sure where we need help, contact volunteer@rosecityastronomers.org and we'll find something for you to do. To learn about public outreach events and volunteer needs, check out upcoming events on the RCA Forum.

We have begun an "Introduction to Astronomy" series of educational and instructional tutorials focused on basic astronomy, equipment and observing skills, geared towards beginners wanting to learn the fundamentals of astronomical observing and imaging. Series will be every-other month (alternating with New Member Orientation) in the OMSI Planetarium 6:30 - 7:15 p.m. preceding General Membership Meeting (third Monday of month). Instructors will be RCA member-volunteers. Format will be interactive presentation and lots of time devoted to Q & A. Future topics will be based on feedback from New Member Orientation meetings and keeping our ears open to what new members and other beginners are asking about. Please let David Nemo or Howard Knytych (email on page 3) of interest in any topic.

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When: Wednesday, Aug 13th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Started for 2014, more to come.
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, Aug 1st, Noon
Location: McMenamin's on Broadway,
1504 NE Broadway, PDX
SIG Leader: Margaret Campbell-McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members Orientation / Introduction to Astronomy (alternate months)

When: Monday, Jul 21st, 6:30pm (New Members)
Location: OMSI Planetarium
Topic: TBD
SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/new_members.htm

Telescope Workshop

When: Saturday, Aug 9th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
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Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
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WELCOME

Michael Andrews
Dustin Brace
Dale Call
Kathleen Gygi
John Hahn
Mark Jurva
Tyler Kawahara
Skip Laub
Sandford Maddox
Cheryl Mealy
Francis Meetze
Michelle Miller

to all our new members!

Joe Minato
James Prihoda
Charles Radley
Jim Reilly
Chris Schneider
Jeff Soulages
Jacob Szeto
Myles Twete
Patrick Welsh
Tammy Williams
Kay Wyatt
Kelsey Yocum

Binocular Ownership

Used models are easy to acquire.

By John W. Siple

Sorting through the accumulated items at home often yields an unexpected number of valuable treasures. Stargazers can't afford to miss the prized binoculars that once belonged to their parents and relatives. Purchased during the last 20th century for sometimes hefty prices, these legendary "binocs" are liked by collectors and experts in astronomy for their precision lenses, molded construction, and fancy eyepiece adjustments.

Public offerings of classic binoculars rule the hobby of astronomy. A quick look at rival catalogs reveals a commercial indulgence of different models. Ordinary 7 X 35s are very common and, arguably, the cheapest, best values available in secondhand equipment. Larger 7 X 50s and stronger powered versions are also standard to the canon of past advertisements.

Imported Bushnell, Bausch & Lomb, Tasco, and Sears binoculars are readily available and form the core of most collections. Following closely are fine works by SPI, Sans & Streiffe, Swift, Selsi, and Jason. Yet unusual finds do happen, and can include noteworthy examples from Zeiss, Nippon Kogaku (Nikon), Sard, and Steiner.

Bausch & Lomb Co. is the market source for this outstanding pair of 9 X 35 binoculars.

An important aspect of binocular acquisition is provenance or where the item originated. Almost all older discontinued brands say either "Japan," "Made in Japan," or infrequently "Made in Occupied Japan." Buying sprees may also earn a few German glasses, good bets when trained on the stars. Broadening the appeal of collecting are those with atypical zoom, ultra-wide angle and rubber armored features.

Unless documented as an especially valuable collectible, secondhand binoculars bring about $10 to $35 at local auctions and neighborhood estate sales; alternate garage, rummage and moving sales, attended by households with limited funds and other bargain seekers, offer merchandise at or below prevailing rates.

A bonus for collectors is the Nikon 8 X 30 binocular shown above. Its practical design and great optics are unbeatable for astronomy. A slightly more economical glass from Jason (right) was made decades later and has an additional fingertip zoom adjustment.

Browsing thrift and antique stores is also an easy way to unearth cheap, pre-owned pairs. Surprisingly, astronomical grade binoculars in 60mm sizes and up are almost never encountered when stalking these yard sales and resale shops. Of course, people that wish to hunt by personal computer have online auctions and Craigslist advertisements as resources.

With vintage binoculars, flawless condition is a luxury. Buyers are cautioned to look for obvious defects and wear. An appropriate checklist should include the following items: missing parts, inability to focus, worn enamel or lettering, faded lens coatings, dents, and mildew from long term storage in outbuildings. Misalignment in the form of distorted images is quite common and results from sudden jarring and rough use.

Mint condition glasses draw covetous attention. Handled with extreme care for generations, they are free of any noticeable signs of damage. The top-quality 9 X 35 binocular shown at far left was economically priced at $15. It has fully coated optics and a wide, evenly illuminated 7.3° field of view. Because of its low cost, ultra-sharp images and custom design, the B & L "Discoverer" remains the author's unofficial favorite and best overall find.

Top-ranking pairs by brand name companies unquestionably offer the clearest views. Satisfying any critic are those binoculars from Nikon. The vintage Nippon Kogaku 8 X 30 field glass (center photo) was purchased by its previous owner when stationed in the military overseas. It fetched a relatively steep $100 when discovered at a local consignment store. Performance evaluation on the night sky is extravagant while its sleek design makes for effortless handling.

Another guarded treasure is the circa 1972 7X-15X35mm "Statesman" zoom binocular by Jason. The desirable item (below with receipt) is decorated with multiple decals and stickers. Found hanging in an everyday junk shop, it was tagged at less than half the new cost. Similar high-end models were sold by many of Jason's competitors. Tasco's 1973 catalog, for instance, lists a comparable zoom edition for $99.95.

In the marketplace, pricing schemes involving classic merchandise are completely haphazard. The whims of the seller combined with ardent negotiation frequently dictate the final asking price. This can result in arbitrary and widely fluctuating values for the same kind of memorabilia, regardless of condition. This was demonstrated in the purchase of several pairs of Bushnell 10 X 50 "Insta-Focus" binoculars. They varied in cost from $9 to $30, but had no apparent difference in performance.

The modest opportunities gained from shopping bargain outlets allow large quantities of used optical goods to accumulate. A comprehensive group of over two dozen binocular specimens were personally acquired by attending resale events. Most glasses were made in the 1960s and '70s, although a few date from the 1950s.

In the practical 7 X 35 category, important achievements include hand-held models that are marked Ranger, Daylight, Jewel, Mercury, Taylor, and Three Star. Breakthrough finds in the slightly smaller 30mm "general use" category are those from Wray (England), Atlas, and a 1930's Zeiss "Deltrintem"

pair with full provenance. Binoculars with 50mm lenses, true "night glasses" possessing powers of 7X or 10X, have alphabetical inventories of Binolux, Manon, Omega, Optex, Optica, and Tower. Speaking of magnification, several 20X models were also located by the author — Swift's Model No. 788 is the best grade yet discovered.

Surplus glasses from a variety of contractors flooded the market immediately after the end of World War II. Built to take extremely rough handling in outdoor use, these often weigh 45 ounces or more. The military or Magna 10 X 50 was found hidden in the bric-a-brac at a crowded estate sale. A trademark search shows that it was made by the Tokyo Optical Co., Ltd.

Representative samples from J.C. Penney, Wards, Kmart (Focal), Sears, and Tasco are surprisingly common. If these fit your needs, then a trip to the pages of an older catalog is recommended. Inside, series of telescopes, microscopes and binoculars intersect and fiercely compete for the customer's attention. Binoculars have a major presence and offer solid values and innovation.

Back in the 1970s, a customer could buy a nice pair of standard angle 35mm binoculars for around $20. Fancier units show a jump in price, growing from a base sum of twenty dollars to well over $100. Prism binoculars with larger 50mm lenses augment the pictorial ads and effectively peak at the same general price level.

In the 1976 Spring and Summer catalog, Wards had its super-wide angle 7 X 35 model listed at $44.50. Their two optional manual zoom versions with center wheel focusing have $54 and $69 individual costs, depending on the power range and field of view desired. The clients' selection extended to dual 7 X 50s and 10 X 50s, essential glasses for astronomy. These, according to the literature, give "sharp images in low light." Showcased at $34.50 and $38.50, both binoculars possess basic features only.

The future collector can get some necessary shopping tips by glancing at one of Tasco's period catalogs. Established in 1954, the company's many illustrated layouts have become an iconic reference source for astronomers and researchers. Of the approximately 40 or so binocular products displayed annually, you can find listings for such best-sellers as their "Acapulco," "Seville," and all-pro "Touchdown" models. In the 1973 catalog installment most of Tasco's 35mm glasses fall between $30 and $100, with one electric zoom advertised at a whopping $150.

Several unusual items are also shown in Tasco's wonderful gallery of optical products. A featured piece is their #490 roof prism 8 X 56 binocular, which was priced at $120 during most of the early 1970s. It is described as "a

Right: Mercury and Taylor brand 7 X 35 binoculars have similar construction and optics. The war surplus Magna 10 X 50 field glass from Japan (above, left) is of extra durable design. Unless otherwise noted, all images are by the author.

A zoom binocular that was available from Sears, Roebuck and Company.

powerhouse binocular with extra bright images due to the king size 56mm objective lenses," while its unique "new straight-line optical system permits a sleek, slim silhouette design."

Among the leaders in industry is Sears, Roebuck & Co., a firm renowned for its diverse selection of merchandise. Throughout its long business reign, the Chicago-based retail giant supplied the amateur astronomer and naturalist with various types of hand-held binoculars. Fittingly, they offered a legion of models that "bring the action up close and clearly." (Illustrated above is a 7X-16X35mm zoom with amber coated optics.)

A representative look at the company's 1983 Fall and Winter sales catalog has a 40mm wide angle unit for $60 — the more mechanically distinctive 10 to 25X zoom model with a 50mm lens was earmarked higher at $130.

Popular alternatives in their literature are shown all during the 1960s and '70s. Foremost on any collector's list are Tower precision binoculars that were imported directly from France. This custom Sears item came in multiple sizes and powers; featherweight versions were available at substantially greater cost.

Kmart and J.C. Penney have similar but smaller inventories of night vision products. They follow a common pattern in optical sales — their merchandise came from the same host suppliers in Japan. This is clearly seen in the two 7 X 35 models from Mercury and Taylor, where only slight differences appear.

Every binocular sold has a matching carrying case.

Some harder-to-find items: A Remington 9 X 20 pocket glass (far left) is dwarfed in size by the Sears 35mm rubber-coated binocular at center. A military surplus monocular (right) adds variety to collecting.

The maple bookcase below holds numerous finds from estate and garage sales. Dr. Henry Paul's popular book Binoculars and All-Purpose Telescopes *is shown on the top shelf.*

These are considered primary accessory items and come in a wide range of functional styles. Depending on the cost, materials can be either vinyl or leather — colors are usually limited to plain black and various shades of brown and red.

Cheaper models are fabricated out of imitation leather or reinforced plastic. Soft zipper pouches with wrist straps are made for smaller units only. At the forefront of graphic design are V-cut split leather cases with plush velvet-lined interiors. Almost standard on vintage field models, they impart an antique look and raise the market appeal.

Bushnell embellished their precision binoculars with a simple, nearly square case. Black vinyl is the usual construction material but there are transitions to other colors, fabrics and rectangular shapes. The company decided to keep the same sports case for its Taiwanese and Korean-made glasses.

The Johnston & Finch extra-wide angle (10.1° FOV) 7 X 35 binocular with rubber "bumper" rims is housed in a finely-tooled leather case. An inside barrier of soft red cloth prevents rubbing and unsightly scuff marks. This particular item — another of the author's favorites — was priced at $20 when picked out of the clutter at a professionally-held estate sale.

This Johnston & Finch binocular is supplied with a custom leather case.

About 30 percent of the binoculars presented in this article are missing their original protective cases. This is a common occurrence with pre-owned equipment and can result in a confusing "mix-and-match" philosophy. Lost lens caps are another casualty of time. Through absentminded storage these little plastic covers can disappear singly or in sets, but can be replaced with inexpensive substitutes. Vanished eyecups and objective rims are far less a problem but still detract from the cosmetic value.

Another indispensable source for gaining knowledge about certain binoculars is located in the back issues of *Sky & Telescope* and *Astronomy* magazines. Over their long reign, a seemingly unlimited number of necessities for the amateur astronomer have miraculously appeared. Monthly specials from Zeiss, Nikon, and Bushnell are regularly incorporated into camera store market guides, while accompanying pages have solicitations from such long standing entities as Celestron, Orion, Edmund, and Meade.

A random chronology reveals an imposing number of enterprising firms. Lafayette Electronics had a well-earned reputation for selling binoculars and small refractor telescopes during the 1950s and '60s. Meanwhile, Jaegers of Lynbrook, N.Y. promoted its precision-made night glasses at "low, low prices!"

A glance at the May 1981 issue of *Sky & Telescope* reveals an interesting combination of generic goods. Swift has a giant 11 X 80 comet hunting binocular, while R.V.R. Optical stocked "every size and style, including special Giant 6" Models — the absolute ultimate for comets and spectacular wide-field observation."

These larger units pose a real challenge for the bargain sleuth. Most non-astronomical suppliers focus their attention toward sports events and daily nature studies where light-gathering power isn't as important. A cutoff point seems to be about 50mm. A higher initial cost plus other considerations make them a scarce sight at yard sale tables. Other than a contemporary Barska 15 X 70 glass, the author's only other discovery of significance in this category has been a die-cast aluminum Tasco #316 "Super Spotter" 20 X 60mm, which was purchased from an antique dealership.

A lifetime obsession with astronomy and science has led many people to the world of stereoscopic viewing. Temperance is not an option in binocular ownership, since quality used glasses are so cheap and plentiful. For less than $30 per item, the average person can acquire a suitable collection of binocular-related paraphernalia for investment and astronomical enjoyment. Token treasures can extend to telescopes and other optical items, paving the way to further collections and stargazing activities.

Most successful transactions require some sort of familiarity with binocular history — this knowledge adds to the fun of the hobby and can be passed down to offspring and friends. Traveling a few miles in either direction from home brings the individual to a promising number of bargain spots. Everyone enjoys looking at the tables and shelves full of trinkets and gently used merchandise. Given the opportunity, chances are very good of securing your own great glass from the 1960s and '70s.

Catching stars that go *BANG!*

About once a century in any galaxy, a star spontaneously explodes—so brilliant that for a few days it can outshine all other stars in a small home galaxy. Although frequent by cosmic standards, supernovae are rare in human terms: since the invention of the telescope, none has been seen to explode in our Milky Way.

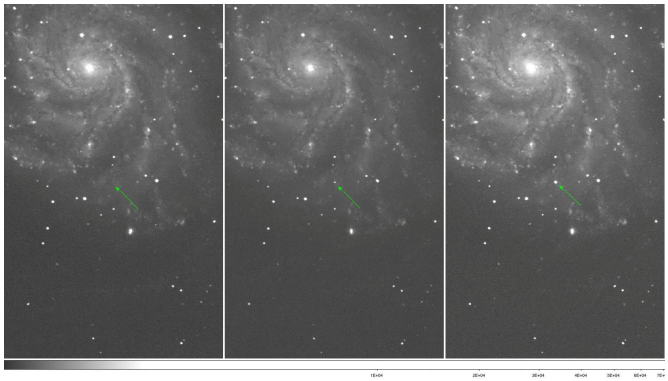
So how can astronomers study such catastrophic stellar suicides, especially the hours immediately after ignition?

Answer: Partner two automated telescopes with real-time supercomputing to monitor tens of thousands of galaxies every night, so that statistically there's a high chance of spotting a star exploding in some galaxy.

"Just since April 2009, we've discovered over 1,300 supernovae!" exclaimed Peter Nugent, senior staff scientist at Lawrence Berkeley National Laboratory and principal investigator of the Palomar Transient Factory (PTF) Type Ia supernova program (supernovae come in different types).

How it works

Atop Palomar Mountain, the Samuel Oschin telescope—a 48-inch (1.2-meter) Schmidt—acts as an automated wide-field survey camera, snapping sequential exposures of 8



The beautiful Pinwheel Galaxy in the constellation Ursa Major (the Big Dipper) is shown the night before supernova SN 2011fe exploded on August 22, 2011 (left), half a day after it exploded (middle) on August 23, and a day later (right) on August 24 (green arrows). The supernova reached maximum brightness on September 10, 2011, and then began fading. It was both the nearest and the youngest supernova discovered by the Palomar Transient Factory, being discovered only 11 hours after it detonated.

square degrees across the night sky. Each minute or so, its sensitive CCD 101-megapixel sensor array records stars and galaxies as faint as 20th magnitude.

Each digital image is instantly beamed to the San Diego Supercomputing Center at the University of California, San Diego, and then 400+ miles north to the National Energy Research Scientific Computing Center (NERSC) at Lawrence Berkeley National Laboratory. Within minutes, supercomputers subtract each incoming image from reference images, comparing new sources of light to the Sloan Digital Sky Survey and other databases.

"We collect about 50 gigabyes of raw data per night," Nugent says, "and typically discover about a million things that vary. The vast majority of them are 'garbage'—known variable stars, asteroids, etc. But one or two per night are young supernovae!"

Coordinates of suspected supernovae are forwarded 500 miles back down to Palomar to a 60-inch photometric telescope for detailed brightness measurements that same night—and possibly also to 15 other telescopes around the world for spectroscopic observation.

Brilliant discovery

The PTF's most spectacular find so far made newspaper headlines last summer: on August 24, 2011, a supernova (SN 2011fe) brightening in the Pinwheel Galaxy in Ursa Major only 21 million light-years away. The nearest and brightest Type Ia supernova to be spotted by the PTF, on September 10th, it peaked at visual magnitude 9.9.

In a paper published in *Nature* on December 15th, 2011, Nugent and coauthors conclude that SN 2011fe was a white dwarf star 1.4 times as massive as the sun, but only the diameter of Earth. It was stealing gas from a close sun-like companion until a runaway thermonuclear explosion ignited. Found only 11 hours (plus 21 million years!) after it exploded, it was the youngest supernova ever detected.

–Trudy E. Bell, M.A.

The Carver IBM iDataPlex supercomputer at NERSC at Lawrence Berkeley National Laboratory does much of the real-time analysis of images for the PTF, comparing digital images taken with the 48-inch Samuel Oschin telescope on Mount Palomar with reference images to identify supernovae. It found SN 2011fe.

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three Department of Energy laboratories (Lawrence Berkeley Laboratory, Lawrence Livermore Laboratory, and Los Alamos National Laboratory). UC-HiPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at http://hipacc.ucsc.edu .

July 2014

July 07	Monday	Board Meeting	OMSI Classroom 1	7pm
July 09	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
July 11	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
July 12	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
July 12	Saturday	OMSI Public Star Party	Rooster Rock and Stub Stewart State Parks	Dusk
July 18	Saturday	Haggart Public Night	Haggart Observatory	Dusk
July 19	Friday	RCA Picnic/Star Party	Stub Stewart State Park	Evening
July 20	Sunday	OMSI Astronomy Day	OMSI	All Day
July 21	Monday	New Member Orientation	OMSI Planetarium	6:30pm
July 21	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
July 22-27	Tue-Sun	Table Mtn. Star Party	Eden Valley Guest Ranch, Oroville, WA	
July 23	Wednesday	Cosmology SIG	Firland Apartments Community Room 8012 SE Raymond St., Portland, OR	7pm
July 25-July 27	Fri-Sun	Trout Lake Star Party	Flattop Sno Park near Trout Lake WA	Evening

August 2014

Aug 01	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
Aug 04	Monday	Board Meeting	OMSI Classroom 1	7pm
Aug 09	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Aug 12	Tuesday	OMSI Perseid Meteor SP	Stub Stewart and Rooster Rock State Parks	Dusk
Aug 13	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Aug 16	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Jun 18	Monday	Intro to Astronomy	OMSI Planetarium	6:30pm
Jun 18	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Aug 19-24	Tue-Sun	Oregon Star Party	Indian Trail Springs, Ochoco National Forest	
~~Aug 20~~	~~Wednesday~~	~~Cosmology SIG~~	***** CANCELLED THIS MONTH*****	
Aug 22-24	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening
Aug 29-31	Fri-Sun	Mt. St. Helens Star Party	Mt. St. Helens - TBD, check website for updates.	Dusk

http://www.rosecityastronomers.org

Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356

The Rosette Gazette

Volume 27, Issue 08 Newsletter of the Rose City Astronomers August, 2014

"30 Second Astrophotography: Learning to Image the Night Sky"
Craig Hlady

Are you curious about how to start taking pictures of the night sky with just a DSLR (Digital Single Lens Reflex) camera?

Craig will introduce both simple tripod photography and piggy-back photography that concentrates on 'prime focus' astrophotography -- that is, using a DSLR camera on just a tripod or connecting a DSLR camera directly to a telescope so that the telescope becomes the camera lens.

Why 'thirty seconds' in the title? Astrophotography is perceived as a very complicated and technically challenging endeavor, requiring a computer in the field and expensive equipment to perform successfully. However, with camera exposures up to thirty seconds a computer is not necessary to successfully take wonderful pictures of the night sky -- a tracking mount, telescope and DSLR camera are all that are required to get started in this great hobby.

DSLR Astro-Imaging is the easiest way to get started in capturing portions of the night sky, and if you're traveling, the gear is lighter than you might think. You can image wide star fields of our galaxy the Milky Way, comets, constellations, planetary alignments, beautiful aurora, combined lunar and nature landscapes, polar star trails, and meteor showers.

Great results can be achieved just with a tripod mounted camera and short exposures. Cameras that are mounted piggyback on telescopes or tracking platforms can capture images that rival images produced by professional observatories. Vast arrays of equatorial mounted DSLRs are being used for real research, and DSLR astrophotographers are discovering new variable stars, novas, supernovas, and exoplanets every day.

(Continued on page 2)

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Everyone Welcome! Monday August 18th
Intro to Astronomy Begins: 6:30 pm. Location: OMSI Planetarium
General Meeting 7:30 pm. Location: OMSI Auditorium

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

Last Quarter Moon	New Moon	First Quarter Moon	Full Moon
Aug 17	Aug 25	Sep 01	Sep 08

As a youth Craig was an avid amateur astronomer and learned everything he could about the stars and planets. As he grew older, however, he became more interested in other pursuits -- some academic, some not quite so much -- and did not seriously return to his first love until after he got high school, university, his first job, marriage, and kids all squared away.

In 2008 he received a telescope for Christmas from his better half (who had no idea what she was getting herself into), put a camera on it and was hooked. Since then he has found astrophotography to require a blend of artistic and technical discipline that deeply appeals to him.

Originally from British Columbia Craig after moving around for years, he returned to the Pacific Northwest in 2009 and joined the Rose City Astronomers. He currently is the Sales Director and you can usually find him at the Sales Table during meetings.

Professionally, Craig holds a Master's degree in Metallurgical Engineering from the University of British Columbia, and spent most of his career working in the steel industry. He now pays for his hobby as the quality assurance manager for a local steel mill.

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, Sep 10th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Started for 2014, more to come.
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, Sep 5th, Noon
Location: McMenamin's on Broadway,
1504 NE Broadway, PDX
SIG Leader: Margaret Campbell-McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members Orientation / Introduction to Astronomy (alternate months)

When: Monday, Aug 18th, 6:30pm (Intro to Astronomy)
Location: OMSI Planetarium
Topic: TBD
SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/new_members.htm

Telescope Workshop

When: Saturday, Sep 6th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: Wednesday, Sep 17th 7:00pm

Note: Meeting Cancelled for August.

Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leader: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

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Cosmology Special Interest Group	Viktors Berstis	cosmology-sig	@ rosecityastronomers.org
Downtowners Lunch Special Interest Group	Margaret McCrea	downtown-sig	@ rosecityastronomers.org
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Observing Site Fund (Site Fund)	David Nemo	sitefund	@ rosecityastronomers.org
Sister Clubs	Margaret McCrea	sisterclub	@ rosecityastronomers.org
Starlight Parade Float	Sameer Ruiwale	starlight	@ rosecityastronomers.org
Telescope Workshop	John DeLacy Don Peckham	tw-sig	@ rosecityastronomers.org
RCA Member Forum	Larry Godsey	admin	@ rosecityastronomers.org
Webmaster	Larry Godsey	webmaster	@ rosecityastronomers.org
ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org

RCA 2014 Star Party Calendar

These are the currently scheduled star parties for the Rose City Astronomers club for 2014. As always, these are weather dependent. Star parties may be rescheduled or cancelled due to various factors. Reschedules may be found here in the newsletter if enough advance notice is given. All updates will be posted to the online calendar and on the forum. Last minute cancellations are handled through the forum and it's email system. Directions for star party locations can be found online as well.

August

~~Aug 12 (Tue) OMSI Perseid Meteor SP~~
Aug 16 (Sat) Haggart Public Night
Aug 19-24 Oregon Star Party
Aug 22-23 (Fri-Sat) Maupin SP
Aug 29/30 (Fri/Sat) Mt. St. Helens SP

September

Sep 13 (Sat) Haggart Public Night
Sep 19/20 (Fri-Sat) Camp Hancock
Sep 20 (Sat) OMSI Autumnal Equinox SP
Sep 25-27 (Thu-Sat) Indian Trail Spring SP
Sep 26 (Fri) Rooster Rock SP
Sep 27 (Sat) Stub Stewart SP

October

Oct 08 (Wed) OMSI Total Lunar Eclipse SP
Oct 18 (Sat) Haggart Public Night
Oct 23 (Thu) OMSI Partial Solar Eclipse
Oct 24/25 (Fri-Sat) Maupin SP
Oct 24 (Fri) Rooster Rock SP
Oct 25 (Sat) Stub Stewart SP

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

Welcome:

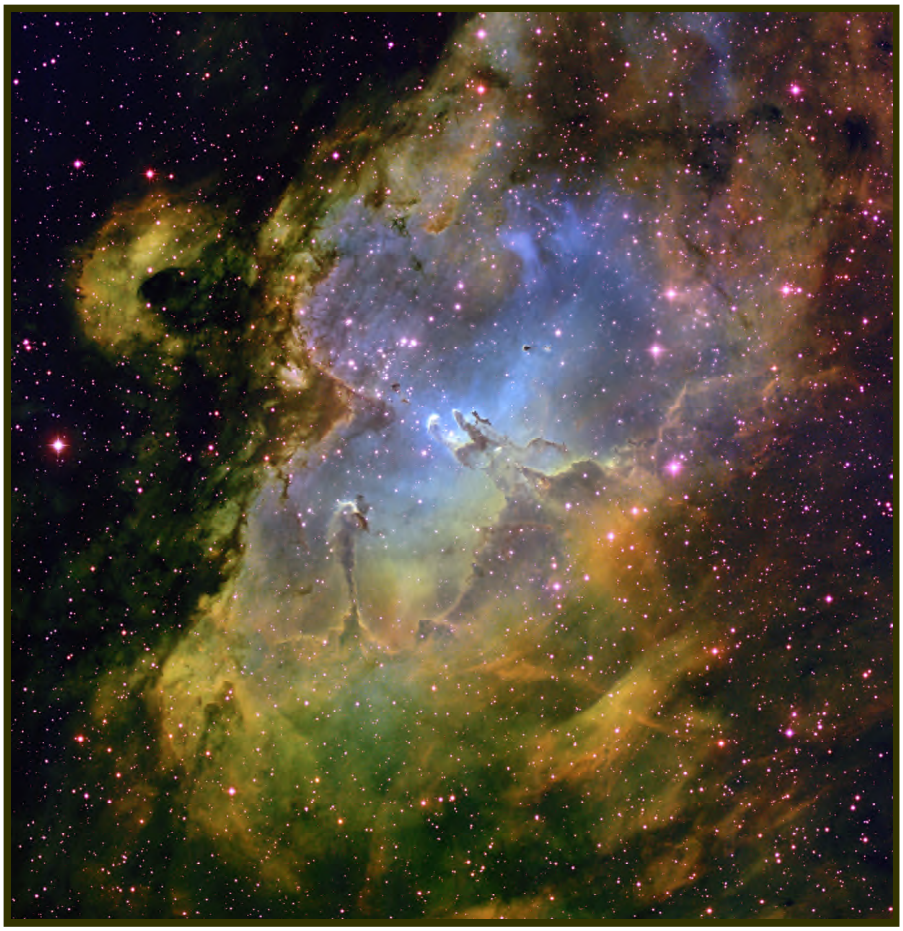
RCA is powered by volunteers. If you are interested in volunteering for a single event or ongoing program, contact the RCA program director. If you have some time and skills but aren't sure where we need help, contact volunteer@rosecityastronomers.org and we'll find something for you to do. To learn about public outreach events and volunteer needs, check out upcoming events on the RCA Forum.

We have begun an "Introduction to Astronomy" series of educational and instructional tutorials focused on basic astronomy, equipment and observing skills, geared towards beginners wanting to learn the fundamentals of astronomical observing and imaging. Series will be every-other month (alternating with New Member Orientation) in the OMSI Planetarium 6:30 - 7:15 p.m. preceding General Membership Meeting (third Monday of month). Instructors will be RCA member-volunteers. Format will be interactive presentation and lots of time devoted to Q & A. Future topics will be based on feedback from New Member Orientation meetings and keeping our ears open to what new members and other beginners are asking about. Please let David Nemo or Howard Knytych (email on page 3) of interest in any topic.

Chaotic Nebulae

The glorious Eagle Nebula, a favorite deep-sky inhabitant of the summer Milky Way, displays a strongly shaped star forming region.

By John W. Siple



An entanglement of hydrogen gas and hot, O-type stars characterize the Eagle Nebula. It lies approximately 6,500 light years away in the Sagittarius — Carina spiral arm of the Milky Way. Photograph courtesy of Travis Rector and Brenda Wolpa (NOAO/AURA/NSF).

Over fifty stars and counting. That is the number visible within the Eagle Nebula, a riveting deep-sky object that occupies far eastern Serpens. It is actually composed of weaving patterns of tenuous matter that resemble an eagle's body with outstretched wings. Also known as the Star Queen Nebula, the colorful complex is home to the "Pillars of Creation," giant towers of ultraviolet etched dust.

In the second quarter of the 18th century, Swiss astronomer Philippe Loys de Cheséaux was scanning the skies from his observatory in Lausanne when he chanced upon the brightest cluster stars. Unfortunately his discovery wasn't given international credit until 1884. Charles Messier noticed the same object in 1764, entering it as number sixteen on his famous deep-sky list. The nebulous portion, an area of ongoing star birth, is cataloged separately today as IC 4703. A designation of M16 (NGC 6611) addresses the easily recognizable open star cluster.

The Star Queen is a signature member of four prominent bright nebulae that inhabit a narrow zone near the Galactic center. M17 (the Swan or NGC 6618) lies only 3° south, while the remaining Trifid and Lagoon associations grace the Milky Way deep inside the constellation Sagittarius. As a prime showpiece, the cosmic eagle spans 35' X 28' and illuminates the region with a strong 6th-magnitude glow.

Serpens' best deep-sky object can be seen without any difficulty in ordinary 7 X 35 binoculars even under moderate light pollution. Generally, most small instruments show just a loose assemblage of stars mingled with a faint fog-bound haze, which is pretty much what Messier saw centuries ago.

To get a different perspective several recent era telescopes of varying aperture and design were put into active service. Besides the binoculars, a classic 1950's Lafayette 2.4-inch alt-azimuth "Planetoid" refractor was used for a basic look; upscale Meade 8-inch Schmidt-Cassegrain LX200 equipment and a 15-inch Dobsonian reflector produced far more dazzling reviews.

The embedded star cluster is a trivial challenge for our 2.4-inch scope. A blockbuster concentration of starlight decorates the northwestern half, where a wide 27" pair with 8th-magnitude components holds dominance. Sitting adjacent to the binary is a dented arc of five suns. In all, 20 members of M16 can be discerned in the little refractor.

Narrowband filters of various kinds are now readily available to all levels of optical astronomy. Even in the Lafayette telescope significant differences appear if a nebula filter of the right type is selected. Options include those that possess hydrogen-beta (Hβ), Oxygen-III, and UHC (ultra high contrast) light transmission capabilities.

A factual demonstration of the Eagle's grandeur was given by the larger flagship equipment. Both professional models reveal an ornate kaleidoscopic field that's covered by a sensational number of luminous features. With an O-III filter, the nebula spreads conclusively northeast and southwest. The silhouetted fingers of M16's emission complex — knobby stalactites and stalagmites light years high — were recorded with equal frequency through each telescope. Astronomer Fred Hoyle once referred to these unlikely formations as "elephant trunks."

However, the really best views come from the special art of astrophotography. Characteristics that make the Eagle Nebula so attractive — vivid color, young and nascent stars engulfed in a havoc of nebulosity, and mesmerizing glimpses of the Pillars of Creation — are all in the exquisite image by Travis Rector and Brenda Wolpa, posted above on this page.

Peter Pan with a Telescope: Observing at Larch Mountain

By Robert McGown

On Sunday September 8 2013, I drove up to Larch Mountain for an evening star gazing with Michael Meo and his two sons Michael Kepler and John Dominic. It was a fall opportunity to sport a laser guided observing session on the 4,000 ft summit of Larch Mountain lookout. As the twilight faded to a starry darkness, we were pleased to observe an iridium flare and a few sporadic meteors. The Milky Way was spectacular, so we star hopped through the major constellations tour as I showed off the tea pot asterism. I had recently attended a play of Peter Pan that Michael Kepler had starred in which gave me the idea of Pete Pan with a Telescope theme. Peter Pan is a story mischievous boy that never grows up that was created by the Scottish playwright J.M. Barrie. Peter Pan was the leader of the Lost Boys, a gang of adventurous boys. In the play, they interacted with mermaids, fairies, pirates, and Indians. During this stellar evening, I shared a Greek myth about Orpheus and the Lyre and was regaled with an abundance of greater detail from the boys. Here on Larch Mountain's summit, we used the abstract analogy of Peter Pan to describe the situation and the geography. The pillars of rock on the steep summit trail were silhouetted against the sky like the sails of Captain's Hook's pirate ship. We knew we were soon in for a ride on Carl Sagan's ship of the imagination in foreverland.

For the whole evening, Michael Kepler regaled us with Greek myths and lore. Tonight on a journey of the imagination, we thought of what Einstein once said," Imagination is more important than knowledge." After we climbed down from the summit of the ancient volcano caldera, I joked that we might come across Captain Hook's crocodile on the narrow precipitous trail on Larch Mountain. We set up the 10 inch coulter telescope in the parking lot. Sometimes the Lost Boys are on Larch Mountain, visitors to the park, and they would share views in the telescope. You never know who you'll meet at Larch Mountain observing. We viewed through the Tetrad a few Messier objects and 457 (the ET cluster). Gazing at Andromeda M 31 and the satellite galaxies of Andromeda we thought of the incredible distances and never neverland. The Pin Wheel galaxy and M32 a dwarf elliptical and M110 an ill regular galaxy were a visual delight near the great spiral of Andromeda. There are 9 galaxies that orbit Andromeda that hoover around the parent galaxy. Michael and his sons were super excited to see the Milky Way in all of its glory with the constellations of the ecliptic. As we gazed at the Local Group galaxies, I knew that I knew that I wanted to never grow up peering through the telescope forever.

Michael Sr. has a deep interest in the history of astronomy. This evening we didn't center on politics saving the planet as usual. Michael and I discussed romanticism in Russian astronomy in the early 19th century. The two of us have common interests in Russian astronomy, since I have been to Russian astronomy sites and Michael Meo translates Russian historic scientific documents. We have worked on a variety of Russian astronomy historical projects.

As we came down the heavily wooded Larch Mountain road Michael and John sung Lord of the Rings songs as if we were really in a Tolkien forest with Frodo and Gandalf. John de Lacy, telescope maker, also shared his Tolkien experience with me and the Meo boys during their Tolkien audition. This evening, it seemed so surreal that I actually felt as if I was in a time machine transported to New Zealand sharing the evening with Professor Tolkien. Some people have suggested that Tolkien's Lord of the Rings was allegorical for the World Wars, although Tolkien said there was no connection. Years ago at star parties in Canada with the AAVSO, one of Tolkien's colleague professors would show up at the star parties and entertain us with Tolkien anecdotes. Being a Tolkien admirer, I traveled to Free State, South Africa where Tolkien was born while I was working in Africa as an astronomer.
On the way home, we also talked about the ancient constellation ship Argo and the sirens. I was driving through the construction area on the Terwillager curves on I-5; a huge flaming bolide came down seemingly over Tigard. It was strikingly green and breaking up with angular flames going out 30 degrees straight out. I saw the flaming object for two and half seconds before it broke up in flames. I thought there might have been a shock wave. It looked as though the object had structure and was tumbling. The bolide almost looked as if it could have been a helicopter crashing and breaking up. In the morning on the way to work, I called Richard Pugh, the meteoriicist with Cascadia Meteorite Laboratory and reported the incredible bolide that I observed. It was an amazing finale at the end of a magical evening with the intellectual Meo family.

The Larch Mountain Road would be snowed over soon and we left the imaginary world of the Lost Boys and Peter Pan back on the summit of Larch Mountain. The holiday season would be upon us. Very soon, I would put out my E=MC^2 Christmas lights on my observatory. I was recently amused that the Milky Way depicted in the bible was called the "firepath" and a meteorite depicted in the Hebrew bible was called the "path of fire". It might have been how ancient scholar would use a metaphor and analogy to describe something seemingly supernatural. Over the holiday season, it was fun to entertain my friends in a Richard Feynman style of scientific imagination and the idea that Einstein was the second coming of Christ. ☺ One of Albert Einstein's favorite biographies written by Abraham Pais was called *Subtle is the Lord*. I am not a deeply religious person, however sometimes it is fun to be creative with myth and literary allegory and explore our cosmic connectedness to the Universe. This evening, indeed we were like Peter Pan with a telescope on Larch Mountain's summit, sharing adventures in foreverland.

References:

1. Barrie J.M. Peter Pan, The Boy Who Wouldn't Grow Up, Published as a novel in 1911, an arch type of unending youth.
2. Peter Pan, North West Children's Theater 2013, with Michael Kepler Meo, Michael and Trudy Meo, Michael Kepler as Peter Pan.
3. Abraham Pais (1918-2000) Rockefeller University, physicist and historian of science.
4. Tolkien, J.R. Lord of the Rings, AAVSO, Calgary, Canada/ Australia

Milky Way: Cosmic Cannibal!

Get ready for a feeding frenzy! The supermassive black hole in the center of our Milky Way galaxy will grab an appetizer in June—right in time for prime summer viewing for northern-hemisphere astronomers!

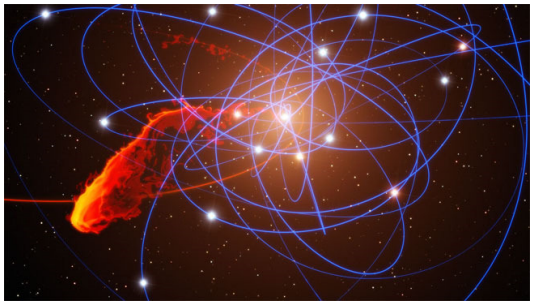
From Earth, the center of the Milky Way is in Sagittarius near the border of Scorpius. The supermassive black hole, partly named for its host constellation, is called Sgr A* (pronounced "Sadge A-star").

From radio astronomy measurements, the Schwarzschild radius of Sgr A*—that is, of its "event horizon" beyond which light cannot escape—is known to be a quarter the radius of Mercury's orbit. But that entire volume is jam-packed with a mass 4 million times greater than our Sun.

Starvation diet

Weirdly, Sgr A* "is the most underluminous black hole observed," remarked Peter Anninos of Lawrence Livermore National Laboratory in northern California, meaning it hardly glows. True, the very definition of a black hole is something so massive that not even light can escape. But supermassive black holes in many other galaxies are surrounded by gas, dust, and other material. When material falls into, or accretes onto, a black hole, it emits a broad spectrum of radiation most intense in X-rays.

SgrA* doesn't glow, though, because "it is starved for material," Anninos explains. Observations reveal that hundreds of hot young stars are whirling around SgrA* in orbits within 1 parsec (about 3 light-years). Measurements and calculations suggest their stellar winds blowing away the gas are so fast and furious that "it is difficult to actually get the gas down to the black hole."



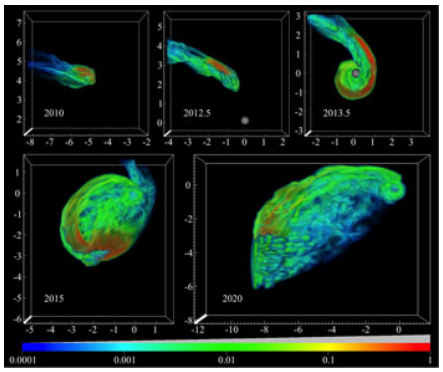
Simulations of the dust and gas cloud G2 (orange and yellow) on its orbit around the Milky Way central black hole Sgr A (invisible near center). White objects and orbits depict hot young stars whipping around the supermassive black hole.*
Credit: M. Schartmann and L. Calcada, European Southern Observatory and Max-Planck-Institut fur Extraterrestrische Physik

Within this environment, however, "Sgr A* may occasionally enjoy a relative feeding frenzy," continues Anninos and his three coauthors from Livermore and the College of Charleston in South Carolina, writing in a November 2012 issue of *The Astrophysical Journal*. Maybe every 10,000 years or so a daredevil star zipping tauntingly close to SgrA*—about the Sun-Earth distance—might get torn apart by tidal forces and consumed. But that's a long time between meals.

Cosmic cannibalism

Enter the hapless gas cloud G2. In 2011, three astronomers detected a small clump of dusty, ionized gas near the galactic center; dubbed G2, it has a radius of 2 to 20 billion kilometers (about as big as our solar system) and a mass triple Earth's. G2's dust is warm—550K, about twice Earth's temperature; its gas is 10,000K, twice as hot as our Sun. But G2 is far cooler than the heated, rarefied gas at the galactic center. Because cool clouds in such a hostile environment evaporate, G2 either formed shortly before it was detected or is part of a larger extended structure.

Like a comet heading toward the Sun, G2 is plummeting toward Sgr A*. At closest approach (pericenter) in June, G2's center of mass will scream by only 4 billion kilometers away, scarcely more than 3,000 times the Schwarzschild radius of Sgr A*. Although too distant for G2 to be gulped whole (just as only rarely do sun-grazing comets actually plunge into the Sun), computer simulations reveal that enormous tidal forces will elongate G2 until it begins to fragment and lose angular momentum through interactions with background gas. "The cloud stretches into a stream of gas feeding the black hole," Anninos explains.



Three-dimensional volume visualization spanning the period 2010 to 2020, of the gas and dust cloud as it approaches the Sgr A black hole near the center of the Milky Way galaxy at five points from 2010 to 2020. Credit: Chris Fragile and Julia Wilson*

The show will start in June and unfold through 2020.

What might observers actually see? Astronomers are excited to find out. Calculations suggest that while SgrA* won't turn the center of the Milky Way into an AGN (active galactic nucleus), it could brighten by more than 100 times the luminosity of our Sun, mainly in X-rays. With the right equipment, "this event should be easily observable over the next several years," Anninos estimates. "The break up of G2 will provide an unprecedented opportunity to study accretion physics in the galactic center." *–Trudy E. Bell, M.A.*

***Further reading*:** Link to the paper in *The Astrophysical Journal* is at http://arxiv.org/abs/1209.1638. A Lawrence Livermore press release is at https://www.llnl.gov/news/newsreleases/2012/Oct/NR-12-10-07.html . A movie of the simulation of G2 being captured and eaten through 2020 is at http://fragilep.people.cofc.edu/research/movies/cloud_new.mov .

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three Department of Energy laboratories (Lawrence Berkeley Laboratory, Lawrence Livermore Laboratory, and Los Alamos National Laboratory). UC-HiPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at http://hipacc.ucsc.edu

August 2014

Aug 01	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
Aug 04	Monday	Board Meeting	OMSI Classroom 1	7pm
Aug 09	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Aug 12	Tuesday	OMSI Perseid Meteor SP	Stub Stewart and Rooster Rock State Parks	Dusk
Aug 13	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Aug 16	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Jun 18	Monday	Intro to Astronomy	OMSI Planetarium	6:30pm
Jun 18	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Aug 19-24	Tue-Sun	Oregon Star Party	Indian Trail Springs, Ochoco National Forest	
Aug 20	Wednesday	Cosmology SIG	***** CANCELLED THIS MONTH*****	
Aug 22-24	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening

September 2014

Sep 05	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
Sep 06	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Sep 08	Monday	Board Meeting	OMSI Classroom 1	7pm
Sep 10	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Sep 13	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Sep 15	Monday	New Member Orientation	OMSI Planetarium	6:30pm
Sep 15	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Sep 17	Wednesday	Cosmology SIG	Firland Apartments Community Room 8012 SE Raymond St., Portland, OR	7pm
Sep 19-21	Fri-Sun	Camp Hancock Star Party	OMSI's Camp Hancock near Fossil, OR	All Day
Sep 20	Saturday	OMSI Public Star Party	Rooster Rock and Stub Stewart State Parks	Dusk
Sep 24-28	Wed-Sun	Brothers Star Party	Near Brothers, OR	
Sep 25-28	Thu-Sun	RCA ITS Star Party	Indian Trail Springs (Oregon Star Party Site)	
Sep 26	Fri	RCA Rooster Rock SP	Rooster Rock State Park	Evening
Sep 27	Sat	RCA Stub Stewart SP	Stub Stewart State Part	Evening

http://www.rosecityastronomers.org

Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356

The Rosette Gazette

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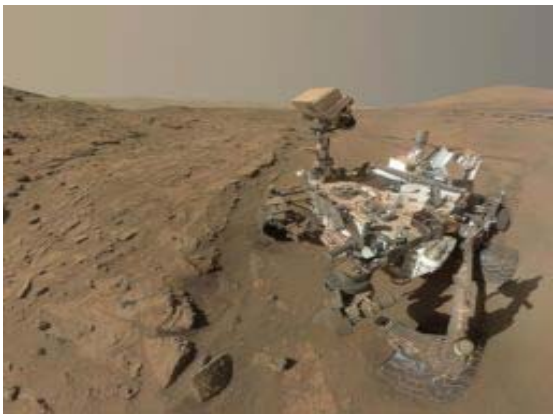
Curiosity Rover in Gale—All Uphill From Here

Dr Ken Edgett



In June, Curiosity completed its first Mars year of fieldwork in Gale, a 96-mile-wide impact crater near the Martian equator.

The rover team's main objective is to read the story of successive changes in past Martian environments recorded in the lower part of a 3-mile-high mountain of layered rock in central Gale known informally as Mt. Sharp.

But the terrain on this mountain is too rugged for Curiosity's famous "7 Minutes of Terror" landing system, so the rover touched down, in August 2012, in the deep valley between the north wall of Gale and Mt. Sharp.

The valley floor displays abundant outcroppings of rock formed from pebbles and sand that were transported by streams; it also found rock formed from mud. Mud that was at the bottom of a lake or pond. After drilling this mudstone, the team concluded that it was a record of a habitable environment — life as we know it might have been able to live in that water.

Curiosity has arrived at the base of Mt. Sharp. From there, it will drive up hill and through time, each layer of rock younger than the one just below it; each layer telling us about a different Mars of long ago.

Ken Edgett is the Principal Investigator for Curiosity's Mars Hand Lens Imager (MAHLI) mounted on the turret at the end of the rover's robotic arm. MAHLI has acquired some of the most iconic images of the mission, including "selfies" of Curiosity at its sample extraction sites and close-ups of dust clinging to a 1909 Lincoln penny on the camera's calibration target.

Ken is a Senior Research Scientist with Malin Space Science Systems of San Diego, California. The company built and operates Curiosity's four color cameras as well as cameras currently operating in orbit about the Moon and Mars and cruising toward Jupiter.

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Everyone Welcome! Monday Sept 20th

New Members Orientation Begins: 6:30 pm. Location: OMSI Planetarium
General Meeting 7:30 pm. Location: OMSI Auditorium

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

Last Quarter Moon	New Moon	First Quarter Moon	Full Moon
Jul 19	Jul 26	Aug 03	Aug 10

Welcome:

RCA is powered by volunteers. If you are interested in volunteering for a single event or ongoing program, contact the RCA program director. If you have some time and skills but aren't sure where we need help, contact volunteer@rosecityastronomers.org and we'll find something for you to do. To learn about public outreach events and volunteer needs, check out upcoming events on the RCA Forum.

We have begun an "Introduction to Astronomy" series of educational and instructional tutorials focused on basic astronomy, equipment and observing skills, geared towards beginners wanting to learn the fundamentals of astronomical observing and imaging. Series will be every-other month (alternating with New Member Orientation) in the OMSI Planetarium 6:30 - 7:15 p.m. preceding General Membership Meeting (third Monday of month). Instructors will be RCA member-volunteers. Format will be interactive presentation and lots of time devoted to Q & A. Future topics will be based on feedback from New Member Orientation meetings and keeping our ears open to what new members and other beginners are asking about. Please let David Nemo or Howard Knytych (email on page 3) of interest in any topic.

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, October 8th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Started for 2014, more to come.
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday October 3rd, Noon
Location: McMenamin's on Broadway,
1504 NE Broadway, PDX
SIG Leader: Margaret Campbell-McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members Orientation / Introduction to Astronomy (alternate months)

When: Monday, Sept 20th, 6:30pm (New Members)
Location: OMSI Planetarium
Topic: TBD
SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/new_members.htm

Telescope Workshop

When: Saturday, October 11th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: Wednesday, Sept 17th
7:00pm
Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leader: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

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Director, New Members	Howard Knytych	newmembers	@ rosecityastronomers.org
Director, Newsletter (Rosette Gazette)	Scott Kindt	editor	@ rosecityastronomers.org
Director, Merchandise Sales (Merchandise Sales)	Craig Hlady	sales	@ rosecityastronomers.org
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Director, Youth Program (RCA Youth Program)	Kathy Kornei	youth	@ rosecityastronomers.org
Other Contacts			
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Astronomical Imaging Special Interest Group	Greg Marshall	ai-sig	@ rosecityastronomers.org
Cosmology Special Interest Group	Viktors Berstis	cosmology-sig	@ rosecityastronomers.org
Downtowners Lunch Special Interest Group	Margaret McCrea	downtown-sig	@ rosecityastronomers.org
Haggart Observatory	Rusty Baumberger	haggart	@ rosecityastronomers.org
Magazine Subscriptions (Discount Subscriptions)	Larry Godsey	magazines	@ rosecityastronomers.org
Observing Site Fund (Site Fund)	David Nemo	sitefund	@ rosecityastronomers.org
Sister Clubs	Margaret McCrea	sisterclub	@ rosecityastronomers.org
Starlight Parade Float	Sameer Ruiwale	starlight	@ rosecityastronomers.org
Telescope Workshop	John DeLacy Don Peckham	tw-sig	@ rosecityastronomers.org
RCA Member Forum	Larry Godsey	admin	@ rosecityastronomers.org
Webmaster	Larry Godsey	webmaster	@ rosecityastronomers.org
ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org

RCA 2014 Star Party Calendar

These are the currently scheduled star parties for the Rose City Astronomers club for 2014. As always, these are weather dependent. Star parties may be rescheduled or cancelled due to various factors. Reschedules may be found here in the newsletter if enough advance notice is given. All updates will be posted to the online calendar and on the forum. Last minute cancellations are handled through the forum and it's email system. Directions for star party locations can be found online as well.

September

Sep 13 (Sat) Haggart Public Night
Sep 19/20 (Fri-Sat) Camp Hancock
Sep 20 (Sat) OMSI Autumnal Equinox SP
Sep 25-27 (Thu-Sat) Indian Trail Spring SP
Sep 26 (Fri) Rooster Rock SP
Sep 27 (Sat) Stub Stewart SP

October

Oct 08 (Wed) OMSI Total Lunar Eclipse SP
Oct 18 (Sat) Haggart Public Night
Oct 23 (Thu) OMSI Partial Solar Eclipse
Oct 24/25 (Fri-Sat) Maupin SP
Oct 24 (Fri) Rooster Rock SP
Oct 25 (Sat) Stub Stewart SP

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

WELCOME

Üdvözöljük **to all our new members!** Välkomna

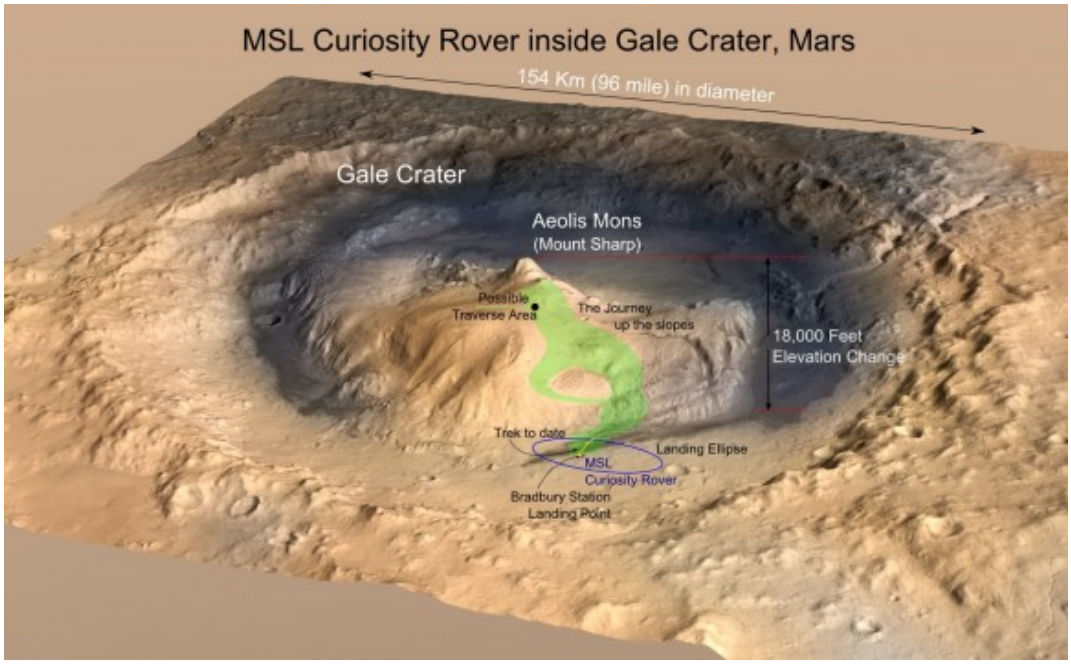
Ryan Anderson
David Billingsley
Laura Bitts
David Blair
Daniel Bruce
Phoebe Burns
Chris Carrera
Maxwell Furr

Vitejte Bienvenue Bem-vindo!

Lily Heyn
Linus Hoyt
Skip Laub
Sallie Norton
Doug Peters
Jonathan Riggs
Robert Roy

Καλώς ήρθατε Willkommen

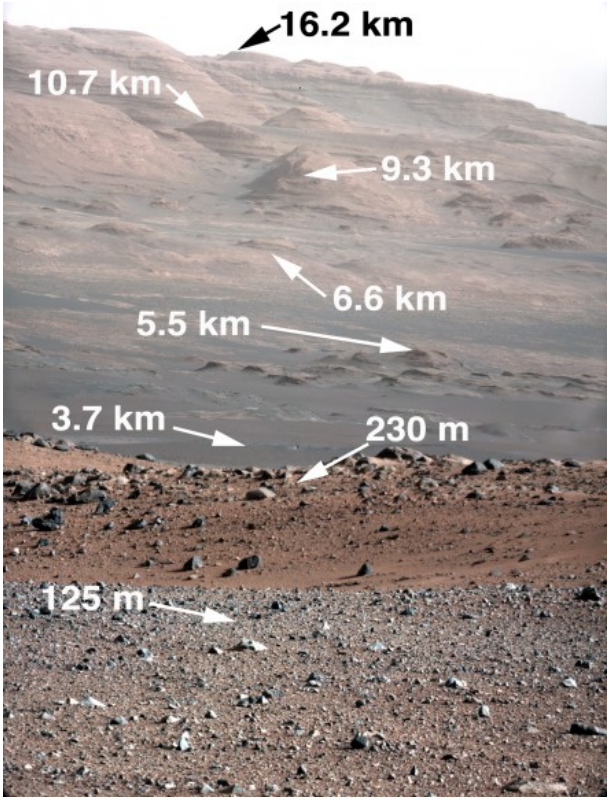
Curiosity Finally Arrives at Mt. Sharp



Mount Sharp is anything but the normal central peak of an impact crater. Gale crater at 154 km (96 miles) in diameter is what is called a complex crater. Beyond a certain size, depending on the gravity of the planet, craters will have a central peak. It is similar to the spike of water which is thrusted upwards when you drop an object into a pool of water. Like the spike of water, an impact, thrusts regolith upwards and it collapses and coalesces into a central peak. However, with Mount Sharp there is something more. If the peak was nothing but a central impact peak, NASA with Mars Curiosity would not be trekking inside Gale Crater.

Mars scientists believe that Gale crater after its creation was completely filled with sedimentary material from a series of huge floods passing over the surrounding terrain or by dust and ice deposits such as happened at the Martian polar caps. The deposition over 2 billion years left a series sedimentary layers that filled the crater.

Following the deposition of the layers, there was a long period of erosion which has finally led to the condition of the crater today. The erosion by some combination of aeolean (wind) forces and water (additional flooding), scooped out the huge crater, re-exposing most of the original depth. However, covering the original central peak are many sedimentary layers of debris. Gale crater's original central peak actually remains completely hidden and covered by sedimentation. This is what has attracted scientists with Curiosity to the base of Mount Sharp.



Within the sedimentary layers covering Mount Sharp, there is a sequential record of the events that laid down the layers. Embedded in each of those layers is a record of the environmental conditions on Mars going back over 2 billion years. At the base are the oldest sedimentary layers and as Curiosity climbs the flanks of the mountain, it will step forward in time. The advanced instrumentation residing on and inside Curiosity will be able to analyze each layer for material content and also determine its age. Each layer and its age will reveal information such as how much water was present, whether the water was alkaline or acidic, if there is any organic compounds. The discovery of organic compounds on Mount Sharp could be, well, Earth shaking. There are organic compounds and then there are organic compounds that are linked to life and this search for organics is of very high importance to this mission.

Already, over the two year trek, Curiosity has seen numerous signs of the flow of water and sedimentation. At its first major waypoint, Glenelg, Curiosity stepped into an area called Yellow Knife Bay that showed numerous signs of past water. There were veins of magnesium salt deposits embedded in the soil, sedimentation and even conglomerate rock such as that found in river beds.

There is another side to the terrain that Curiosity is traversing. The crater floor, essentially a flood plain has been particularly hard on the mobility system of Curiosity.

Curiosity is now at the 6.6km point and the trek moves upward to see what the layers on Mount Sharp will reveal.

Story and Photos from JPL

September 2014

Sept 5	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, Portland	Noon
Sept 6	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Sept 8	Monday	Board Meeting	OMSI Classroom 1	7pm
Sept 10	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Sept 13	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Sept 15	Monday	New Member Orientation	OMSI Planetarium	6:30pm
Sept 15	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Sept 17	Wednesday	Cosmology SIG	Firland Apartments Community Room 8012 SE Raymond St., Portland, OR	7pm
Sept 19-20	Fir-Sat	Camp Hancock Star Party	Camp Hanock, Clarno, OR	
Sept 20	Saturday	OMSI Public Star Party	Rooster Rock and Stub Stewart State Parks	Dusk
Sept 25-27	Thu-Sun	Indian Trail Star Party	50 miles East of Prineville, OR	
Sept 26	Friday	RCA Star Party	Rooster Rock State Park	Evening
Sept 27	Saturday	RCA Star Party	Stub Stewart State Park	Evening

October 2014

Oct 3	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
Oct 6	Monday	Board Meeting	OMSI Classroom 1	7pm
Oct 8	Wednesday	OMSI Lunar Eclipse	Milo McIver State Park	1am-5am
Oct 8	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Oct 11	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Oct 18	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Oct 20	Monday	Intro to Astronomy	OMSI Planetarium	6:30pm
Oct 20	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Oct 22	Wednesday	Cosmology SIG	Firland Apartments Community Room 8012 SE Raymond St., Portland, OR	7pm
Oct 23	Thursday	Partial Solar Eclipse	OMSI East Parking Lot	1:30-4pm
Oct 24-25	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening
Oct 24	Friday	RCA Star Party	Rooster Rock State Park	Evening
Oct 25	Saturday	RCA Star Party	Stub Stewart State Park	Evening

http://www.rosecityastronomers.org

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The Rosette Gazette

Volume 27, Issue 10 Newsletter of the Rose City Astronomers October, 2014

Astronomers Without Borders
Mike Simmons

Mike Simmons has been involved in astronomy education and public outreach for more than 35 years. He has led and founded outreach organizations that share the work of astronomers and telescopic views of the sky with the public. He is a writer and photographer who has contributed to various publications, including Scientific American, Astronomy and Sky and Telescope, and he regularly gives presentations on astronomy.

Recognizing astronomy as a universal interest that transcends cultural differences, Mike founded Astronomers Without Borders in 2006. He now serves as President of this effort to unite astronomy and space enthusiasts around the world through those common interests. Mike and Astronomers Without Borders held leadership roles in the International Year of Astronomy 2009, a UN-declared year that sought to bring astronomy to the public worldwide while conveying its importance to our common heritage and experiences. Minor Planet Simmons was named in his honor in 2003, in part for his "varied outreach activities in astronomy".

Astronomers Without Borders is based on a simple truth – when we look up at the sky, no matter where we are, we know others are doing the same thing from other countries around the world. At similar latitudes the sky is identical regardless of where you are. And we all share the same wonder of the starry night sky, the planets and the entire Universe beyond. That wonder is part of the traditions of every culture, passed down through time. It will certainly be a part of our future as well.

But there's more to it than the beauty of the Milky Way's thousands of stars seen from a dark location. When we look up we're looking outward, into our cosmic neighborhood. With a telescope we see even further into the cosmic hinterlands. For adventurers who long to see what lies on the other side of every hill, the Universe offers unlimited mysteries.

The Universe – all that you see when you look up at the stars – is where we live. The Earth is one small part of it. If you've ever wanted to travel in space, just drive to a dark location, look up and take a look around. You're there, orbiting around our galaxy along with the rest of the inhabitants of Spaceship Earth.

(Continued on page 2)

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Everyone Welcome! Monday October 20th

Intro to Astronomy Begins: 6:30 pm. Location: OMSI Planetarium
General Meeting 7:30 pm. Location: OMSI Auditorium

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

Last Quarter Moon	New Moon	First Quarter Moon	Full Moon
Oct 15	Oct 23	Oct 30	Nov 06

The World at Night is a great demonstration of how we all share that magnificent view of the night sky. The team of expert landscape astrophotographers assembled by project founder Babak Tafreshi has imaged the night sky from locations worldwide, showing a blanket of stars above historic, cultural and natural landmarks with stunning results. Whether it's a church, mosque, or synagogue in the earthly foreground, the sky above is the same. We can change details of the orb we live on but the rest of the Universe hovers beyond our reach, untouched, practically unchanging.

This is the idea behind Astronomers Without Borders and the source of our slogan, One People, One Sky. The earthly view of the heavens is also strikingly similar to what some astronauts experience from their perch in orbit. Frank White coined the term, "The Overview Effect," in his book of the same name to describe the sensation astronauts often experience seeing the Earth hanging in space among the stars and other planets, without any apparent borders between us. I've told Frank I consider our view of the night sky to be the overview effect for the rest of us – those of us who will never travel out of Earth's atmosphere – and he agrees. When we connect with someone in a distant land, far beyond our horizon, and they're seeing the same sky we do (offset by time as the Earth rotates), the sensation of One People, One Sky is reinforced. The overview effect may not be as easy to visualize as from space – or as fun as being weightless – but it's there just the same.

I started Astronomers Without Borders after visiting countries like Iran and Iraq, and meeting people who are far more like us than they are different. They have the same needs, wishes and problems as anyone else. I've given many presentations on astronomy in those countries to astronomy clubs in the US, and the focus inevitably turns to the difficulties others have in pursuing our common activities. Equipment we take for granted is difficult or impossible to acquire in many countries. Dark skies are out of reach without transportation. The result is sympathy for the situation of our colleagues and a desire to help. There's nothing political about it – it's nature, our common heritage. And it's there for everyone, an unlimited resource. Why shouldn't we all share in it equally? The political and other issues that seem so important most of the time just become irrelevant, at least for that moment. This is purely people to people interaction of the most basic sort.

Astronomers Without Borders now has participants in most of the world's countries, with global programs that bring people together as never before. All based on our living on one planet, looking up at the same sky. An American amateur astronomer with the latest computerized gear and a student in a poor country may have different activities during the night but in the end they're there for the same reason. And they say remarkably similar things about the wonders of the night sky. After all, we're all looking out from the same place – Earth – and traveling together through the stars.

RCA 2014 Star Party Calendar

These are the currently scheduled star parties for the Rose City Astronomers club for 2014. As always, these are weather dependent. Star parties may be rescheduled or cancelled due to various factors. Re-schedules may be found here in the newsletter if enough advance notice is given. All updates will be posted to the online calendar and on the forum. Last minute cancellations are handled through the forum and it's email system. Directions for star party locations can be found online as well.

October

~~Oct 08 (Wed) OMSI Total Lunar Eclipse~~ SP
Oct 18 (Sat) Haggart Public Night
Oct 23 (Thu) OMSI Partial Solar Eclipse
Oct 24/25 (Fri-Sat) Maupin SP
Oct 24 (Fri) Rooster Rock SP
Oct 25 (Sat) Stub Stewart SP

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

RCA Logo Updated

David Nemo, RCA President

The RCA Board approved a new version of the RCA logo at their August meeting and it was unveiled at the August General Meeting.

The old logo was designed shortly after RCA was formed in 1988, and first appeared in the November 1989 edition of the RCA Gazette. No history of who designed it or what it represented could be found, so this article will serve that purpose for our new logo.

The need to update the logo initially became an issue due to the non-digital format of the original artwork and thereby the unsuitability of the logo for use in imprinting or embroidering on a wider variety of clothing and other items. In addition, feedback from new and younger members was that the logo appeared "old" and led them to presume the membership was also old and out-of-date. So, a secondary objective was to modernize the logo and give it a sharp, fresh, and younger look.

Members James Martyn and Alejandro Appel (both professional graphic designers) answered my call for help in coming up with something new – with the Board ultimately settling on the design by Alejandro. Rather than go a completely different direction, we decided to maintain the basic elements of the original logo with some fresh and modern touches.

While some thought the comet over Mt. Hood in the old logo was Hale-Bopp, it couldn't have been as Hale-Bopp didn't appear over Mt. Hood until 1997, nine years after the logo was created. But – we can say that now, as that was an iconic event that is worthy of being symbolized in our logo and certainly held the attention then, and in the memories still, of RCA members.

Yes, the rose is gone – but in subtle homage to the rose, we've kept some thorny stems. The new text typeface is Insignia , with its own version of a thorn on some letters. And finally, we've added the notation of the club being established in 1988, to acknowledge that RCA is in fact growing 'old'.

With the new logo of course comes NEW BRANDED CLOTHING – available for sale at our September meeting. And if you don't see something you would like to buy with the RCA logo on it, let Craig or Robin at the sales table know and we'll see if we can make it happen.

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, Nov 12th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Started for 2014, more to come.
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, Nov 7th, Noon
Location: McMenamin's on Broadway,
1504 NE Broadway, PDX
SIG Leader: Margaret Campbell-McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members Orientation / Introduction to Astronomy (alternate months)

When: Monday, Oct 20th, 6:30pm (Intro to Astronomy)
Location: OMSI Planetarium
Topic: TBD
SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/new_members.htm

Telescope Workshop

When: Saturday, Nov 8th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: Wednesday, Oct 22nd 7:00pm

Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leader: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

RCA Board of Directors			
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Director, Merchandise Sales (Merchandise Sales)	Craig Hlady	sales	@ rosecityastronomers.org
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Director, Youth Program (RCA Youth Program)	Kathy Kornei	youth	@ rosecityastronomers.org
Other Contacts			
Program / Project / Activity	*Name*	*Email Address*	
Astronomical Imaging Special Interest Group	Greg Marshall	ai-sig	@ rosecityastronomers.org
Cosmology Special Interest Group	Viktors Berstis	cosmology-sig	@ rosecityastronomers.org
Downtowners Lunch Special Interest Group	Margaret McCrea	downtown-sig	@ rosecityastronomers.org
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Observing Site Fund (Site Fund)	David Nemo	sitefund	@ rosecityastronomers.org
Sister Clubs	Margaret McCrea	sisterclub	@ rosecityastronomers.org
Starlight Parade Float	Sameer Ruiwale	starlight	@ rosecityastronomers.org
Telescope Workshop	John DeLacy Don Peckham	tw-sig	@ rosecityastronomers.org
RCA Member Forum	Larry Godsey	admin	@ rosecityastronomers.org
Webmaster	Larry Godsey	webmaster	@ rosecityastronomers.org
ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org

Starburst-Ring Galaxies

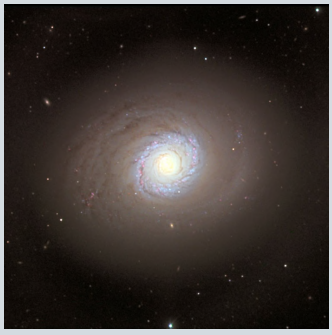
Explore the beautiful whorls of a distant island universe through your telescope.

By John W. Siple

M94's nested coils are fully displayed in this extraordinary photograph by Emil Ivanov.

Rings of organized matter abound in the universe. Our own solar system has Saturn, while a multitude of geometrically similar objects inhabit deeper space. Starburst rings are something of an anomaly in the visual study of galaxies. These are dusty gas fed structures, where heated streams of material on a vast scale are being drawn into slim jackets or bands. Brilliantly intense, star formation inside happens at an unusually vigorous pace.

Comparative database searching indicates that Messier 94 (NGC 4736) falls into this classification. As an occupant of the constellation Canes Venatici, it follows the Big Dipper around the celestial pole, offering unhampered access during a major portion of the year. A chart of the heavens places this 8th-magnitude object 3° northwest of Cor Caroli (α) in the mythological figure of Asterion and Chara.



Starburst-ring galaxies are places of aggressive internal activity. In this image of Messier 94 by scientist Adam Block (NOAO/AURA/NSF) the innermost band is undergoing intense star formation brought on by interaction with the central nucleus 3,800 light-years away. The outlying luminous halo contains significant arm structure that can be seen in larger astronomical instruments.

Pierre Méchain made the initial discovery of the galaxy on March 22nd, 1781. Several days later friend Charles Messier summed up his own observations: "Nebula without star above Charles' Heart. On the same parallel as the star beta. It is brilliant in the centre and the nebulosity is a little diffuse. It resembles the nebula which is below Lepus, No. 79, but is finer and brighter."

At a dimension of 11.2' by 9.1', M94 has a noticeably oval disk characterized by a confection of tightly wound spiral arms, dusty mottling and a stunning saffron-tinted core. The distant hurricane-shaped galaxy is in a nearly face-on orientation with respect to the Milky Way, which helps to showcase its multiple rings and embedded arms.

Many observers like Messier have been quick to point out how similar M94 is to an unresolved globular cluster. In a classic Celestron 4.5-inch "Polaris" reflector it certainly gives the first impression of a condensed mass of stars, but after closer study vague traces of an overlying spiral pattern begin to emerge. Because of its rather small size and strong surface brightness, M94 exults in high power views.

Telescopes constrained by aperture frequently display a luminous disk devoid of any outward rings. For those who have access to 6-inch and larger pieces of equipment a much greater visual appreciation is possible. Especially apparent is an intense central core that measures almost 30" across and an oval, collapsed annulus of surrounding material. Extending toward the periphery of the galaxy is a far dimmer halo of closely packed whorls, which dissolve into a number of irregular fragments as the telescopes' size is increased. At the very edge is another major feature of M94 — a great encircling ring that gradually fades into the dark background of extragalactic space.

This last so-called resonance structure has a measured diameter of approximately 15', making it the galaxy's largest contiguous ring zone. Hints of its existence may be detected in as little as a 4-inch telescope; at this aperture level skilled amateurs have described fleeting glimpses of a semi-detached circular band on the galaxy's outskirts, just beyond the brighter coiled disk.

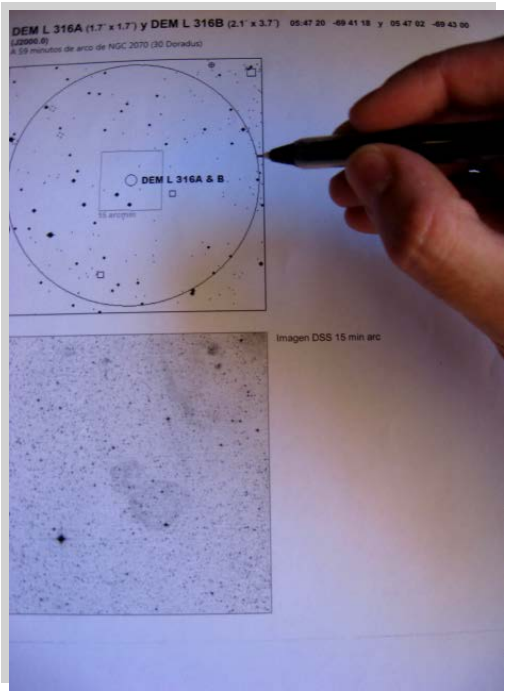
M94 is shown in a wonderful way through a 15-inch telescope. The object now offers an impressive canary-yellow center, pinpoint nucleus and a mesmerizing outer annex of thin spiral arms. However, the galaxy's finest feature still remains the inner 70" diameter halo of star formation, which appears as a tight matrix of patchy whorls.

Exploration of the 16 million light-year distant island universe by remote satellite imaging produces some fascinating results. Data culled from NASA's highly successful GALEX instrument package shows the object's varied structural intricacies in great detail. In the active ultraviolet, M94's inner starburst-ring has an intense laser-like luster. This is a telltale sign of younger stars, which radiate photons profusely in that part of the spectrum. Alternative views from SPITZER reveal an infrared cascade of dusty spiral arms along with an enhanced central hub.

The sky around Canes Venatici holds many common spirals but only one champion example of a starburst-ring galaxy. When scanning the area for such deep-sky treasures as the famous Whirlpool (M51) and Sunflower (M63), don't forget to add M94 to your list of favorites. It has a galactic opulence that is worth the eyepiece journey.

There is a Population of This Kind of Object in the Large Magellanic Cloud. Are They Accessible to Amateur Observers?, A Visual Analysis.

February 1987, the astronomical world was amazed by a powerful and wonderful phenomenon. A supernova appeared in the southern skies within one of our satellite galaxies, the Large Magellanic Cloud. During that time it was a top topic among scientists and amateur astronomers. For night sky observers the kind of objects that leave evidence of such an energetic event, a cloud of stellar material known as a "supernova remnant", has fascinated human beings for centuries.



Detailed charts are necessary to find the supernova remnants and identify their main features and morphology.

As an observer, you are surely familiar with what may be the best example of them, the "Crab Nebula" (Messier 1) in the Milky Way galaxy, visible toward constellation Taurus (the bull). But, where can we find other examples of a "dead star´s relic" in the sky? The Large Magellanic Cloud could be a good site to look for them.

I decided to carry out a short observing program containing four of this kind of object belonging to this nearby galaxy, which is high in the sky during the southern summer. I used the MCSNR (Magellanic Cloud Supernova Remnant Database) and the list given by C. Badenes, D. Maoz, and B. Draine in their paper **"On the size distribution of supernova remnants in the Magellanic Clouds"** (2010) to look for candidates to include in my list. The main criterion to select the sample to observe with a 16-inch dobsonian reflector was the brightness in optical wavelength. I have chosen supernova remnants that look seemingly brighter and more detached on DSS (Digitized Sky Survey) images and as isolated as possible from HII regions, thus avoiding a confusing identification of the target under observation. Certainly, DSS images are a very useful tool, in my opinion, to make this kind of analysis.

Several supernova remnants, like N157B[1] for example, or N159 (I talk briefly about this one in the article **"A Remarkable Complex in the Vicinity of 30 Doradus",** published in the May issue of the Rosette Gazette, Rose City Astronomers, 2012) lie in zones with prominent HII clouds so they are hard to identify. Both mentioned criteria drove me to compile the following short list, N49, N86,

DEM[2] L 316A & B, and N63A. Now the nights at the observing field will told me how easy or hard each supernova remnant is to see.

I spent two nights (January 3 and 4) to observe the first two supernova remnants (i.e. N49 and N63A). The observations were made when the galaxy was at its highest in the sky, around its transit through the local meridian.

The N49 Supernova Remnant

Embedded in the North Blue Arm[3], this is a bright X-ray and optical supernova remnant in the Large Magellanic Cloud (Long et al. 1981); certainly, it is the optically brightest object of this kind in this galaxy.

D.S. Mathewson and J. R. Healy identified this remnant while Park et al. (2003) state that its age is about 6,000 years. Moreover, it is almost surely the result of a type II explosion. You can see here a short video about this supernova remnant by the Chandra X-Ray Observatory.

Before observing this object I was reading papers and watching pictures about this magellanic remnant. It shows a peculiar shape suggesting me the nickname of "South America Nebula" (because of the mirror image of this part of the continent). I went to a place named "Potrerillos" to set up a 16-inch telescope and observe N49. The night was clear and dark so I had good conditions to study this object.

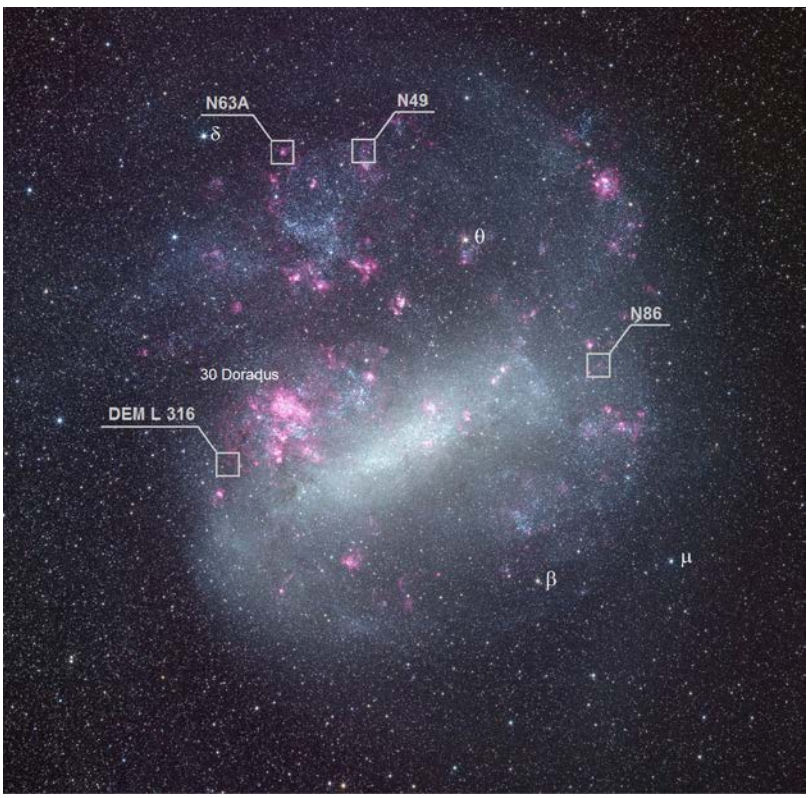


Figure 1. Picture of the Large Magellanic Cloud showing the positions of the four supernova remnants. North is up.

I made a first observation of the field where N49 lie using low magnification (43x). This eyepiece gave me a 1.2 degree field of view where the most conspicuous object is the globular cluster NGC 1978, which is clearly detected through a 16-inch. The other region dominating the zone is the 10 Myr old OB association[4] LH53[5] that lies about 10 arc minutes to the south-southwest of the remnant and is associated with it. It is also known with the entry 1948 in the more familiar catalogue NGC. It was discovered in 1826 by James Dunlop from Australia. This 11.6 magnitude association appears like a roundish hazy patch containing several faint stars of similar brightness that are better viewed using averted vision.

Some of very faint nebulosity seems to be in the zone connecting LH53 and NGC 1978.

At this magnification N49, with an angular size of 1.4 arc minute, is very difficult to see. If you look carefully using averted vision and with patience an extremely faint, smooth, round, and small nebulosity can be glimpsed. Higher power is necessary to see this remnant better. Take a look at **Figure 2.1**. There you will see a small nebulosity and a star very close to each other (indicated with β). This object was visible like a faint "defocused" star. In fact, it was visible more clearly than N49 at this power.

It is time now to see N49 using a little higher magnification. A 32mm eyepiece gave me 56x. Now N49 is more clearly visible, even with direct vision a small and rather round nebulosity is visible. However, averted vision improves the view, N49 appears then more contrasted against the background sky. The UHC filter improves a lot the view of the remnant which is clearly seen with direct vision. Using averted vision two or three brighter spots are visible within the object, higher magnification is necessary to try to see them better and with more detail. One of these spots looks a little brighter, being situated in the area indicated with number **1** in **Figure 2.1**.

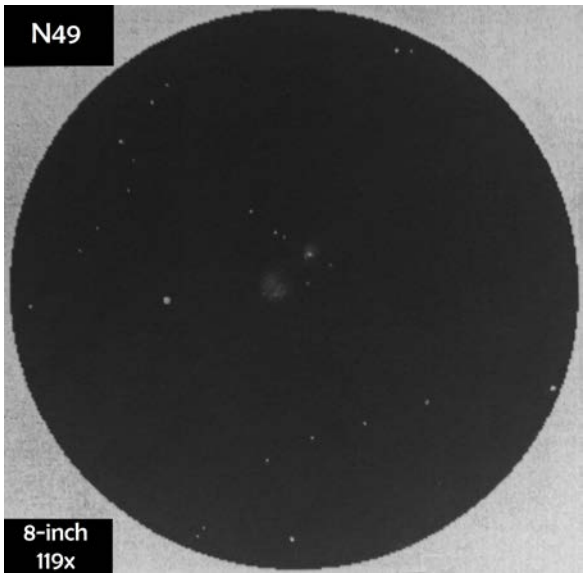
The "South America" and North America nebulae (left and right respectively). Two objects displaying "continental" shapes but with a very different origin. While the North America is a star forming region, the South America nebula is a vestige of a star that exploded in our neighbor galaxy thousands of years ago. Images are not at scale.

Using an OIII filter the view also improves. The bright spots are visible for moments. The view is not as sharp as that obtained with the UHC filter.

The background sky did not look too dark through the Orion Ultrablock filter. Very faint background nebulosity makes the view of N49 not so sharp. However, the view is better than that without a filter, with N49 being clearly identified in the field.

H-Beta was not useful to see this remnant.

The view at 106x starts to reveal some of the internal structure of the remnant. The view of N49 and LH53 is very interesting. The association is a conspicuous object in the field and now several of its stars can be seen. At this magnification N49 starts to show its peculiar shape, somewhat triangular. A small dark region seems to lie in the southwest part (blue arrow in **Figure 2.1**). Without a doubt the region **1** appears a little brighter.



N49 is in the reach of an 8-inch telescope. This sketch, made by the author, gives a clue of what to expect to see through this kind of instrument at 119x and dark sky conditions.

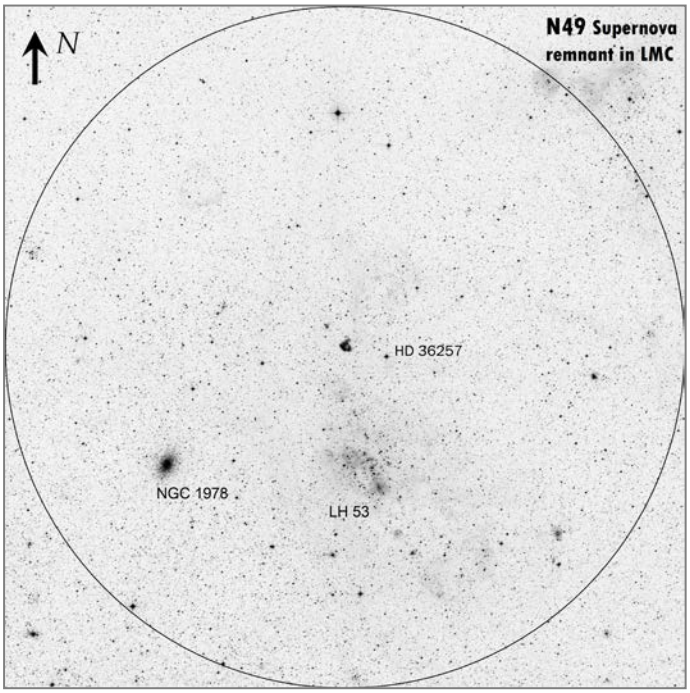


Figure 2. DSS image of N49 (center) and its surrounding field.

The UHC filter at this magnification helps to identify both the spots and the faint regions (see **Figure 2.1**). These regions show a smooth brightness.

I also used OIII and Orion Ultrablock at 106x. The first one helps to see the remnant. On the other hand, Ultrablock filter shows a brighter image and in this case the fainter regions of the remnant are a little better viewed. H-Beta filter was absolutely useless. Without any filter the small nebulosity and faint star are clearly visible (β in **Figure 2.1**).

I made a final observation of N49 using 200x. I think we are around the best magnification to see this supernova remnant.

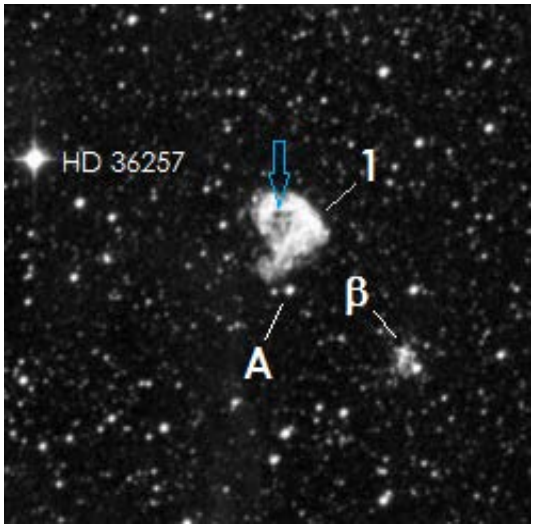


Figure 2.1 N49 supernova remnant

N49 looks just beautiful. Even if we are talking about a faint nebulosity this magnification makes possible to see and suggest the shape of South America including the dark lane or zone in the west part of this object. At this magnification the faint star (**A**) is visible. It is a good guide or "candle" to try to catch the narrow region of the remnant immediately to the left of this star on the image here. However, the "southern tip of South America" (north end of the remnant) was not possible to identify with certainty. I only used the UHC filter at this power and the view, as in the other cases, was improved. Zone **1** can be viewed appearing somewhat brighter and noticeable. The other fainter parts of the remnant were visible too but even with this filter the north end was not very well viewed.

Filter	Notes
UHC (Ultra High Contrast) Lumicon	Excellent. Very good contrast. Bright spots can be seen within the remnant
OIII	Very good. Bright spots visible for moments
Orion Ultrablock	Good. Less contrast than OIII
H-Beta	Useless. The remnant is not visible at all

The N86 Supernova Remnant

Situated at the west end of the stellar bar we find this object. A good way to find the area is to use the stars μ Mensae and θ Doradus that are visible with the unaided eye from dark sky sites. The position of the target is equidistant from these stars (see **Figure 1** on page 7).

Overall, the optical morphology of N86, which has an angular size of 3.5 arc minutes, shows a relatively well defined shell rich in internal filamentary structure, and a large jet-like feature extending to the north. It can be described (in optical morphology) in terms of four "quadrants", the eastern quadrant is the brightest of the three (paper "**Supernova Remnants in the Magellanic Clouds. II. Supernova Remnant Breakouts from N11L and N86"** R. M. Williams, Y. Chu, and J. R. Dickel, 1999). On a colorful note, we can say that N86 is also known by the nickname "Lionel Murphy Nebula" after Lionel Murphy who was a justice of the High Court in Australia. That nickname comes from Dopita, Mathewson and Ford, who studied the remnant and found that its shape resembles Murphy´s large nose.

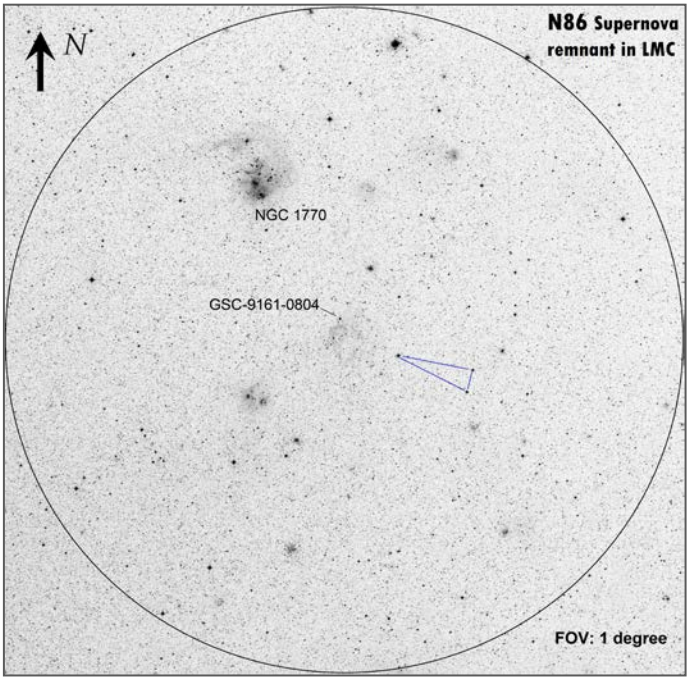


Figure 3. The N86 supernova remnant is the faint nebulosity immediately to the south of the star GSC-9161-0804.

I observed this object under very good seeing conditions. A first view of the field around N86 at 43x shows stars with rather similar brightness, without very bright stars. The most conspicuous object there is the cluster with nebulosity NGC 1770, discovered in 1826 by James Dunlop. Look at **Figure 3**, the stars forming a triangle were very useful to reach the accurate zone of N86 (which is at the center of the field in the image) with its vertex pointing to that area. The star GSC-9161-0804[6] in the picture was also visible at this power helping to scan the area looking for some nebulosity of this remnant.

Using some higher magnification (56x) a very faint nebulosity can be barely glimpsed using averted vision. The small nebulosity is coincident with the brighter region indicated by the DSS image of this remnant (see **Figure 3-1**). This brighter area lies in the eastern tip of N86, in the "eastern quadrant" mentioned above. A UHC filter brings the remnant to the view but still very faint and hard to see. A smooth nebulosity lies close to GSC-9161-0804. Averted vision and a very slight movement of the telescope were necessary to improve the challenging view. This filter seems to work a little better than an OIII, which makes possible to see this part of the remnant for a moment. On the other hand, an H-Beta filter is useless. Higher magnification is necessary for a better analysis of this supernova remnant.

I observed this remnant again on a different night using 106x. I must say that the galaxy was low in the sky at the moment of this observation (29 degrees) so the results of seeing N86 under this condition must be not the best. At this power some of extremely faint and subtle nebulosity seems to lie in the zone of the stars indicated with **A** in **Figure 3.1**. Using a UHC filter I was able to glimpse the nebulosity a little better close to the star GSC-9161-0804 (indicated with the arrow in **Figure 3.1**) and embedding the stars mentioned above. This area is the brightest portion of the remnant as appears in the DSS image. The view through the Orion Ultrablock filter was not as good as UHC but it was possible to glimpse some nebulosity embedding the stars **A**. I also observed this part of the remnant with an OIII filter. The faint nebulosity was visible using averted vision with a sharper view for a very brief moment.

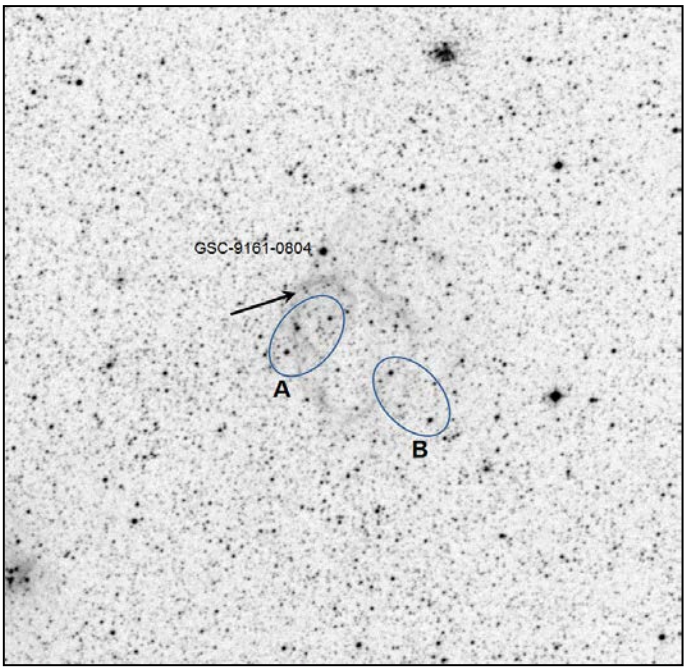


Figure 3.1. DSS image of the N86 supernova remnant

Even higher magnification (200x) makes it possible to see the field of the remnant with more details with the three stars (**A**) and the pair (**B**) identified. Averted vision is necessary to see them. I think the view at 200x was not better than that at lower power (106x). At 200x none of nebulosity is visible in the field. Using the UHC and Orion Ultrablock filters the faint nebulosity between the star GSC and the stars **A** was barely visible for moments.

The N63A Supernova Remnant

I should call it "the high-magnification-remnant". It is embedded in a larger H II region, N63, and appears to be located within the OB association NGC 2030 (LH83) (Chu & Kennicutt 1988). The SNR is expanding within a bubble produced by its progenitor within the N63 H II complex. N63A is believed to be the product of the explosion of a massive star in a dense and complex environment (Shull 1983; Hughes, Hayashi, & Koyama 1998) and is the first

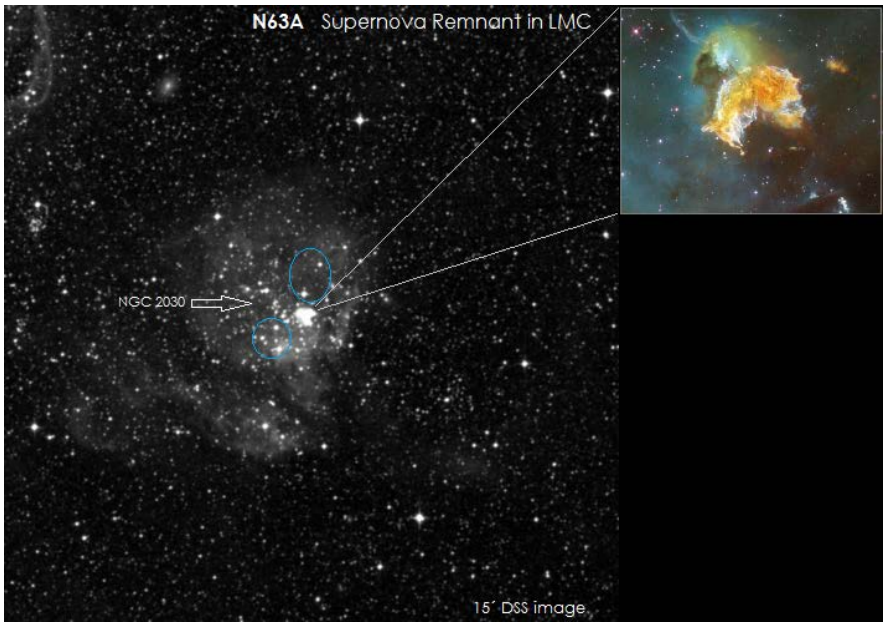


Figure 4. The small supernova remnant N63A. Even if the DSS image shows a "bright" and concentrated spot within a cluster with nebulosity, the view through a 16-inch is quite different, being a faint and elusive spot to catch. North is down, east to the right.

confirmed SNR in an HII region (Shull 1983), see **"Revealing New Physical Structures in the Supernova Remnant N63A Through Chandra Imaging Spectroscopy"**, Jessica S. Warren and John P. Hughes (2003).

Let´s start by saying that this is a very challenging object even for a 16-inch telescope. Although it is in an HII region (it doesn`t match one of my selection criteria) I thought this would be an easier object to visually observe taking into account the "brightness" of the remnant (shown in **Figure 4** above). If you compare it with the brightness of N49 on DSS images, you should think that it would be relatively easy to see…but that was not the case. I observed this object during a night of very good seeing on January the 4th 2014. The observing site, Potrerillos, offers good dark skies to see deep sky objects. My friend Carlos Gutierrez, who was observing Jupiter that night, stated that the view of the planet was really astounding. I think we had an excellent seeing, and the transparency was good enough.

I observed this remnant the night after the N49 observation. At 43x I scanned the surrounding field where N63A lies. The field shows some rather faint stars. Some of the brighter stars form a pattern I could easily identify to be sure I am in the accurate zone of this remnant. As I said before, this remnant is situated in the association NGC 2030. Wolfgang Steinicke's Revised NGC and IC Catalog shows this object like a diffuse nebula or a supernova remnant while the NGC/IC Project web page states that NGC 2030 is a cluster with nebulosity. It was discovered by John F. W. Herschel in 1826, He recorded it as *"bright, large, gradually brighter in the middle"*. It looks like a round nebulosity embedding several faint stars of similar brightness that are better detected using averted vision. One of the stars looks a little brighter.

Unlike N49, which is visible even at low magnification, N63A is not detected at 56x. Several stars embedded in the nebulosity of NGC 2030 are obviously better detected at this power and the brighter star is visible again when you see the stellar swarm using averted vision.

At 56x using a UHC filter the nebulosity of the association is better seen, appearing more detached and round in shape. Other nebulae areas jump into view in the field using this filter. I got a similar image using an OIII filter. With an H-Beta filter I could see a smooth and faint nebulosity. However, this filter did not help very much to try to identify the supernova remnant within the complex.

106x, at this magnification the detailed structure of the association is visible making it possible to identify the accurate position of the supernova remnant. The stars indicated with blue circles in **Figure 4** were identified and a faint nebulosity was visible engulfing those stars and the nearby area.

Using the UHC filter, that nebulosity looks more detached. In the zone where N63A lies I could barely glimpse, using averted vision, a very small slightly brighter spot (the remnant???). The view was very hard so higher magnification was necessary to try to get a better view. I decided then to ignore the other filters and apply higher power to the telescope.

Using 288x without any filter I could see the remnant! But it is still a very challenging and elusive object. Averted vision is necessary to see it, suggesting for moments a sort of roughly triangular shape, very small.

The view at this magnification with UHC was a little worse. N63A is situated in a nebulae area so the view was always difficult.

The Obscure DEM L 316 Supernova Remnant

I observed this faint object from Uspallata valley on February 1st, starting at 10:30pm local time (UT – 3hs) with the Magellanic Cloud at its highest point (53 degrees). The seeing was not perfect that night though to try to see which I guess is the faintest remnant of the list.

This peanut-shaped nebula was first noted by Mathewson & Clarke (1973) to have a high [S ii]/H_ ratio, a typical signature of supernova remnants (SNRs). The authors designated the two lobes of this system shells A (the northeastern shell) and B (to the southwest) (paper **"Supernova Remnants in the Large Magellanic Clouds VI. The DEM L316 Supernova Remnants"** R. M. Williams and Y.-H. Chu (The Astrophysical Journal, 635:1077–1086, 2005 December 20)).

These two shells are: A) two independent remnants superimposed along the line of sight (Mathewson & Clarke, 1973), B) a single supernova that exploded into an interconnected bubble formed by a stellar wind or a previous supernova (Lasker 1981; Mills et. Al. 1984), or C) "colliding remnants" (Williams et. al. 1997) (paper **"ASCA Observations of the Twin Supernova Remnants in the Large Magellanic Cloud, DEM L316"** by M. Nishiuchi, J. Yokogawa and K. Koyama, 2000).

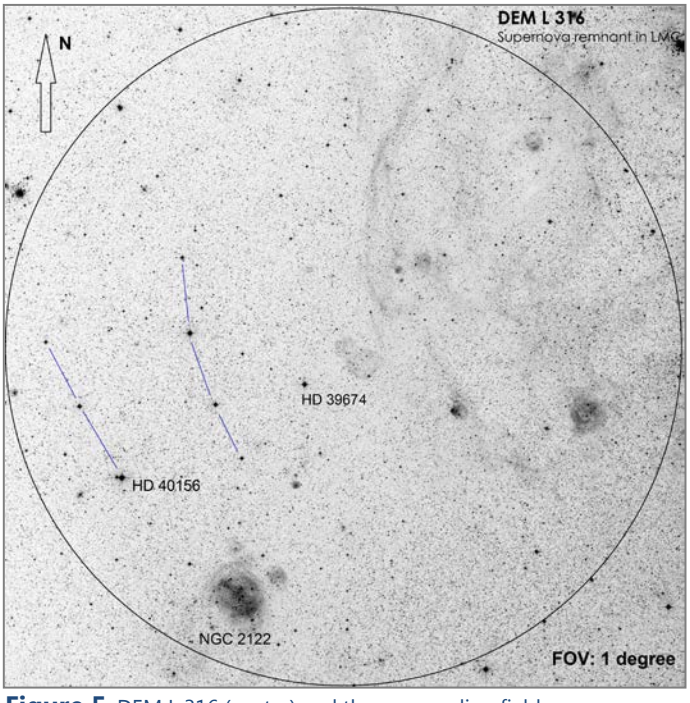


Figure 5. DEM L 316 (center) and the surrounding field.

At 43x the field of view shows the brightest stars grouped in the eastern region, being visual magnitude 7.6 HD 40156 the brightest one. The stellar patterns (stars linked with blue lines) in **Figure 5** were easily recognized thus confirming that it is the accurate area of the remnant. The most conspicuous object in the field is a bright and slightly northeast-southwest elongated nebulosity, NGC 2122. If you pay attention to the opposite zone (180 degrees from the stellar pattern, right on **Figure 5**) a very faint and extended nebulosity can be glimpsed. Just a small movement of the telescope toward the west makes possible to see more nebulosity with several faint stars and some small hazy spots embedded there, all of this a result of our proximity to the amazing complex 30 Doradus which lies at only one degree to the northwest of DEM L 316. At this magnification the target was not visible at all, only the stars labeled **A**, **B**, and **C** in **Figure 5.1** were identified (**C** appearing a little dimmer). Higher magnification is necessary to try to glimpse this object.

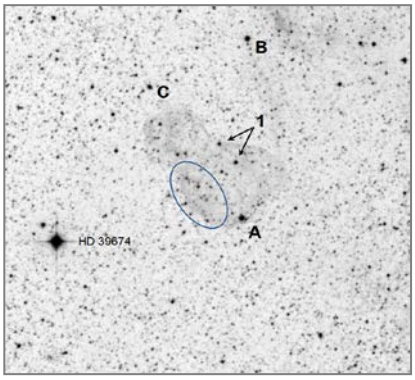


Figure 5.1. Close up view of DEM L 316

At 56x, the stars **1** in **Figure 5.1** can be glimpsed for a moment, appearing very faint. Even if the remnant is not visible at this power, the identification of the stars **A**, **C** and **1**, whose positions delineate (in some sense) the remnant, makes possible to concentrate the view on this small area. At this time of the observation I guessed that to try to see DEM L 316 would be a "retinal torture". Using an UHC filter, I could see for a brief moment and in a very hard way (using averted vision of course) a very dim and small nebulosity which position I have indicated with the blue ellipse in **Figure 5.1**. I can certainly not affirm I saw part of DEM L 316 because the nebulosity was in the very threshold of visibility (bigger scopes are welcome!). I get a similar view using an OIII filter. The ghostly nebula seems to be the south-east edge of the bigger lobule (DEM L 316 B). Like with the other remnants, the H-beta filter did not help to see this object.

At 106x the view starts to be more interesting. The pair of stars **1** is viewed much more clearly showing both stars a similar brightness. Once again, the extremely faint hazy area within the ellipse is visible with difficulty. I only used an UHC filter with this eyepiece but the view did not show an evident nebulosity.

Even at high magnification (200x) this remnant or parts of it are not easy to catch. DEM L 316 is a target for astrophotographers or owners of bigger aperture telescopes, always remembering that good conditions for transparency and seeing are a must for a successful observation.

CONCLUSIONS

This kind of obscure object can be a good target for those observers who want to test their capability of using averted vision and extreme visual conditions. Most of these supernova remnants were virtually invisible, at least in my observing conditions that consisted of a 16-inch "well-collimated" mirror, "my own eyes", "clean" optics, a site offering usually a value of 6.2 as a mean limiting magnitude sky (which is not the best limiting magnitude at all!), etc. Surely, other observers using bigger mirrors or the same aperture but under a darker sky would be able to see these objects a little better, at least in some cases. The cases of DEM L 316 and DEM L 299 (I observed this last remnant but I have not included a report in this article) are good examples of a situation where you must use averted vision and observe the zone for several minutes. Then take a couple of minutes of rest and observe it again. I´m sure that is a situation where you are undoubtedly in the "threshold of the imagination". Are you really seeing something like a tiny and very dim filament or is your brain trying to trick you?

Without a doubt N49 is, by far, the brightest and easier remnant to see. You will be able to see it even in smaller telescopes, like 8-inch for example, being obvious even without filters in bigger instruments. Well, if you see at least N49 you can be sure that you were able to add an extragalactic supernova remnant to your observing log files.

1_ **N** refers to the Henize Catalogue. The complete name of an object is LHa120-N1. "L" refers to the Lamont-Hussey Observatory of the University of Michigan; "Ha" means the Hydrogen-alpha emission line, the key signature line used in the survey; "120" refers to the plate number (objective prism plate) for the LMC; "N" labels the object as a nebula, as distinct from a star (label "S"). Some of the more complex nebulae are subdivided, using the letters A,B,C etc to indicate related knots of nebulosity within the complex.

2_ **DEM** is a catalogue of 357 nebulae in the Large Magellanic Cloud and 167 nebulae in the Small Magellanic Cloud that was published in 1976 by R.D. Davies, K.H. Elliot and J. Meaburn. The LMC catalogue is DEM L and the SMC catalogue is DEM S.

3_ This is the name of one of the structures extending off the ends of the LMC bar that are morphologically similar to spiral arms. The blue arm is still remarkable as the remains of a major star formation event in the outer disk of the LMC 100–160 Myr ago.

4_ **OB Association**: The concept of a stellar association was originally introduced in 1949 by V. A. Ambartsumian, who later separated them into OB and T associations (Ambartsumian 1968). Morgan, Sharpless, & Osterbrock (1952) considered as a stellar association any loose group of stars within an area where bright OB stars exist and with evidence of a common origin.
A recent definition of a stellar association (Kontizas et al. 1999) refers to it as a single, unbound concentration of early-type luminous stars, embedded in a very young star forming region.

5_ **LH** is a catalogue of OB associations in the Large Magellanic Cloud published by Lucke & Hodge (1970).

6_ **GSC** stands for Guide Star Catalogs, created by the staff of the Catalogs and Surveys Branch of the Space Telescope Science Institute.

October 2014

Oct 03	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
Oct 06	Monday	Board Meeting	OMSI Classroom 1	7pm
Oct 08	Wed	OMSI Lunar Eclipse	Milo McIver State Park	1am-5am
Oct 08	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Oct 11	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Oct 18	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Oct 20	Monday	Intro to Astronomy	OMSI Planetarium	6:30pm
Oct 20	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Oct 22	Wednesday	Cosmology SIG	Firland Apartments Community Room 8012 SE Raymond St., Portland, OR	
Oct 23	Thursday	OMSI Partial Solar Eclipse	OMSI East Parking Lot	1:30-4pm
Oct 24-25	Fri-Sun	Maupin Star Party	Wapinita Airstrip near Maupin OR	Evening
Oct 24	Fri	RCA Rooster Rock SP	Rooster Rock State Park	Evening
Oct 25	Sat	RCA Stub Stewart SP	Stub Stewart State Part	Evening

November 2014

Nov 03	Monday	Board Meeting	OMSI Classroom 1	7pm
Nov 07	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
Nov 08	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Nov 12	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Nov 15	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Nov 17	Monday	New Member Orientation	OMSI Planetarium	6:30pm
Nov 17	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Nov 19	Wednesday	Cosmology SIG	Firland Apartments Community Room 8012 SE Raymond St., Portland, OR	7pm
Nov 21	Fri	RCA Rooster Rock SP	Rooster Rock State Park	Evening
Nov 22	Sat	RCA Stub Stewart SP	Stub Stewart State Part	Evening

http://www.rosecityastronomers.org

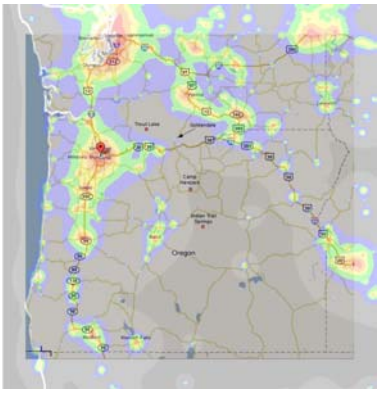
Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356

The Rosette Gazette

Volume 27, Issue 11 Newsletter of the Rose City Astronomers November, 2014

Losing the Night Sky
David Ingram

David Ingram is the Chairman of Dark Skies Northwest, which is the Northwest Section of the International Dark-Sky Association. Their mission is to be a focal point for light pollution issues in the NW, promote quality outdoor lighting, promote and preserve the night sky and educate the public about the problems of light pollution and its solutions.



NW Light Pollution Map

Light pollution is any adverse effect of artificial light, including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste.

Light pollution wastes energy, disrupts global wildlife and ecological balance, and has been linked to negative consequences in human health.

Mission of the IDA:

The mission of the International Dark-Sky Association (IDA) is to preserve and protect the nighttime environment and our heritage of dark skies through quality outdoor lighting.

Goals:

1. Stop the adverse effects of light pollution, including;
   - Energy waste, air and water pollution caused by energy waste
   - Harm to human health
   - Harm to nocturnal wildlife and ecosystems
   - Reduced safety and security
   - Reduced visibility at night
   - Poor nighttime ambience
2. Raise awareness about light pollution, its adverse effects, and solutions
3. Educate about the values of quality outdoor lighting.

Photo of Portland by Katie Mahorney

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Everyone Welcome! Monday November 17th

New Members Orientation Begins: 6:30 pm. Location: OMSI Planetarium
General Meeting 7:30 pm. Location: OMSI Auditorium

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

Last Quarter Moon	New Moon	First Quarter Moon	Full Moon
Nov 14	Nov 22	Nov 29	Nov 06

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, Nov 12th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Start in February 2015.
Location: Kennedy School
See http://www.rosecityastronomers.org/youth/youthAA.htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, Dec 5th, Noon
Location: McMenamin's on Broadway,
1504 NE Broadway, PDX
SIG Leader: Margaret Campbell-McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members Orientation / Introduction to Astronomy (alternate months)

When: Monday, Nov 17th, 6:30pm (New Members)
Location: OMSI Planetarium
Topic: TBD
SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/new_members.htm

Telescope Workshop

When: Saturday, Dec 6th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw.htm

Astrophysics / Cosmology SIG

When: Wednesday, Nov 19th 7:00pm

Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leader: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www.rosecityastronomers.org/sigs/cosmology.htm

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Newsletter Editor (Rosette Gazette)	Vacant *Larry Godsey, pro tem*	editor	@ rosecityastronomers.org
Observing Site Fund (Site Fund)	David Nemo	sitefund	@ rosecityastronomers.org
Sister Clubs	Margaret McCrea	sisterclub	@ rosecityastronomers.org
Starlight Parade Float	Sameer Ruiwale	starlight	@ rosecityastronomers.org
Telescope Workshop	John DeLacy Don Peckham	tw-sig	@ rosecityastronomers.org
RCA Member Forum	Larry Godsey David Nemo	admin	@ rosecityastronomers.org
Webmaster	Larry Godsey	webmaster	@ rosecityastronomers.org
ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org

RCA 2014 Star Party Calendar

These are the currently scheduled star parties for the Rose City Astronomers club for 2014. As always, these are weather dependent. Star parties may be rescheduled or cancelled due to various factors.

Updates will be posted to the website calendar and on the forum. Last minute cancellations are handled through the website, forum and it's email system. Directions for star party locations can be found online as well.

November

Nov 15 (Sat) Haggart Public Night
Nov 21 (Fri) Rooster Rock SP
Nov 22 (Sat) Stub Stewart SP

December

Dec 13 (Sat) Haggart Public Night
Dec 19 (Fri) Rooster Rock SP
Dec 20 (Sat) Stub Stewart SP

Elections for RCA Officers

At the November General Membership Meeting we will be voting on the following RCA officers candidates for 2015:

David Nemo - President

Ken Hose - Vice President - Membership

Jim Higgs - Vice President - Outreach and Education

Photo not available

John Taylor - Vice President - Communications

Mark Martin - Vice President - Programming

Photo not available

Steve Weiler - Vice President - Observing

Larry Godsey - Treasurer

Photo not available

Duncan Kitchin - Secretary

RCA Book/Video Library

The Rose City Astronomers maintains a comprehensive club library of astronomy related articles, books, CDs and videos. These items can be borrowed by members through checkout at the general meetings for a period of one month with renewals available by phone or e-mail to the club library director.

RCA LIBRARY BOOK SALE

However, from time to time, the RCA Library reduces its excess inventory with a book sale with fantastically low prices. Check the library sales table this month at the General Meeting for the many bargains available.

EQUIPMENT DIGEST

Classic Telescopes in Astronomy

An obscure Sears 3.5-inch refractor from the early 1970s entices collectors.

By John W. Siple

VINTAGE hardware in astronomy is beautifully expressed by refractor technology. The Illinois-based industry giant Sears, Roebuck & Co. has a rich history of commercial sales, with a broad-ranging display of celestial-themed memorabilia. Especially fundamental to many collectors are their cost-effective 2.4- and 3-inch models, which were sold in great abundance during the last 20th century.

For three years, starting in 1970, a new 3.5-inch F/16 "Discoverer" became an infrequent but highly touted visitor to their legendary catalog pages. To date, only an estimated 400 complete instruments are known to have been pledged for customer review and purchase. Somewhat unorthodox in design but above standard in performance, this comparatively rare Sears product has achieved a very high ranking among devoted classic telescope fans.

An initial advertisement appeared in the Fall and Winter "big book" of 1970, where it was offered at a reasonable price of $499.95. In the company's numbering system a sequence of #6345 confirms the 3.5-inch (metric 90mm) refractor's identity. Exceeding the aperture boundary of its smaller trusted sales companions by a slight margin, this luxury model possesses the light gathering ability of 165 human eyes.

The long-focus refractor was crafted exclusively in Japan by master opticians. Through international marketing agreements, Astro Optical Industries Co., Ltd. was assigned the task of supplying the prestigious telescope. Since 1957, this particular overseas manufacturer was the primary source for equipment acquisitions by both Tasco (think of their "Solarama" line) and Sears. Judging by the positive response, Astro's precision merchandise had a major influence on optical sales throughout the world.

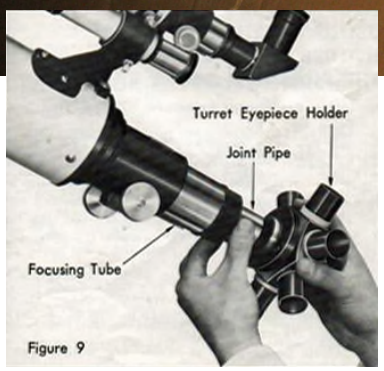
To many wishful astronomers, this special Discoverer offered a magical entry into the field of refractor ownership. Ever since Sears directed its distribution, the interest among skygazers has been overwhelming. It was also a viable alternative to comparable Unitron equipment, which for decades had been setting a standard of excellence in the telescope industry.

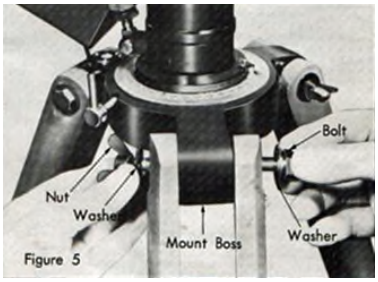
Very limited numbers of the #6345 telescope were made available by Sears. Two catalog promotions from the early 1970s are displayed directly below, courtesy of Sears Archives.

The thrill of owning and operating another superbly performing instrument from Sears had just settled in when production ceased suddenly in 1972. A dramatic price drop to $299.95 was the strategy used to closeout the remaining inventory. (In 1971 it supposedly had a cost of $399.95.) As a result of the telescope's limited availability and other factors, contemporary worth often exceeds $1,000 or more at sanctioned auction sales.

The author's equipment diary boasts a total of six separate #6345 purchases. In fact,

Only about 400 of these rare Sears telescopes are known to exist. Always in demand, they are considered a leading item in most collections.





A sturdy cardboard carton with molded blocks of Styrofoam acts as protection during shipment and storage. At left is a simple series of diagrams (courtesy of Sears) that help guide assembly. The tracking motor for right ascension is the boxlike device shown in Figure 7.

they were discovered under a wide range of serendipitous and sometimes entertaining circumstances. In the quest for secondhand equipment, local and regional purchases provided the best values, where firsthand inspection and direct negotiation was possible. Conducting long distance transactions, such as from eBay and Craigslist, were forthright but never resulted in true bargains.

It was a classified advertisement in the *Oregonian* newspaper which ultimately became the incentive for future searches. The desirable telescope was located in the basement of a house in Milwaukee, a large Portland suburb, and belonged to an avid model railroader. His reason for selling the Sears refractor was simple: he needed the money to fund more train projects. (The floor of his basement was one big hobby layout with tons of track, tunnels, and stations.)

The telescope itself was in fair shape but unfortunately missing the original wooden tripod and 40mm auxiliary viewfinder. To compensate, he quickly pointed out its many remaining positive features and fair asking price. As a last courtesy, the seller ran one of his prized locomotives, its whistle signaling the transfer of this rare Sears treasure (serial number 990381) to a satisfied new owner.

Several years later, word of my interest in astronomy appeared in a workplace publication about employee activities. One reader of this February ’92 interagency bulletin was a Spokane field geologist and amateur stargazer who had several oddball pieces of equipment for sale. We eventually met east of Portland on a rainy Columbia Gorge day, the back of his vehicle holding an 8-inch F/8 Cave Astrola reflector telescope. (The genuine Alika K. Herring primary mirror, circa 1961, later became an article topic for *Sky & Telescope* magazine.)

A once neglected Sears #6345 mounting head was also cheerfully acquired during our brief visit. Beautifully preserved, it had all of the features common to that product — counterweights, control cables, and a working tracking motor. Inasmuch as it was a real pleasure to find, a frustrating mystery still surrounds the unexplained loss of the valuable (and irreplaceable) tube assembly.

The Table Mountain Star Party near Ellensburg, Washington attracts vendors and hundreds of other participants from throughout the region. In 1997, while attending the event it was noticed that a Seattle area exhibitor had brought an interesting truckload of miscellany. Buried among the items was the welcomed presence of a Sears #990383 refractor, which soon found a place in my Toyota sedan. Unfortunately the integral star tracking motor was missing, a somewhat annoying but tolerable problem. (Optically it proved to be a real gem and absolute paragon of mechanical movements, providing many memorable views of the stars and planets.)

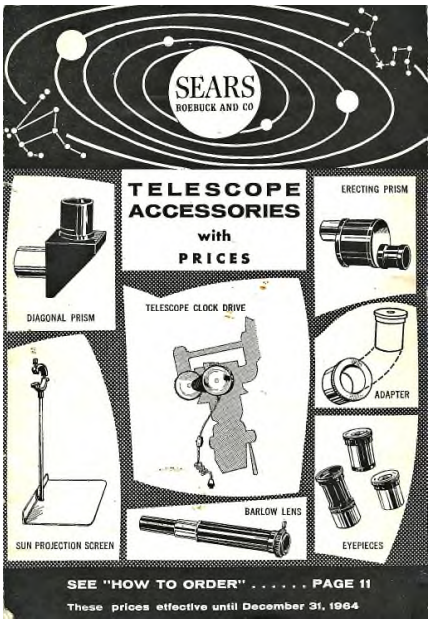
Fast forward ten years to an era now dominated by rapid internet communication and frequent online dealing. This switch in venue produced two more nicely crafted 90mm telescopes from Sears. A remote com-

mercial turf made personal inspection almost impossible; tidbits of information about each telescope were trusted to the seller despite some reserved skepticism.

San Diego, California sets the stage for a successful Craigslist purchase. Here, pictured in the fenced backyard of a rural Spring Valley residence, sat a battered but fully functional stargazing tool. Definitely not in showroom condition, it displayed a legacy of cosmetic issues that included a scratched white metal tube and water damaged objective lens.

The serial number was #990112, identifying it as the 112th model in a closed sequence of approximately 400 instruments. Despite its pitfalls the 1970's imported Sears refractor still gives a convincing performance, regularly showing fine detail in distant galaxies and on the lunar surface.

Another glimpse through the public internet resulted in the procurement of #990152. Found by a thrifty individual at an estate sale



Literature from Sears included this pamphlet, which lists many of the accessories found on the 3.5-inch F/16 telescope (above, circa 1964). Right: An improvised metal base provides added stability for a classic Discoverer telescope.

in neighboring Ventura, it was eventually posted through an astronomy forums' website. In much better condition than #990112, this Sears work was without a tracking device, one item apparently overlooked during the impromptu rummage hunt.

From emails, it was discovered that the telescope once belonged to a family patriarch who had recently passed away. Before the sale relatives used it to briefly view a comet, but since no one expressed interest in saving the telescope it later became part of the estate belongings. An unlikely but fortuitous set of circumstances sent this rare classic to a new home across the Oregon border and into the hands of an enthusiastic collector.

Sears' knack for commercial expansion is exemplified by the Midtown Exchange, a major retail store and regional hub that once employed nearly two thousand workers. Built in 1928, it is conveniently located on Lake Street in Minneapolis, Minnesota. (Eight years ago the famous landmark was redeveloped into the Midtown Global Market, a local network of affordable shops and community services.) A flashback to the early '70s finds a Lake Street store manager considering the closeout sale on a large Discoverer telescope, which was later purchased as a gift for his father in-law.

An unsolicited telephone inquiry earlier this year from the retired manager's wife led to my ownership of this fine #990354. Assembled only once in Minneapolis, it had gathered dust and cobwebs from storage in their attic. A wonderful piece of nostalgia, it turned out to be in superb shape with an untouched objective lens. (The 1400mm focal length refractor is pictured in its cardboard crate on the previous page.)

However, nothing lasts forever in a collection. Our writer's #990381 (optical tube only) made its way to an astronomy enthusiast in Vancouver after much negotiation, the Sears #990112 of Craigslist fame is used nightly, #990383 went in a roundabout way to a Chicago area collector and the single mounting platform of Spokane heritage is carefully stored away, its occasional purpose to hold various types of quality, older Japanese and American-made optical gear.

The Midtown Exchange building of Minneapolis as it appeared in 1941, which was the source for the author's latest #6345 acquisition. Photograph from the Norton & Peel Collection.

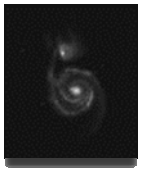
Although deemed a good optic, #990152 was nevertheless auctioned off at a loss to a fellow member of the astronomer's guild. With its documented provenance and unusual condition #990354 remains the center of attraction at home. Literature and related paper memorabilia grace bookcase shelves, finding use on cloudy nights.

Before an extended tryout, certain changes to existing pieces of equipment are highly recommended. Replacement of the both the weak tripod system and trunnion sleeve may become necessary. Some people purchase a tall metal pier for added stability, while the thin wrap-around cradle rings (which can cause scratching) are often upgraded with thicker diameter versions from such companies as Parallax Instruments.

An advertisement in the *Starry Messenger*, a long out-of-print classified shopper, produced a wonderful pedestal substitute from Pentax. Homemade stands also work great. The top portion of an orange cast iron pillar stand is shown holding #990152. It was fabricated years ago by a Portland area resident (he took first place in his Benson High School welding class for the project).

The Sears #6345 odyssey continues with the hunt for more lucrative equipment. Because of a limited abundance, it's not an easy task for today's generalist collector. Organized searches have shown a dearth of available low cost models. Online auctions relinquish an occasional instrument, calculated at the rate of one or two per year, but the majority of 90mm telescopes remain hidden in dark attics and basements.

To everyone's best knowledge nothing below #990100 has yet appeared. In some corner of the world a coveted #990001 must exist, its value exceeding that of any currently known Sears Discoverer. Maybe a future collector will stumble upon this iconic treasure and finally settle the debate about those missing low numbered telescopes.

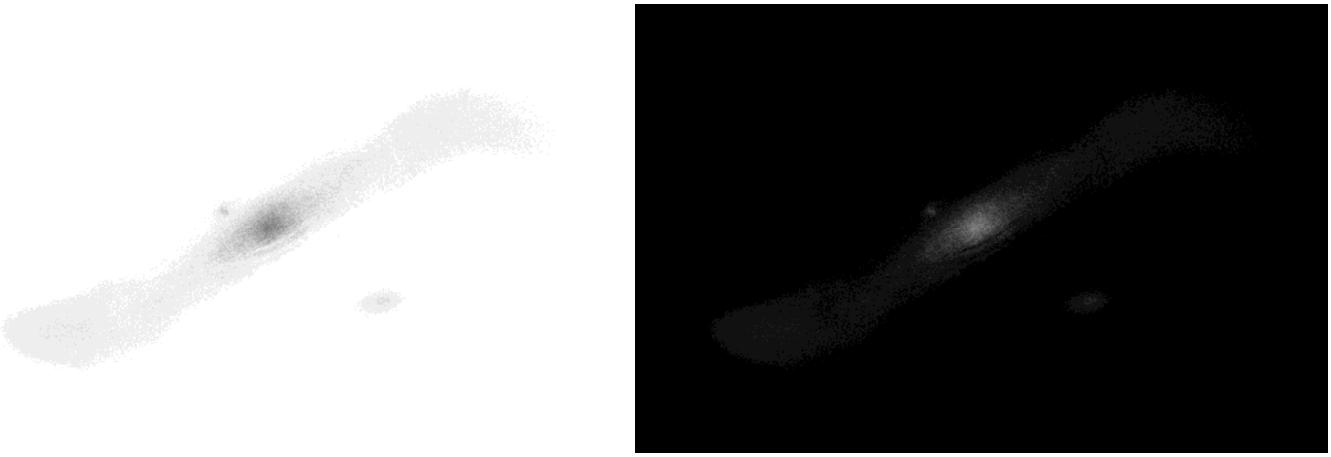


The M31 Twist and Fast Scopes

I recently completed an 8 inch f 3.3 Dobsonian and enjoyed observing with it at the Oregon Star Party this past August for the first time under dark skies. As you might imagine, a scope this size and short focal length excels at very wide field observing, and my most memorable and unexpected observation was of M31's twist.

Never heard of M31's twist? Neither had I until I plainly saw it in the 8 inch at 37x with my first glance in the eyepiece. M31 and its two main satellite galaxies, M32 and M110, were nicely framed in the eyepiece with M31 nearly spanning the entire width of the fov. I expected to see the tilted disk of M31 highlighted with a few star clouds, but what I saw was the disk with what appeared to be a distinctive tuft trailing off each end like water out a gently rotating sprinkler. Was I ever surprised!

By the way, the near side (facing M110) seemed quite straight and was highlighted by two dust lanes. The far side (facing M32) looked slightly curved

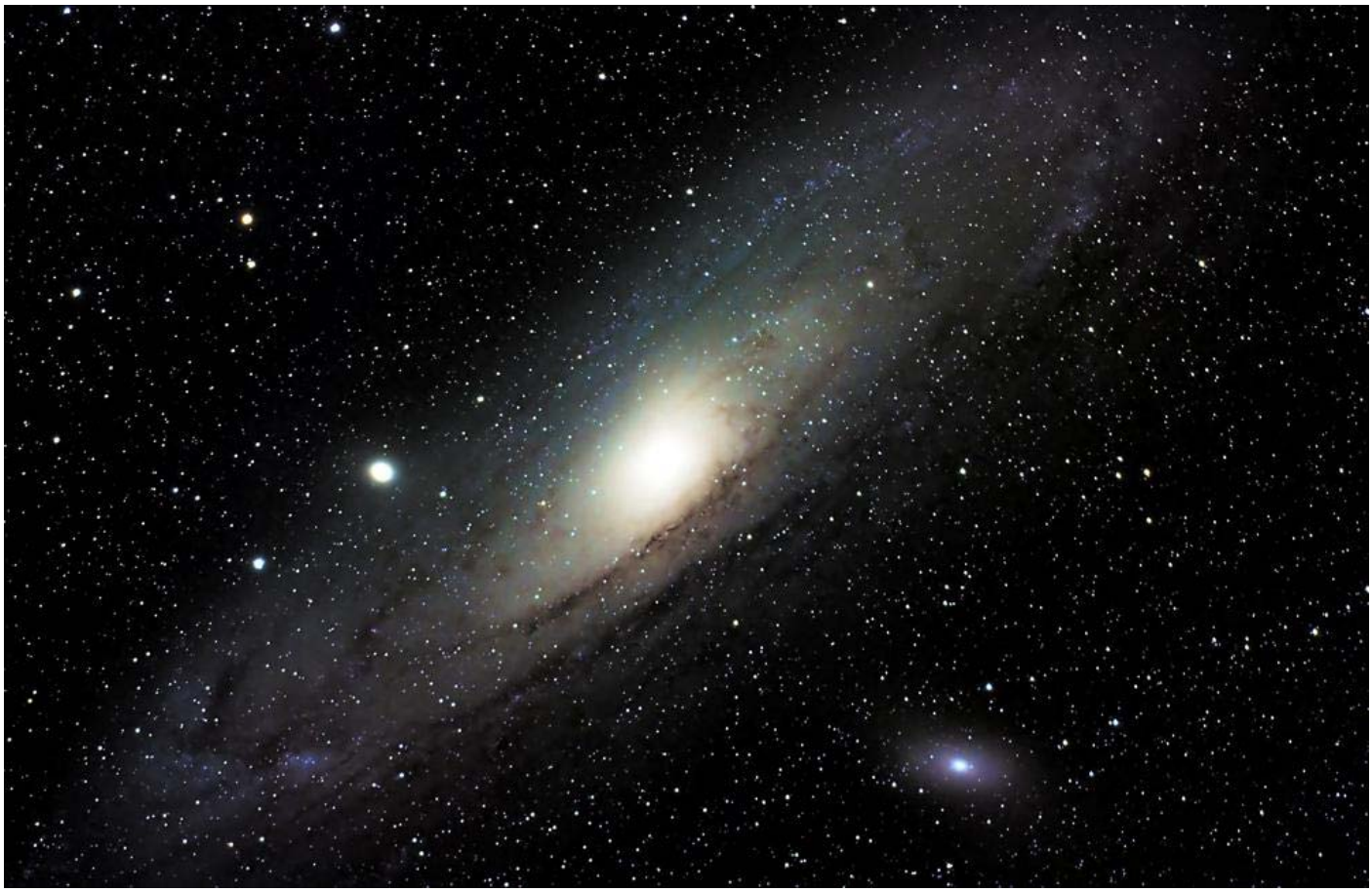


This is my sketch of M31's twist from the 2014 OSP using the 8 inch f3.3 scope. The lack of stars is an indication of the quick nature of the sketch.

M31 is a disturbed spiral, and is organized more in concentric rings than distinct arms, so what I saw is likely the brighter parts of the star forming regions that are most densely grouped toward the outer regions of M31's disk. From our perspective in the Milky Way, this appears to give M31 its twist.

You can see these blue-ish star clouds in the photo below, most noticeably to the lower left, and get a hint of the twist if you squint just right. But photos don't show what the eye perceives, so to really see the twist you'll have to see it through a short focus scope.

Continued on next page



http://www.phy.davidson.edu/FacHome/mjb/astrophotography/mario2011/jpg/m31_618mm_LRGB_19by600_26by300sV2.jpg

While I was describing my observation of M31 to several people at the OSP, including Mel Bartels, he said, “Oh, you saw M31’s twist!” Mel had seen the twist previously in his wonderful 6 inch f2.8 and 10 inch f2.7 scopes, and before the star party was over I had a look at M31 through both these scopes. The twist was most pronounced in his 6 inch because it had the wider fov and put M31 in the best context with its surroundings – a marvelous view.

In general, small, fast scopes provide new perspectives on familiar objects because of their ability to provide a larger context with significant light gathering ability. For now, they’re not widely available because the fast primary mirrors take considerably more time and skill for opticians to make to the same quality as a common f5 optic.

Steve Swayze is the only optician I know of that will make small mirrors like this professionally, and we’re fortunate that he’s in Portland. Of course, you can make one yourself but be prepared for a challenge because the sweet spot for a well corrected parabola in the f3 range is really, really small.

To get an idea of what can be seen beyond M31’s twist in small, fast scopes, see some of Mel’s sketches using his 6 inch f2.8, along with a discussion about building and using this scope at:

http://www.bbastrodesigns.com/6inchF2.8/6%20Inch%20F2.8%20Telescope.html

"20 Things You Didn't Know About Galaxies"

by Katherine Kornei -- also appearing in this month's DiscoverMagazine.com."

1. Eighteenth-century philosopher Immanuel Kant was one of the first people to theorize that the Milky Way was not the only galaxy in the universe. Kant coined the term island universe to describe a galaxy.

2. Astronomers now estimate that there are 100 billion galaxies in the observable universe.

3. One of the earliest uses of the English term Milky Way was in Geoffrey Chaucer's 14th-century poem "The House of Fame." He likened the galaxy to a celestial roadway.

4. While we're talking road trips: Due to the expansion of the universe, most other galaxies are receding from our own. Galaxies farther from the Milky Way are speeding away faster than those nearby.

5. Some of the galaxies receding from the Milky Way are ellipsoidal, like footballs. Galaxies can also be thin and flat with tentacle-like arms — just like the Milky Way.

6. Galaxies come in irregular shapes, too, including many dwarf galaxies. These galaxies, the smallest in the universe, contain only a few hundred or a few thousand stars (compared with 100 billion stars in the Milky Way).

7. You'll often find dwarf galaxies clustered around larger galaxies.

8. Dwarf galaxies frequently lose their stars to their larger neighbors via gravity. The stars stream across the sky as the dwarf galaxies are ripped apart. Alas, you can't see it with the naked eye.

9. You also can't see the enormous black hole lurking in the center of the Milky Way, though if you've ever looked at the constellation Sagittarius, the archer, you've looked in the right direction.

10. Most galaxies have a black hole at the center, and astronomers have found the mass is consistently about 1/1000th the mass of the host galaxy.

11. Two of the closest galaxies to the Milky Way — the Small Magellanic Cloud and the Large Magellanic Cloud — may not have black holes. Or, because both are low-mass galaxies, their central black holes may be too small to detect.

12. Every galaxy does have dust, though. Produced by stars, the dust causes light to look redder than it really is when observed visually, which can make it difficult for astronomers studying properties of stars.

13. That dust can really travel, too. Some galaxies drive galactic winds, expelling dust and gas at hundreds of kilometers per second into the intergalactic medium, the space between galaxies.

14. These winds are caused by starlight exerting pressure on the dust and gas; the fastest galactic winds are in distant galaxies that are forming stars more rapidly than the Milky Way.

15. The Milky Way rotates at about 250 kilometers per second (about 560,000 mph) and completes a full revolution about every 200 million years.

16. One galactic revolution ago, dinosaurs ruled the Earth.

17. Galaxies rotate faster than predicted based on the gravity of their stars alone. Astronomers infer that the extra gravitational force is coming from dark matter, which does not emit or reflect light.

18. Dark matter aside, galaxies are mostly empty space. If the stars within galaxies were shrunk to the size of oranges, they would be separated by 4,800 kilometers (3,000 miles).

19. If galaxies were shrunk to the size of apples, neighboring galaxies would only be a few meters apart. The relative proximity of galaxies means that galaxies occasionally merge.

20. In about 4 billion years, the Milky Way will merge with the Andromeda galaxy. The result of the merging process — which will take at least a hundred million years — will be an ellipsoidal galaxy nicknamed "Milkomeda."

2015 RCA Calendar $10

With over 80 photographs to choose from it was a really hard choice this year to pick just 13 of them for the 2015 calendar.

Many thanks to all who submitted their photographs.

The 2015 RCA Calendars will go on sale at the November 17th General Meeting.
Also available via US Mail—see RCA website for details

Katie Mahorney
PORTLAND AT NIGHT

KEN HOSE
IC 342 (CALDWELL 5)

RUFUS DAY
HEART NEBULA (IC 1805)

PAT HANRAHAN
NAMBIAN SKY

TOM LOGAN
LEO TRIO

BRUCE ALBER
MAUNA KEA OBSERVATORIES

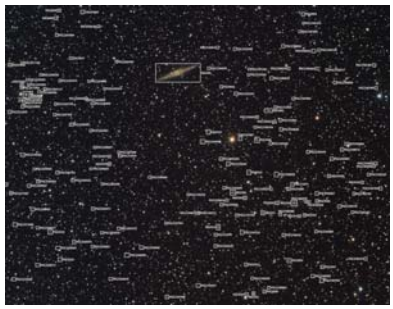
PAT HANRAHAN
ETA CARINAE NEBULA

BRUCE ALBER
MT ST HELENS & THUNDERSTORM

TOM LOGAN
CYGNUS WALL

JOHN CORBAN
LUNAR ECLIPSE

JOHN CORBAN
ALBIREO



DUNCAN KITCHIN
NGC891 & NEARBY GALAXIES

MATT HEATH
HACETA HEAD LIGHTHOUSE

November 2014

Nov 03	Monday	Board Meeting	OMSI Classroom 1	7pm
Nov 07	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, PDX	Noon
Nov 08	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Nov 12	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Nov 15	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Nov 17	Monday	New Member Orientation	OMSI Planetarium	6:30pm
Nov 17	**Monday**	**General Meeting**	**OMSI Auditorium**	**7:30pm**
Nov 19	Wednesday	Cosmology SIG	Firland Apartments Community Room 8012 SE Raymond St., Portland, OR	7pm
Nov 21	Fri	RCA Rooster Rock SP	Rooster Rock State Park	Evening
Nov 22	Sat	RCA Stub Stewart SP	Stub Stewart State Part	Evening

December 2014

Dec 01	Monday	Board Meeting	OMSI Classroom 1	7pm
Dec 05	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, Portland	Noon
Dec 06	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Dec 10	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Dec 13	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Dec 15	**Monday**	**Holiday Potluck**	**OMSI Auditorium**	**6:30pm**
Dec 19	Fri	RCA Rooster Rock SP	Rooster Rock State Park	Evening
Dec 20	Sat	RCA Stub Stewart SP	Stub Stewart State Part	Evening

http://www.rosecityastronomers.org

Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356

The Rosette Gazette

Volume 27, Issue 12 Newsletter of the Rose City Astronomers December, 2014

RCA Members Potluck
Monday, December 15th 2014—6:30pm to 8:00pm

Our Annual Holiday Potluck dinner will be held on Monday, December 15th at 6:30pm in the OMSI Auditorium. This is our opportunity to celebrate and enjoy each other's company and it is a members-only event. We will have a short program starting at 7:30pm.

The Book Library, Telescope Library and Membership tables will not open for the evening.

The Sales Table will be open for a few minutes after the short program and will be selling only the 2015 RCA Calendar, which are still only $10.

= = = = = = = = = = Dinner = = = = = = = = = =

The club will provide ice, plates, and eating utensils. Please bring your own beverages (no alcohol allowed). We will be depending on each other to provide most of the food (and the club will provide some pizza again this year) so please bring a dish large enough for several people and appropriate serving utensils.

Below are the suggested dishes:

If your last name starts with:	Please bring:
A thru K	Main Dish
L thru Q	Dessert
R thru Z	Side Plate

To be fair, the dishes requested for each range of letters rotates each year.

At 7:30pm there will be a short program, and we are planning on finishing by 8pm.

All RCA Members Welcome! Monday December 15th
Our Annual Holiday Potluck
Dinner Begins 6:30pm—Short Program 7:30pm
Location: OMSI Auditorium

In This Issue:

RCA is a member of the Astronomical League.
http://www.astroleague.org

Trout Lake Star Party photo above courtesy Michael Minnhaar
Moon photos below courtesy David Haworth

Last Quarter Moon	New Moon	First Quarter Moon	Full Moon
Dec 14	Dec 21	Dec 28	Dec 06

Crescent Moon and Spica at sunrise with Diamond Head in the background and Honolulu in the foreground.
By David Nemo,
His first day on vacation in Hawaii and still running on PST.

Special Interest Groups

Astro-Imaging Special Interest Group

When: Wednesday, Dec 10th, 7pm

Location: Oak Hills Church,
2800 NW 153rd Ave, Beaverton

SIG Leader: Greg Marshall (pro tem)
Email: ai-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/astroimage.htm

Youth Program

When: New Classes Start in February 2015.
Location: Kennedy School
See http://www rosecityastronomers.org/youth/youthAA htm for more information or to sign up.

Leader: Kathy Kornei
Email: youth@rosecityastronomers.org
http://www rosecityastronomers.org/sigs/youth.htm

Downtowners Luncheon

When: Friday, Dec 5th, Noon
Location: McMenamin's on Broadway,
1504 NE Broadway, PDX
SIG Leader: Margaret Campbell-McCrea
Email: downtown-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/downtowners.htm

New Members Orientation / Introduction to Astronomy (alternate months)

When: Not meeting in December
Location: OMSI Planetarium
Topic: TBD
SIG Leader: Howard Knytych
Email: newmembers@rosecityastronomers.org
http://www rosecityastronomers.org/sigs/new_members.htm

Telescope Workshop

When: Saturday, Dec 6th
10:00am - 3:00pm
Location: Technical Marine Service, Inc.
6040 N. Cutter Circle on Swan Island-Portland
SIG Leader: John DeLacy
Assistant: Don Peckham
Email: tw-sig@rosecityastronomers.org
http://www.rosecityastronomers.org/sigs/tmw htm

Astrophysics / Cosmology SIG

When: Not Meeting in December

Topic: TBA
Presented by: TBA
Location: 8012 SE Raymond St., Portland, OR 97206
SIG Leader: Viktors Berstis
Email: cosmology-sig@rosecityastronomers.org
www rosecityastronomers.org/sigs/cosmology htm

RCA Board of Directors			
Elected Officers	*Name*	*Email Address*	
President	David Nemo	president	@ rosecityastronomers.org
Secretary	Duncan Kitchin	secretary	@ rosecityastronomers.org
Treasurer	Larry Godsey	treasurer	@ rosecityastronomers.org
VP Communications	Diana Fredlund *Don Taylor (elect)*	communications	@ rosecityastronomers.org
VP Membership	Ken Hose	membership	@ rosecityastronomers.org
VP Observing	Steve Weiler	observing	@ rosecityastronomers.org
VP Outreach and Education	Jim Higgs	outreach	@ rosecityastronomers.org
VP Programming	Mark Martin	program	@ rosecityastronomers.org
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Director, Dark Sky Preservation (IDA)	Dawn Nilson	ida	@ rosecityastronomers.org
Director, Book Library (Books & Videos)	Jan Keiski	library	@ rosecityastronomers.org
Director, New Members	Howard Knytych	newmembers	@ rosecityastronomers.org
Director, Merchandise Sales (Merchandise Sales)	Craig Hlady	sales	@ rosecityastronomers.org
Director, Telescope Library (Telescope Library)	David Horne	telescope	@ rosecityastronomers.org
Director, Youth Program (RCA Youth Program)	Kathy Kornei	youth	@ rosecityastronomers.org
Other Contacts			
Program / Project / Activity	*Name*	*Email Address*	
Astronomical Imaging Special Interest Group	Greg Marshall	ai-sig	@ rosecityastronomers.org
Cosmology Special Interest Group	Viktors Berstis	cosmology-sig	@ rosecityastronomers.org
Downtowners Lunch Special Interest Group	Margaret McCrea	downtown-sig	@ rosecityastronomers.org
Haggart Observatory	Rusty Baumberger	haggart	@ rosecityastronomers.org
Magazine Subscriptions (Discount Subscriptions)	Larry Godsey	magazines	@ rosecityastronomers.org
Newsletter Editor (Rosette Gazette)	Vacant *Larry Godsey, pro tem*	editor	@ rosecityastronomers.org
Observing Site Fund (Site Fund)	David Nemo	sitefund	@ rosecityastronomers.org
Sister Clubs	Margaret McCrea	sisterclub	@ rosecityastronomers.org
Starlight Parade Float	Sameer Ruiwale	starlight	@ rosecityastronomers.org
Telescope Workshop	John DeLacy Don Peckham	tw-sig	@ rosecityastronomers.org
RCA Member Forum	Larry Godsey David Nemo	admin	@ rosecityastronomers.org
Webmaster	Larry Godsey	webmaster	@ rosecityastronomers.org
ALCOR (Astronomical League Coordinator)	Ken Hose	alcor	@ rosecityastronomers.org

RCA 2014 Star Party Calendar

These are the currently scheduled star parties for the Rose City Astronomers club for 2014. As always, these are weather dependent. Star parties may be rescheduled or cancelled due to various factors.

Updates will be posted to the RCA website calendar and on the forum. Last minute cancellations are handled through the RCA website, RCA forum and broadcast. Directions for star party locations can be found online as well.

December

Dec 13 (Sat) Haggart Public Night

Dec 19 (Fri) Rooster Rock SP

Dec 20 (Sat) Stub Stewart SP

RCA 2015 Star Party Calendar

The Star Party schedule for 2015 is on the RCA website calendar. Updates and last minute cancellations will be posted to the RCA website calendar, the RCA forum and broadcast.

Directions for star party locations can be found on the RCA website as well.

As always, RCA Star parties may be rescheduled or cancelled due to various factors.

2015 RCA Officers

At the November General Membership Meeting we elected the following Officers for 2015.

David Nemo - President

Ken Hose - Vice President - Membership

Jim Higgs - Vice President - Outreach and Education

Photo not available

John Taylor - Vice President - Communications

Mark Martin - Vice President - Programming

Photo not available

Steve Weiler - Vice President - Observing

Larry Godsey - Treasurer

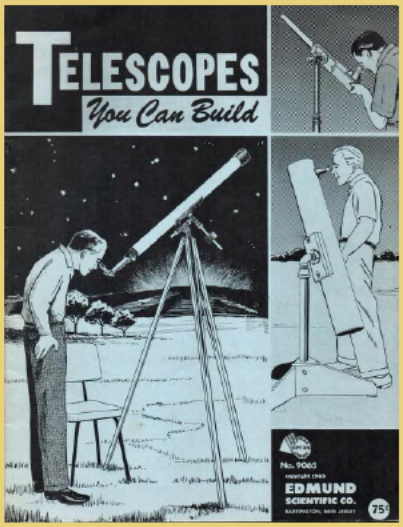
Photo not available

Duncan Kitchin - Secretary

Handbook Collections

Favorite manuals from the past offer a unique look into telescope construction and use.

By John W. Siple



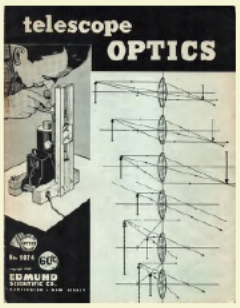
The telescope and its many uses are described in countless illustrative texts. Several handsomely bound volumes from recent history are now popular paper collectibles, where existing copies are frequently referenced for expert advice. Winning the approval of equipment critics and discerning stargazers, their technical allure and symbolism makes them continual favorites throughout science.

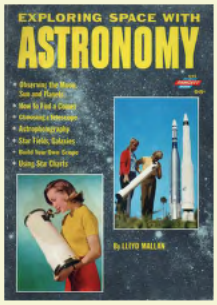
The intrigue of designing your own telescope is best chronicled in Edmund Scientifics' how-to series of booklets, which began hitting the market in the late '50s. Often priced at less than a dollar, each fun issue contains valuable reading for the curious layperson. In the field of astronomy there are approximately seven bestselling titles to choose from (four are shown in this article). Edited by knowledgeable expert Sam Brown, they have an average of 36 fact-filled pages and measure 11 by 8½-inches in size. Two booklets in particular seem to be especially popular. *How To Use Your Telescope* was launched with considerable acclaim in 1959, while a related guide, *Telescopes You Can Build*, made its scientific debut four years later in 1963.

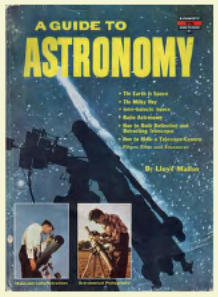
Easy-to-understand diagrams accompany the wording in each of the seven publications. Presented are 2-inch folded refractors, 16x sky sweepers, Maksutovs, Dall-Kirkham Cassegrains, and convertible 3-inch reflectors. There are fine articles on telescope arithmetic, optical bench procedures, graphical ray tracing, projection systems, barlow lenses, clock drives, and gadgets you can build from scratch. This set of books also has more generalized discussions for beginners; finding sky objects and what to expect in telescope performance are just several examples.

Because of their often easy availability in used bookstores, a good recycled copy from the set usually costs between $10 and $25, but expect some delays in finding a few of the scarcer titles. (Edmund's No. 9066 or *Homebuilt Reflector Telescopes* seems to be one of the toughest to locate.)

Fawcett Books, a strong competitor in how-to literature, marketed hundreds of hobby titles but only several by noted astronomy educator Lloyd Mallan. *A Guide To Astronomy* (1958) has 141 pages of stargazing fundamentals, while its circa-1967 softcover companion *Exploring Space With Astronomy* is bound into a thinner 112 pages.







From left in row above Edmund's How To Use Your Telescope *was issued in 1959;* Telescope Optics *(No. 9074) has a cover price of 60 cents and is copyrighted 1966;* Photography With Your Telescope, *a 32-page booklet, also appeared in 1966;* Exploring Space With Astronomy *from Fawcett Publications has a release date of 1967;* A Guide To Astronomy, *another petite handbook written by Lloyd Mallan, is thicker in size and was published earlier in 1958. Top Another how-to guide from Edmund's popular optics library, this time titled* Telescopes You Can Build *(1963). Reproductions are courtesy of each publisher.*

Each unique work measures only 9 by 6½-inches—a little smaller than those from Edmund Scientific—but are brilliantly written. One of the most striking features of this literature is in its presentation of classic merchandise. Persuasive black and white images of older Unitron, Edscorp (Edmund), Optical Craftsmen, Criterion, and Questar telescopes are prevalent; *A Guide To Astronomy* (priced at 75 cents) even has Unitron's entire 38-page catalog reproduced in miniature.

In the veteran writer's books, wordplay is often directed toward telescope construction via personalized kits, but there many different articles to pick from. "A 3-inch Refractor for $75" and "Star Fields and Clusters, Open and Closed" take top honors among some readers, while "Choosing a Telescope and Eyepieces" is also very highly rated.

For the collector, both of these nonfiction Mallan books are quite scarce and may require the bargaining services of an experienced online dealer. A fair market value of $40 per paperbound edition seems appropriate, but don't hesitate to buy a copy.

RCA YOUTH ASTRONOMY ACADEMY

Spring 2015 Classes: Saturday Mornings Feb 14 - Mar 14 - Apr 11 - May 9 in NE Portland.

** Introduction to Observing - Students will learn about objects astronomers look at in our universe and how to navigate the night sky to find planets, stars and other interesting objects with binoculars or a telescope.

** Introduction to Astronomy - Students will learn about the origin and development of our universe, our galaxy (the Milky Way), and our solar system - as well as what else is out there of interest to astronomers, like nebula, star clusters, and black holes. Students will also learn about some historical figures and discoveries in astronomy as well as exciting new research. We'll also provide some guidance on what education requirements and career opportunities could lie ahead if they want to become an astronomer or astrophysicist.

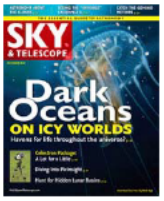
Contact the RCA Youth Director, Katherine Kornei at youth@rosecityastronomers.org for more information.

Sales Table

Will not open for the December 15th Meeting.
The RCA 2014 Calendars will be available for purchase starting at 8:00pm.
Calendars are also available by US Mail and at future RCA Meetings.
See the RCA Website for more information.

Discount Magazines

Will not be open for the December 15th Meeting.
You can renew your subscription or get a new subscription online or by US Mail.
See the RCA Website for more information.



Telescope Lending Library

Will not open for the December 15th Meeting.

Contact the Telescope Librarian for more information.

RCA Book/Video Library

The Rose City Astronomers maintains a comprehensive club library of astronomy related articles, books, CDs and videos. These items can be borrowed by members through checkout at the general meetings for a period of one month with renewals available by phone or e-mail to the club library director.

RCA LIBRARY BOOK CLOSED IN DECEMBER

Happy Holidays from the RCA Library.

IDA Issues New Standards on Blue Light at Night

New rules strengthen IDA's Fixture Seal of Approval program.

Tucson, AZ - Dec. 1, 2014 - The International Dark-Sky Association (IDA) is pleased to announce new requirements for "dark sky friendly" light fixtures certified through its Fixture Seal of Approval (FSA) program. Created nearly a decade ago, the FSA program is regarded by industry leaders as an essential certification for outdoor lighting and continues to evolve as new research and metrics become available.

The FSA program encourages lighting manufacturers to design responsible outdoor lighting. IDA-approved light fixtures have undergone an objective, third party assessment to ensure they are fully shielded and have minimal negative impacts on the night environment. The FSA logo assures consumers that they are purchasing environmentally friendly lighting. The new FSA program requirements are designed to provide even greater protection of the night environment.

Until now, FSA criteria only required fixtures to be fully shielded and emit light downward. The advent of new lighting technologies, particularly light-emitting diodes (LEDs), has raised concerns about the potential negative effects of blue-rich white light, even from fixtures with proper shielding.

Exposure to blue light at night has known negative effects on ecology and is thought to cause certain kinds of chronic disease in humans. It can increase glare compromising human vision, especially in the aging eye. The blue component of outdoor white LED lighting also increases light pollution more than older lighting technologies.

IDA warned of these hazards in its 2010 white paper, "Visibility, Environmental, and Astronomical Issues Associated with Blue-Rich White Outdoor Lighting." Since the report was issued, evidence supporting its findings has continued to grow.

The FSA program's new standards address these concerns by limiting the amount of blue-rich light in the nighttime environment. FSA approval now requires that products offer a listed correlated color temperature (CCT) configuration of 3000K or lower. Previously approved products will have one year to comply with the new standard. As new research emerges, IDA will continue to reassess FSA standards and expects to further strengthen the program guidelines in the future.

"IDA is working to drive the lighting industry toward limiting the amount of blue light at night," said IDA Acting Executive Director Scott Kardel. "We will be tightening the program requirements even further as time goes on."

Since the program's inception, the market for FSA-approved public and industrial lighting has grown exponentially. Manufacturers at industry trade shows display the FSA logo on many of their products. Builders, architects, and city planners who attend these shows can choose from a variety of dark sky-friendly products, including LEDs, induction lighting, and high-pressure sodium fixtures. Residential customers can now easily find FSA-approved lighting at major hardware retailers.

IDA has also been instrumental in driving product development for lighting in ecologically sensitive areas. As a result, many of these new technologies are now being introduced to the general marketplace. IDA is actively involved in developing lighting recommendations for sensitive coastal areas where significant populations of endangered sea turtles nest and hatch. In 2015 IDA will launch a new Sea Turtle Friendly product certification to complement the new FSA requirements.

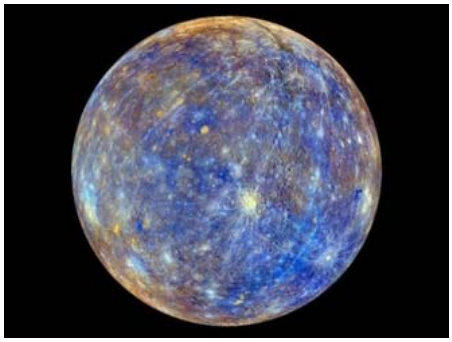
Learn more at http://www.darksky.org/fsa.

Related Content

- October 2014 IDA press release: 2014 Nobel Prize for Physics Draws Attention To Promise And Challenges of Blue Light
- IDA 2010 white paper "Visibility, Environmental, and Astronomical Issues Associated with Blue-Rich White Outdoor Lighting" (PDF)
- Seeing Blue, 5-page summary of the 2010 white paper (PDF)

UC-HiPACC AstroShort News

Mercury: Snow Globe Dynamo?



Mercury seen close-up from MESSENGER, with colors enhanced to emphasize the chemical, mineralogical, and physical differences among its surface rocks. Credit NASA

We already knew Mercury was bizarre. A planet of extremes, during its day facing the sun, its surface temperature tops 800°F—hot enough to melt lead—but during the night, the temperature plunges to -270°F, way colder than dry ice. Frozen water may exist at its poles. And its day (from sunrise to sunrise) is twice as long as its year.

Now add more weirdness measured by NASA's recent MESSENGER spacecraft: Mercury's magnetic field in its northern hemisphere is triple its strength in the southern hemisphere.

Numerical models run by postdoctoral researcher Hao Cao, working in the lab of Christopher T. Russell at UC Los Angeles, offer an explanation: inside Mercury's molten iron core it is "snowing," and the resultant convection is so powerful it causes the planet's magnetic dynamo to break symmetry and concentrate in one hemisphere.

"*Snowing" inside Mercury*

With a diameter only 40 percent greater than the Moon's, Mercury is the smallest planet in the solar system (now that Pluto was demoted). But its gravitational field is more than double the Moon's. Why? Mercury has an absolutely gigantic iron core, accounting for 85 percent of the planet's radius—about the size of the entire Moon. Only the planet's outermost 15 percent is a silicate mantle.

Most of that iron is molten. Just the innermost core is solid: its size is unknown, but more on this in a bit. The molten iron is mixed with lighter elements, of which silicon and sulfur are most abundant. In 2008, other scientists showed that when iron is mixed with a lighter element under intense pressures likely reached partway inside Mercury's molten core, there is a zone where solid iron will spontaneously precipitate in fine flakes like iron filings, drifting down like snow toward the solid core. At the same time, buoyant lighter elements will also separate from the iron as a liquid and will float upwards as fine droplets toward the mantle.

Inside Mercury there may be two distinct "snow zones." In both cases, as solid iron falls and the lighter elements rise, their convective action stirs this gigantic molten iron core, bending and stretching magnetic field lines, driving an energetic planetary dynamo.

Planetary dynamos are thought to be helical (spiral) flows of a magnetized fluid along columns parallel to the planet's axis of rotation; molten iron in the case of the rocky inner planets. A given column can spiral any of four combinations of directions: either clockwise or counterclockwise while flowing toward the poles or toward the equator. The question is what happens at the planet's equator.

Spin flip

Inside Earth, in any single column both the northward and southward flows on both sides of the equator are spiraling in the same direction (say, clockwise and toward the equator). In a neighboring column, the flows all spiral in the opposite direction (say, counter-clockwise and toward the poles). That flow configuration is called an "even" mode.

If convective stirring is much stronger than Earth's, fluid mechanics predicts that a planet's molten iron core can also host an "odd" mode where the section of each column south of the equator spins in the opposite direction from the section north of the equator—that is, they reverse vorticity at the equator.

But the numerical simulations reveal that with really, really strong convective stirring—as would happen if a planet's entire molten core is pervaded with convective iron snow—something dramatic happens: the odd and even modes overlap, spontaneously breaking symmetry and enhancing helicity in one hemisphere at the expense of the other.

"Unlike the Earth's dynamo…, Mercury's dynamo is likely powered by uniformly distributed buoyancy sources within the liquid core," the authors conclude.

The model also predicts a size for Mercury's inner core: small. In the simulations, a Mercury-like asymmetric magnetic field developed only when the solid inner core was less than half the radius of the molten outer core-mantle boundary. –Trudy E. Bell, M.A.

Further reading: The paper by Cao and coauthors is "A dynamo explanation for Mercury's anomalous magnetic field" in Geophysical Research Letters 41(2014):4127–4134. A review article is "Model dynamo may solve Mercury mystery," by Ashley G. Smart, in Physics Today (August 2014) pp. 14–16. See also UCLA press release "Mercury's magnetic field tells scientists how its interior is different from Earth's" at http://newsroom.ucla.edu/releases/mercury-s-magnetic-field-tells-scientists-how-its-interior-is-different-from-earth-s.

The University of California High-Performance AstroComputing Center (UC-HIPACC), based at the University of California, Santa Cruz, is a consortium of nine University of California campuses and three affiliated Department of Energy laboratories (Lawrence Berkeley Lab, Lawrence Livermore Lab, and Los Alamos National Lab). UC-HiPACC fosters collaborations among researchers at the various sites by offering travel and other grants, co-sponsoring conferences, and drawing attention to the world-class resources for computational astronomy within the University of California system. More information appears at http://hipacc.ucsc.edu

2015 RCA Calendar $10

With over 80 photographs to choose from it was a really hard choice this year to pick just 13 of them for the 2015 calendar.

Many thanks to all who submitted their photographs.

The 2015 RCA Calendars are available at the Potluck starting at 8pm.
Also available via US Mail—see RCA website for details

Katie Mahorney
PORTLAND AT NIGHT

KEN HOSE
IC 342 (CALDWELL 5)

RUFUS DAY
HEART NEBULA (IC 1805)

PAT HANRAHAN
NAMBIAN SKY

TOM LOGAN
LEO TRIO

BRUCE ALBER
MAUNA KEA OBSERVATORIES

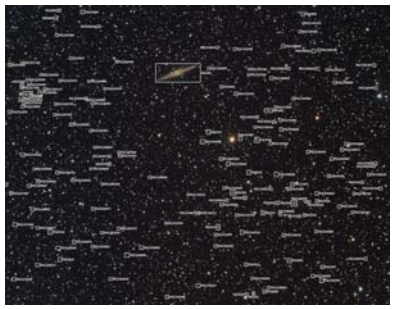
PAT HANRAHAN
ETA CARINAE NEBULA

BRUCE ALBER
MT ST HELENS & THUNDERSTORM

TOM LOGAN
CYGNUS WALL

JOHN CORBAN
LUNAR ECLIPSE

JOHN CORBAN
ALBIREO



DUNCAN KITCHIN
NGC891 & NEARBY GALAXIES

MATT HEATH
HACETA HEAD LIGHTHOUSE

December 2014

Dec 01	Monday	Board Meeting	OMSI Classroom 1	7pm
Dec 05	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, Portland	Noon
Dec 06	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Dec 10	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Dec 13	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Dec 15	**Monday**	**Holiday Potluck**	**OMSI Auditorium**	6:30pm
Dec 17	Wednesday	Cosmology SIG	NOT MEETING THIS MONTH	NA
Dec 19	Fri	RCA Rooster Rock SP	Rooster Rock State Park	**7:30pm**
Dec 20	Sat	RCA Stub Stewart SP	Stub Stewart State Part	7pm

January 2015

Jan 03	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm
Jan 05	Monday	Board Meeting	OMSI Classroom 1	7pm
Jan 07	Wednesday	Astro-Imaging SIG	Oak Hills Church, 2800 NW 153rd Ave, Beaverton	7pm
Jan 09	Friday	Downtowner's Luncheon	McMenamin's 1504 NE Broadway, Portland	Noon
Jan 17	Saturday	RCA Stub Stewart SP	Stub Stewart State Part	Evening
Jan 19	Monday	New Member Orientation	OMSI Planetarium	6:30pm
Jan 19	**Monday**	**RCA Rooster Rock SP**	**OMSI Auditorium**	**7:30pm**
Jan 21	Wednesday	Cosmology SIG	Firland Apartments Community Room 8012 SE Raymond St., Portland, OR	7pm
Jan 24	Saturday	Haggart Public Night	Haggart Observatory	Dusk
Jan 31	Saturday	Telescope Workshop	Technical Marine Service Building	10am-3pm

http://www.rosecityastronomers.org

Rose City Astronomers
Oregon Museum of Science and Industry
1945 SE Water Ave
Portland, OR 97214-3356