Desert Skies

Tucson Amateur Astronomy Association

Observing our Desert Skies since 1954

Summer 2016 Volume LXII, Issue 2

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Grand Canyon Star Party 2016

TAAA member Dean Ketelsen, founder of the current rendition of the Grand Canyon Star Party, captured this image at the 2016 GCSP on June 6th. Astronomers waiting for twilight clouds to dissipate. From left is Doug Taylor-Gebler of Prescott, Joe Bergeron of Endicott, NY, Roger Ceragioli of Tucson and Bernie Sanders of Phoenix. George Barber visiting from Utah is at extreme right.

More Grand Canyon Star Party pictures inside!

Congratulations!

After years of Grand Canyon National Park effort, the International Dark-Sky Association awarded the Grand Canyon National Park provisional "Dark Sky Park Status", where the night sky will be protected by controlling lighting to minimize pollution, assuring that visitors will continue to join us and stare in wonder at the Milky Way transiting overhead every June. I'm gratified that this event has stimulated interest in our dark sky heritage, and hopefully will continue long into the future!

-Adapted from The Ketelsen's Blog

Take Note!

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Our mission is to provide opportunities for members and the public to share the joy and excitement of astronomy through observing, education and fun. We fulfill this by providing Astronomy Services to schools, church groups, scout troops, and convention organizers. We support many organizations in the Tucson area that are involved in Science, Technology, Engineering and Mathematics (STEM) programs. Our members enjoy observing the night sky under the dark skies that our observing sites offer. We are an all-volunteer, tax-exempt, non-profit, 501(c)(3) organization.

Frequency

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Publishing Guidelines

Desert Skies is published quarterly, near the dates of solstice and equinox. The deadlines for publication are March 1st, June 1st, Sept 1st, and Dec 1st. Email submissions to the editor at taaa-newsletter[at]tucsonastronomy.org. Submissions should be in the form of a text or Microsoft Word compatible file. Photos and artwork are encouraged. Please send these as separate attachments with resolution of at least 200 dpi (higher is preferred). Submissions are retained by the editor unless prior arrangements have been made. Copyrighted materials will not be accepted unless permission to use is clearly stated. We will not publish slanderous or libelous material. All copyrights retained by Tucson Amateur Astronomy Association, Inc. or the original author.

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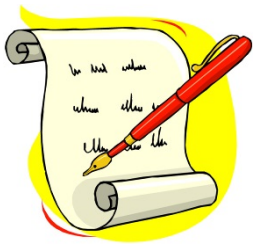

From Our President

Hello Tucson Amateur Astronomy members. I hope that your year-to-date has gone smoothly and that this message finds you doing well! It looks as if we may be getting an early monsoon this year. Here's hoping that the end of monsoon comes early as well, all the better to take advantage of Tucson's excellent fall skies. The monsoon is a good time to perform equipment maintenance and upgrades as well as planning ahead for your Fall observing activities. You might also spend some time browsing the new TAAA website where you'll find the latest information and can provide feedback to our web team for improvement.

We launched the new TAAA website with the goal of providing an easy to navigate, very informative site with the most up to date TAAA information. I am very proud of our members who worked hard to achieve this goal and commend them for their efforts. I encourage you to visit the website at www.tucsonastronomy.org and take some time to explore the features and information. You should also have received an invitation to obtain a password from Member Planet, which is the service we use to host our members-only website. This is where you will set up a profile and access information, such as the club's private calendar which is not available to the public. If you have not yet set up your profile on the members-only site, please do and take advantage of this TAAA benefit. We are constantly working to improve the member benefits provided by Member Planet.

If you have feedback about our website, send it by email to webteam@tucsonastronomy.org. Please help us make a website that all of TAAA is proud of!

At the July 1st TAAA meeting, the membership voted to establish a new Nomination and Volunteer Resource standing committee. This was prompted by our yearly need to spawn a Nominating Committee to handle the nomination of members to the Board of Directors. The intent of the new committee is to reduce the urgency with which the BOD nominations need to be accomplished and to provide a stable framework for holding elections and providing volunteers moving forwards. We have a large number of activities underway and they all require volunteers. This committee will greatly assist us in filling our volunteer needs. Please consider making yourself available as a TAAA volunteer and/or consider holding a position on the new committee. Details about the committee will be forth coming in the monthly member's bulletin. If you have questions, you may contact myself at president@tucsonastronomy.org or any other Board member (see the last page of this newsletter for their addresses). Thank you so much for your consideration and Clear Skies to All!

Ben Bailey

Community Involvement & Outreach

Impressions of the Grand Canyon Star Party 2016

Text and Photos by Dean Ketelsen (ketelsen[at]email.arizona.edu)

I just returned from a few days at the Grand Canyon Star Party and it reminded me why I started the event way back in 1991. For those of you who haven't heard the story (there may be a few of you out there!), John Dobson routinely spent a couple weeks at the Canyon in the late 70s into the early 80s until someone complained about his twilight talk and his comments about how we all evolved from pond scum. Well, he was invited not to return, so tens of thousands were deprived of views of the dark skies through his 24" and smaller telescopes. I came along a decade later when I honeymooned there and noticed a telescope quickly drew a crowd. Vowing we'd return with a few friends for our anniversary the next year, here we are 26 years later and it is now an amazing event!

About eight years ago, I passed the organization baton on to TAAA member Jim O'Connor, though my 27-year attendance streak remains unbroken (don't forget, I was there for the zeroth version!). You will have to check with Jim for recent year statistics, but from that first version in '91 with four TAAA members spending part of the week rim side, there are now over a hundred astronomers serving a couple thousand park visitors every night. The Park Service eventually recognized the good from such an event and over the last decades, they've done a tremendous amount of work to support and publicize the event. And this year, the efforts of the National Park and all the astronomers supporting the event were recognized by the International Dark-Sky Association in declaring the Grand Canyon National Park provisional Dark Sky Park status. The Park's lighting has been a subject of census and analysis and upgrades are in the works. The goal is to complete this work by 2019 so the transition to full Dark Sky Park can status when the park celebrates it's 100th anniversary.

Visitors check out the view of Saturn in Bernie Sanders' 12" Newtonian despite a few thin clouds as Scorpius and Mars also rise.

While gratifying in a small way that our efforts have resulted in protecting the dark skies in Northern Arizona, what continues to be the reward for me and most of the astronomers volunteering for this event is in talking to the visitors from all over the world looking through our scopes. While some travel considerable distance to join us (I met one family from North

(Continued on page 5, GCSP Impressions)

Bernie Sanders from Phoenix chats with our long-term friend Chuck Wahler, interpretive ranger at the Park at far right in white. Chuck was our liaison ranger for many of the early years of the star party. Park visitors check out the view of the moon through Bernie's 12" while they talk.

In a test of Dean's new Canon 6D, this is a stack of 4 frames of 2 minutes exposure each at ISO 3200 with his 70-200 zoom set to 105mm. Saturn visits the dark lanes that connect Scorpius with Ophiuchus.

Community Involvement & Outreach

Highlights of the Grand Canyon Star Party, 2016

Text and Photos by Jim O'Connor, Grand Canyon Star Party South Rim Coordinator (gcsp[at]tucsonastronomy.org)

This year's GCSP was special for two reasons. First, the Grand Canyon National Park officially designated this year's event as the *2016 Grand Canyon Star Party In Memory of Joe Orr*. Joe was a lifelong astronomer who participated in many GCSPs. He also made many financial contributions to the Grand Canyon Association (GCA), the non-profit partner of the Grand Canyon National Park. The GCA provides support for essential GCNP projects that federal funding cannot cover, such as building and rehabilitating hiking trails and visitor information stands along hiking paths. Joe, both physically and financially, was responsible for many of these projects. In 2012, the GCA initiated the Dark Skies Special Project to study and redevelop the GCNP light sources. Joe Orr contributed the initial $40,000 to start the effort, and eventually provided $130,000 toward the effort. Unfortunately, following his participation in the 2013 GCSP, he passed away from pancreatic cancer. It was discovered early last year that Joe left a significant bequest to GCNP for further improvements and rehabilitation, and the Orr Family Foundation continues financial support of the GCA Dark Skies program.

Joe Orr

This leads to the second special event associated with this year's GCSP. On Sunday, June 5th, it was formally announced by the International Dark-sky Association that the GCNP's request for recognition as a Provisional International Dark Sky Park was approved. In a special ceremony prior to the start of Sunday's sunset talk, the award was presented to Diane Chalfant, GCNP Deputy Superintendent. Concurrently, acknowledgement was given to the Park's scientific study of the light footprint and fixture status and to Interpretive Park Ranger Marker Marshall's efforts. Additionally, the Chief Operations Officer of the Grand Canyon Association was recognized for the GCA's financial support and backing of the effort. The TAAA received recognition for raising the environmental awareness of the GCNP visitor through our sponsorship of the GCSP and bringing together astronomers from around the world for the public education and appreciation of dark skies. This has truly been a very special Grand Canyon Star Party.

Grand Canyon Star Party 2016 astronomers gather for an evening of outreach astronomy.

This year, we had very high quality presenters who gave sunset talks each evening:

- Dean Regas, Cincinnati Observatory, Co-Host of PBS's Star Gazers - Tour of the Universe: You Are Here
- Dr. John Barentine, Program Manager, International Dark-Sky Association - Star Light, Star Bright: Protecting Our Heritage of Dark Skies
- Marilyn Unruh, Astronomy Educator - Have You Seen the Shadow of the Earth?, Telescopes as Time Machines, & Astronomy Using Your Five Senses
- Chap Percival, Author and Educator - Go See the Eclipse--And Take a Kid With You! - Get ready for next summer's total eclipse of the sun: August 21, 2017
- Marker Marshall, Park Ranger, Grand Canyon National Park - Starry, Starry Night: Tour the Universe as Seen from Grand Canyon National Park
- Dr. Andrew Odell, Northern Arizona University Professor Emeritus of Physics & Astronomy - The Life and Times of the Sun and Stars: The Evolution of stars
- Dennis Young, Sirius Lookers Astronomy Outreach - Astro-Scenic Photography of Arizona: Northern Lights, Waterfalls, Fireballs, Desertscapes, Comets, and More

Nightly activities have been, for the most part, heavily attended. Early on, temperatures were 10 to 15 degrees above normal resulting in moderately comfortable temperatures. Cloud cover was occasionally intrusive, but generally cleared at night. We conducted three 30-minute

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(Continued from page 4, GCSP Highlights)

constellation tours for interested visitors each night, some of which were conducted by our distinguished speakers, others by TAAA members Alan Delman or Jim O'Connor. These are usually attended by about 35 people, but on occasion we had over 60.

While we haven't received the total visitor count for this year, we usually average close to 1400 visitors a night depending on the weather. We have been setting records for the number of astronomers. Normally we see 35 to 40 astronomers in the first half of the event. This year, 55 to 58 astronomers volunteered for the first four days. The fifth night there were at least 60 astronomers. TAAA members were joined by volunteer amateurs from all over Arizona, as well as Oregon, California, Massachusetts, New York, Texas, Tennessee, Florida, England, and France. These are the A-Team of public astronomy outreach practitioners, and the nightly visitor reaction is spectacular.

The TAAA sponsored "Thank You" pizza and salad party. Pictured left to right are TAAA members Mae Smith, Susan O'Connor, Susan Knoll, and Jim Knoll.

Like many gatherings of amateur astronomers, the GCSP is also a social event. On Sunday, the TAAA hosted a "Thank You" pizza and salad party for the initial cadre of astronomers. TAAA member Susan O'Connor did a wonderful job arranging that event. She also arranged a Tuesday astronomer group trip into Tusayan for an IMAX presentation about the history of humans in the Grand Canyon, followed by lunch in town. On Thursday, the always popular Huevos Rancheros breakfast was organized by George Barber with the astronomers contributing supplies and doing some of the cooking. We also had a traditional pot luck lunch late on the final Saturday to round out the social events.

The Huevos Rancheros Breakfast at Mather Campground—GCSP 2016. Organized by George Barber, seated in blue shirt. Also pictured is Marilyn Unruh (with saucepan).

Volunteer astronomers have been providing superb service to the visitors for many years at the GCSP. Since my video setup is usually the last to get packed away, visitors often take the opportunity at the end of the evening to say what a special experience they've had and how much they appreciate the efforts of TAAA to coordinate the astronomer appearances, and their new appreciation of a dark sky.

The Next One!

(Continued from page 3, GCSP Impressions)

Carolina who saw a write-up in the AAA magazine and drove out for the star party!), most didn't know about it until their arrival - validating my early designation of "the accidental star party". Every visitor I met, filled with wonder gazing upon the Canyon all day, arrived during twilight to absorb the beauty of a naturally dark sky. It is the sharp intake of breath when first gazing at the M13 globular cluster, or the sharp view of lunar craters at 300X that is reward enough for our efforts to be there. I met visitors from around the world - Finland, Egypt, Guatemala, Hungary, Serbia, China - all of them mixed with tourists from all points of the U.S., all waiting to be impressed by the views we provided. It was, and will continue to be, fun setting up for them, showing the best that a dark sky can provide. I'm glad I was able to attend, if only for a few days. I encourage all of you to do the same, if not with a telescope, then as a tourist, eyes upwards, mouth open in wonder!

Community Involvement & Outreach

TAAA's Impact on Astronomy Awareness in Tucson

Text and Photos by Jim Knoll, Volunteer Coordinator (school-star-party[at]tucsonastronomy.org)

We have come to the end of another very successful outreach star party year. A few outreach events will take place over the summer. Thanks to all the dedicated TAAA volunteers, we have inspired many students this past year. Hopefully, quite a few will continue a lifelong interest in the sciences and astronomy in particular. TAAA members should be proud of our outreach activities, which touch every corner of our community. We had 54 volunteers, supporting 89 of 102 scheduled star parties (13 cancelled due to weather) with 355 telescopes and 258 hours of outreach. About 56% of our events were for schools and 44% were for other non-profit organizations or the general public. The public was invited to 27% of our outreach events. The majority (88%) were night events. We reached over 15,000 participants. (The numbers reported in the accompanying charts are for the Spring 2016 school semester.)

Owl & Panther Star Party at Flandrau Science Center—March 15, 2016

Arizona Science, Technology, Engineering, and Math (STEM) Festival.

Month	Events	Audience		Estimated Attendance
		Schools	Public/Other	
January	13	7	6	1,795
February	14	11	3	3,375
March	12	5	7	2,520
April	11	5	6	1,206
May	5	1	4	390
June	2	1	1	210
Totals	57	30	27	9,496

Month	Outreach Hours	Astronomers		Telescopes	Astronomy Guides	NSN Toolkits
		Number	Hours			
January	38	52	156	50	2	2
February	41	59	200	59	0	0
March	41	50	181	39	11	9
April	32	47	130	42	4	2
May	15	34	109	34	6	3
June	5	6	15	6	0	0
Totals	171	248	790	230	23	16

I want to thank everyone that supported the School & Non-Profit Star Party program this year. We had many first-time volunteers which I hope was a rewarding experience and that you will continue to share the wonders of the night sky. The joy of someone seeing one of the gas giants, a galaxy millions of light years away, or a star forming nebula is incredible – and I know each person is very appreciative. We can always use more help, so let me know if you would like to get involved when we crank things up again after (hopefully) a good Monsoon.

Quarterly Reports January - March: Busy school star party season. This quarter also included significant public outreach, including our quarterly star party at Catalina State Park and the Tucson Festival of Books. We cancelled six (6) star parties due to weather. April - June: School star parties winded down for the school year. Still many other outreach events. Primary TAAA event was the Astronomy Festival, held at Brandi Fenton Memorial Park. Visitor count was down from previous years (125) due to cloudy skies. The main attraction was the kids activity station with several Night Sky Network Toolkits.

Members' News

Chiricahua Astronomy Complex Update - Summer 2016

By John Kalas, CAC Site Director (mal3[at]tucsonastronomy.org) Photos provided by John Kalas

John Kalas, CAC Director, provides this update about the recent work performed at our dark site located in Cochise County, AZ. This article was submitted for publication on June 1, 2016, so even more work has been completed more recently.

Ramada News

The Ramada project (Phase 3) is essentially completed with only a minor improvement remaining. On May 7th, the second star-b-cue was successfully held at the CAC Site.

Member Pads Area

On February 6th, Joe Jakoby and I surveyed and staked out the electric pedestal locations for all ten telescope pads. Our contractor, Randy Maddox, finished trenching for the electric service installation on April 5th. The electric sub-contractor, R&R Electric from Willcox, installed the electric service on April 6th and 7th. After a county inspection, Randy back-filled the trenches on April 12th.

I will complete the fabrication of the anchor bolt templates by June 8th and advise Randy that he can schedule the construction of the concrete telescope pads. Six of the ten pads will have a fully vibration-isolated pier provision (concrete dead man under the pier and isolated from the pad slab). The other four pads will have no pier provision. With the loss of our excavation/gravel contractor, I need to identify another gravel resource to put in the parking spaces required at each telescope pad.

Reynolds-Mitchell Observatory

The architectural drawings were finalized on May 10th. The drawings were e-mailed to the two contractors selected for this project on May 19th. Paper copies of the drawing were delivered to the contractors on May 27th. Quotations were requested to be submitted by June 6th. I will be developing the building permit application for submission to the Cochise County Permit Department by June 15th.

On May 7th, members enjoyrf a delicious star-b-que under the recently finished ramada.

Large Roll-Off Roof Observatory (LRoR)

The design concept for this facility has changed from its original design. The 16' wide x 32' long, 4-pier observatory originally contained a warm room measuring 8' x 16'. The warm room was abandoned for several reasons: cost, the tight positioning of the four piers in a reduced observing space (16' x 24'), and the relatively close proximity of the Reynolds-Mitchell Observatory warm room.

Preliminary architectural drawings were submitted and reviewed by the Strategic Planning Group (SPG). Concern was voiced over the excessive weight of the large roof (16'x32') and the mechanism that would be required to move it. A special SPG meeting with architect, John Riggs in attendance, was held on May 10th to address those concerns. The drawings are being updated. As soon as the new drawings are reviewed and approved, they will be submitted to the two contractors who are quoting the Reynolds-Mitchell Observatory project. It is hoped that the LRoR Observatory will be constructed simultaneously as the Reynolds-Mitchell Observatory, or immediately following its construction.

Following the Cochise County inspection, the electrical trenches to the new Member Pads were backfilled by our contractor.

Members' News

TAAA Launches User Friendly Website

By Terri Lappin, Desert Skies Editor (terrilappin[at]tucsonastronomy.org)

Are you in the habit of judging a company by the effectiveness of their website? I do and I'm sure I'm not alone. Much to my delight, the TAAA recently launched a more user friendly website. The address is unchanged (tucsonastronomy.org) but the information has been reorganized and much of it has been rewritten. And, new material is being added all the time. It looks great on your mobile device, too! Be sure to bookmark the site so you can check it often.

The TAAA Board of Directors also chose to provide direct member benefits through a service called Member Planet. Current members must sign up with Member Planet as it's not automatic. From the Member Planet login box found on the homepage, TAAA members gain access to all Member's Only online material such as the Member's Only events calendar, the monthly bulletin, Conjunctions (our Ride Share program), membership renewals, and they can manage their own contact information.

Our webmaster, Diane Neufeldt, put a lot of work went into this new website. If you like it, let her know!

Classified Ad

Free! I have roughly 10-15 years of old S&T and Astronomy magazines (from ~ 1980 - mid 1990s) in good shape (many years in binders), plus a collection of around 5-10 years of Deep Sky Monthly. I'd like these to go to a good home, so if that's you, drop me an email. Contact Bruce Walsh at jbwalsh@u.arizona.edu

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June 27 - July 6

July 28 - August 6

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http://www.globeatnight.org/

We thank our supporters

Featured Article

Skyward—July 2016

Text by David H. Levy, TAAA Past President

Of Friendships and Mentors

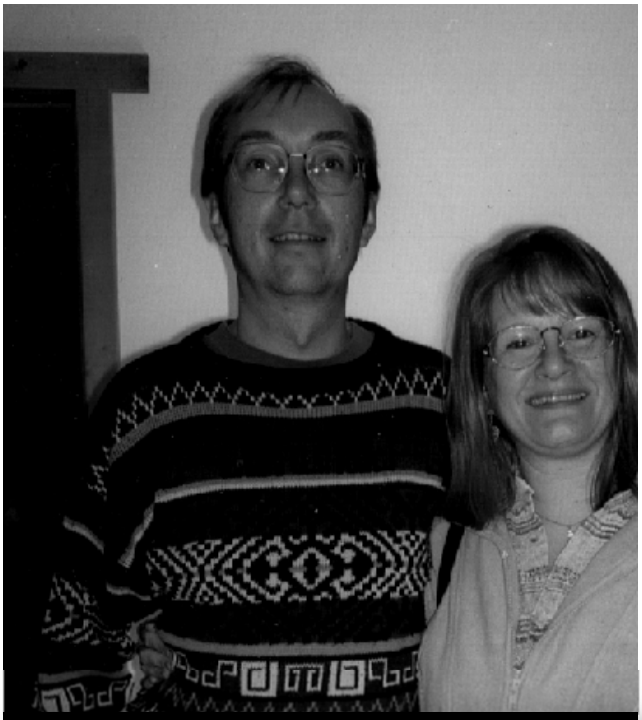
When I wrote recently (Skyward, June 2016) about the many advantages to meeting other people who enjoy the sky, it is possible that the people I left out were even more important than those included. One of those people was Rolf Meier, an amateur astronomer from Ottawa, Ontario, who passed away recently after a brief bout with cancer at the young age of 63. It is difficult to overstate the effect that his wisdom had on my own development as an astronomer.

Rolf was born in Germany in 1953 but relocated to Canada when he was about five. He became interested in astronomy after reading T*he Search for Planet X* about how Clyde Tombaugh discovered Pluto. Rolf joined the Ottawa Centre of the Royal Astronomical Society of Canada in the early 1970s. In 1972 he travelled to Florida where he witnessed the spectacular launch of a mighty Saturn V rocket that carried geologist Harrison Schmidt, as well as astronauts Eugene Cernan, and Ronald Evans on the final Moon flight.

I wish I could have joined him to see that launch, but I actually didn't meet Rolf until the Royal Astronomical Society of Canada's General Assembly held in London, Ontario, in 1979. At that meeting Rolf was the 15th recipient of the Society's Chant medal. Named for Clarence Augustus Chant, this solid silver medal honors an amateur astronomer resident in Canada for a lifetime of achievements; in Rolf's case, it honored him for the work he did as the long-time editor of the center's newsletter *Astro Notes*, for being president of the center, for developing an original astronomical device for measuring light called a photometer, and for his designs for unique and original telescopes. Two of his telescopes received awards at the Stellfane national convention held in Vermont. But more than any of that, the medal commemorated the hours upon hours of observing he did, culminating in his discovery of a comet the previous spring. Comet Meier, then designated as 1978f and now C/1978 H1, remains one of the largest comets ever found.

At the time, I was well into my own and thus far unsuccessful search for comets, and I despaired of ever meeting the famous cometeer. After the banquet at which he received his award, I saw him walking across the campus grounds towards his dormitory. Carrying his award, surrounded on one side by five gorgeous young women and on the other side by another five equally gorgeous young women, I simply assumed that he was too famous to deal with the likes of me.

Not one to give up after one success, Rolf continued his search, and he discovered a second comet (Meier, C/1979 S1). There was a third comet Meier (C/1980 V1) and a fourth (Meier, C/1984 S1). By this time



Rolf and Linda Meier, taken by Bob Summerfield at David and Wendee Levy's wedding in 1997.

Rolf and I were good friends, a friendship that became ever closer after his marriage to Linda McRae in July 1984. Early in 1985 he set up his camera about a mile south of my home, then in Corona de Tucson. While I had a camera set up at my home, we both tried to photograph bright meteors. It turned out that we both captured the same bright meteor traveling through the constellation of Leo the lion, and Rolf even used trigonometry to try to calculate the height of the meteor above the Earth as it disintegrated.

Rolf and Linda had just completed their winter home at the Arizona Sky Village, a place where they and their son Matthew and daughter-in-law Melissa could visit and where we had hoped to visit them in the future, when he received his shattering cancer diagnosis. What we have left are many fond memories, and of course we can watch as he finds his new way among his four comets, all of which will bear with pride the name Meier as they sail through the solar system.

Featured Article

Hubble's bubble lights up the interstellar rubble

By Dr. Ethan Siegel

Permission to use this article granted by the NASA's Space Place.

When isolated stars like our Sun reach the end of their lives, they're expected to blow off their outer layers in a roughly spherical configuration: a planetary nebula. But the most spectacular bubbles don't come from gas-and-plasma getting expelled into otherwise empty space, but from young, hot stars whose radiation pushes against the gaseous nebulae in which they were born. While most of our Sun's energy is found in the visible part of the spectrum, more massive stars burn at hotter temperatures, producing more ionizing, ultraviolet light, and also at higher luminosities. A star some 40-45 times the mass of the Sun, for example, might emit energy at a rate hundreds of thousands of times as great as our own star.

Image credit: NASA, ESA, and the Hubble Heritage Team (STScI/AURA), of the Bubble Nebula as imaged 229 years after its discovery by William Herschel.

The Bubble Nebula, discovered in 1787 by William Herschel, is perhaps the classic example of this phenomenon. At a distance of 7,100 light years away in the constellation of Cassiopeia, a molecular gas cloud is actively forming stars, including the massive O-class star BD+60 2522, which itself is a magnitude +8.7 star despite its great distance and its presence in a dusty region of space. Shining with a temperature of 37,500 K and a luminosity nearly 400,000 times that of our Sun, it ionizes and evaporates off all the molecular material within a sphere 7 light years in diameter. The bubble structure itself, when viewed from a dark sky location, can be seen through an amateur telescope with an aperture as small as 8" (20 cm).

As viewed by Hubble, the thickness of the bubble wall is both apparent and spectacular. A star as massive as the one creating this bubble emits stellar winds at approximately 1700 km/s, or 0.6% the speed of light. As those winds slam into the material in the interstellar medium, they push it outwards. The bubble itself appears off-center from the star due to the asymmetry of the surrounding interstellar medium with a greater density of cold gas on the "short" side than on the longer one. The blue color is due to the emission from partially ionized oxygen atoms, while the cooler yellow color highlights the dual presence of hydrogen (red) and nitrogen (green).

The star itself at the core of the nebula is currently fusing helium at its center. It is expected to live only another 10 million years or so before dying in a spectacular Type II supernova explosion.

This article is provided by NASA Space Place.

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Observing and Imaging

Text by Rik Hill (rhill[at]lpl.arizona.edu)

Fly Me to the Moon

The moon is the only body where the amateur astronomer, armed with everything from a 40mm refractor on up, can study the topography of another body. On Mars we can study the effects of mountains or valleys in cloud formations but it's not like looking at the slopes of Piton or the rima on the floor of Vallis Alpes. However, in order to study these things you need to know what you are seeing. There are numerous ways to accomplish this and it's all free.

First you need to know basically what you are looking at on the moon. A good chart program is a must. The best I've found is the Virtual Moon Atlas (VMA) at:

http://ap-i.net/avl/en/download

While the authors try to steer you to the "Pro" version, I recommend you go to the bottom of the download page and load the "light" or "expert" version and see how you like that first. I find the "Pro" version can run slow at times even though I'm running dual core, 2.5 GHz and 8Gb RAM.

If you use a good 6" aperture or larger, you will quickly exceed the detail shown in VMA (unless you have the "Pro" version loaded with all the images). In such case I recommend the Lunar Reconnaissance Orbiter Camera (LROC) QuickMap:

http://target.lroc.asu.edu/q3/

This camera, run by Arizona State University, goes down to 5-meter resolution in some areas. I guarantee you will not exceed this resolution.

When you get down to kilometer and sub-kilometer detail with your telescope, perigee and apogee will start to make a difference. You will want to be aware of this in planning your observing sessions. A nice table of the dates for perigee and apogee can be found at:

http://www.fourmilab.ch/earthview/pacalc.html

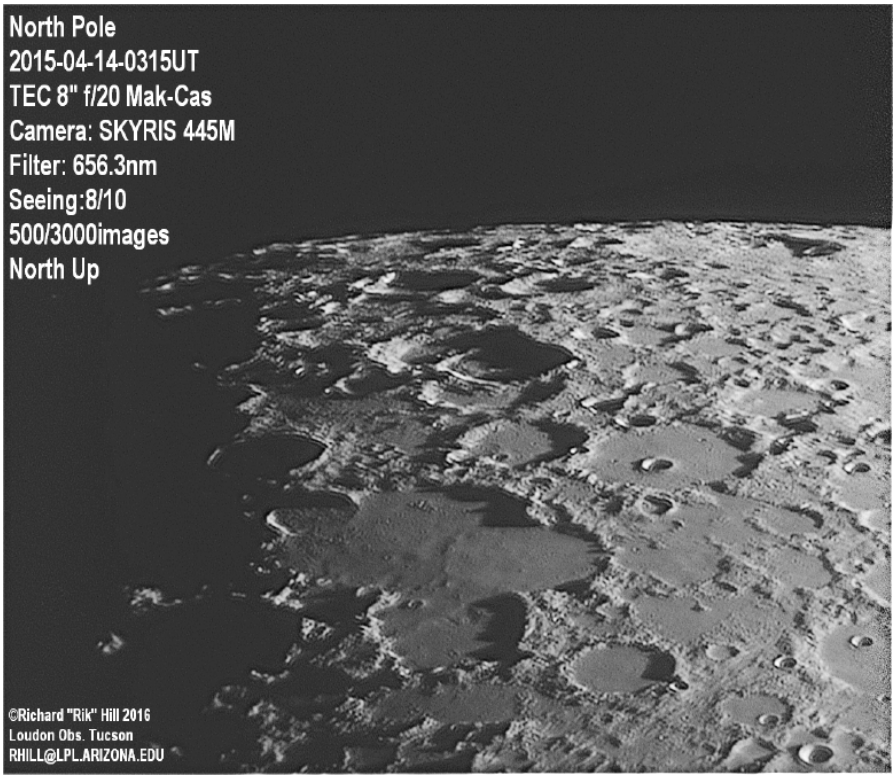
You can find the lunar distance on VMA for a given date/time, but it is not as easy to plan observing with that information as this concise table.

Another thing you might want to pay attention to when planning your observations is the libration of the moon. Libration is the nodding of the moon during its orbit that allows us to see about 10% more than half of its globe. A beautiful example of this over a lunation (28 days) can be seen on the Wikipedia page for "libration". The point of maximum libration on the lunar limb is shown on the VMA by turning on the feature in Configuration that will put a marker on the point most tilted towards the earth. Then you can observe features that are normally out of sight. VMA can identify many of these but even better is using 1:1 Million-Scale Maps of the Moon on the Gazetteer of Planetary Nomenclature website:

http://planetarynames.wr.usgs.gov/Page/Moon1to1MAtlas

These maps use LROC and Lunar Orbiter imagery which will again exceed any telescope you'll ever have. I use these particularly around the poles to identify features during favorable librations. You can identify craters like Hermite, Peary and Rozhdestvenskiy in the north (below) or Shackleton (a crater whose floor is reported to always be in shadow) and Amundsen in the south. It's always fun to peek around the corner so to speak and with these online tools you can do that.

I hope to highlight more lunar features in the coming months, so keep these tools handy.



Observing and Imaging

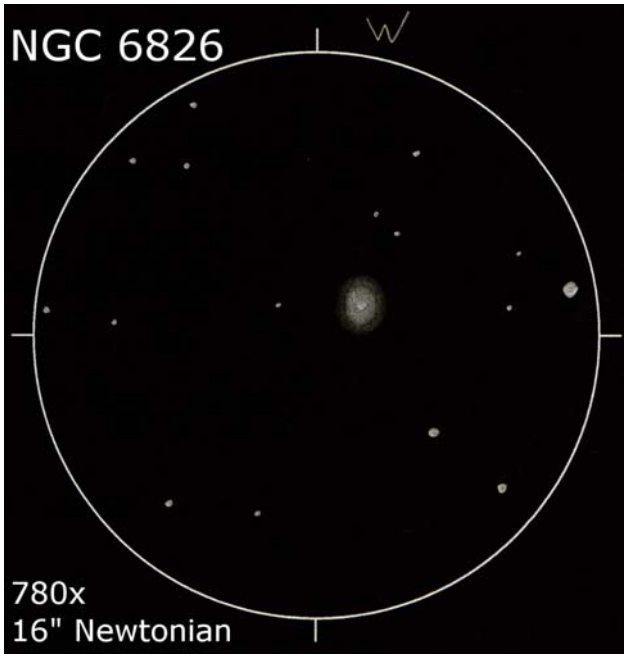
Planetary Nebulae of the Quarter – Summer 2016

Text and Drawings by Christian Weis (weis[at]astroweis.de)

Planetary nebulae (PN) are fascinating objects which come in numerous forms or appearances. Besides the well-known grand four Messiers (M27, M57, M76 and M97), there are hundreds more to explore. This article suggests two PNs, a pretty bright and easy-to-observe one, and a harder one for the more ambitious observer who is equipped with a bigger scope.

Counting the objects NGC 650/651 and NGC 2371/2372 as one object each, there are 94 planetary nebulae (PN) listed in the NGC-catalogue. Having 7840 entries altogether, this object group is rather scarce. It is noticeable that particularly many, i.e. 15 out of 94, belong to the "`68 generation"; meaning that the first two out of four digits are 68. This is not completely accidental but can be explained by the fact that the NGC-catalogue (in general) is sorted in right ascension – and the `68-region is located in the summer milky way – a region where planetary nebulae mostly are located. NGC 6891 was described in the Sep 2012 issue, NGC 6894 in fall 2014. This time, I would like to write about NGC 6826. This object was discovered by William Herschel in 1793 and is one of the brightest planetary nebula. It is also referred to as the "Blinking Planetary" since it has a very bright central star that can easily outshine the nebula surrounding it. When inserting a nebula filter (for instance a UHC-filter) that blocks all wavelengths except for the ones at which the nebula emits, the brightness of the star is greatly reduced and the nebula can be seen easily. The process of inserting and removing a filter is called blinking. It often helps, when there is a bright central star in the nebula or also when there is a bright star in the same field of view. However, a big scope will show NGC 6826 even without a filter.

NGC 6826
RA: 19h 44.8min
Dec: 50° 31´
Constellation: Cygnus
Brightness: 8m8
Central star: 10m1
Size: 2.3 arcmin
Distance: 3200 ly

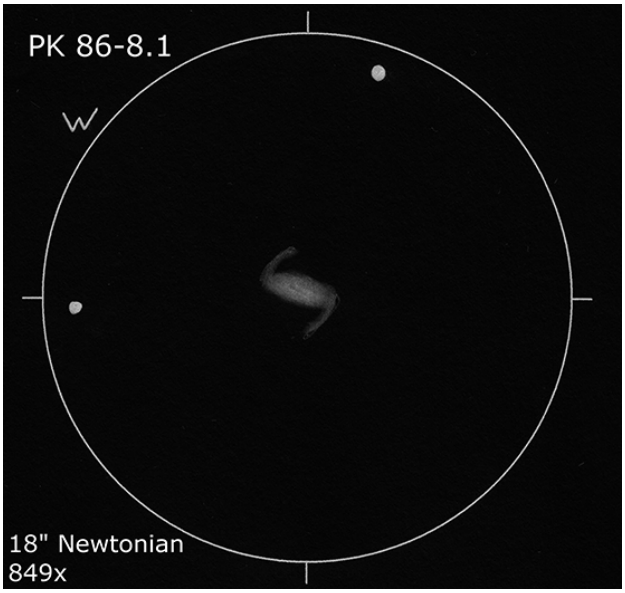


I observed NGC 6826 on several occasions, for example on October 2010 from Kitt Peak with a 16" Newtonian and noted: a little elongated in WSW-ENE, central star conspicuous, seems to have shell (only seen with 780x), UHC only helps a little; 780x, fst 6m0 (And)

This season's tough object is PK 86-8.1, which is also called Humason 1-2 (Hu 1-2). This rather unknown object is also called the Baby Dumbbell due to its shape. Humason announced the discovery of two planetary nebulae (#1-1 and #1-2) in the Publications of the Astronomical Society of the Pacific in 1921. The whole "article" consists of only seven lines and a small table! Humason points out that Mr. Hubble observed both objects visually with the 60" reflector on December 9th, 1920. That used to be astronomy in the good ol' times…

I observed Hu 1-2 on September 24th, 2011 from my home in southern Germany and noted: Found after extended search using the filter-blink-technique even though it appears to be slightly diffuse at 94x, at higher magnifications this object appears elongated in E-W and shows two ansae (very hard to see), no central star; 849x, fst 6m5 (Lyr)

PK 86-8.1 (=Hu 1-2)
RA: 21h 33.1min
Dec: 39°38´
Constellation: Cygnus
Brightness: 12m7
Central star: 15m1
Size: 25 arcsec
Distance: 13,000 ly



Observing and Imaging

Constellation of the Season: Libra - The Scales

Text and artwork provided by Chris Lancaster

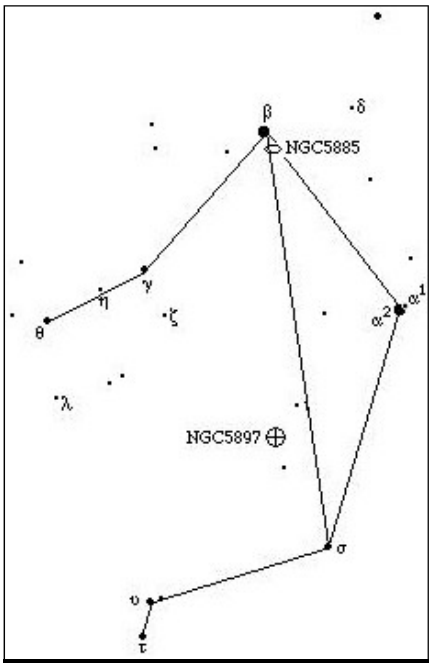
Libra is unique among the constellations of the zodiac in that it is the only one that does not represent a living thing. Originally, the stars of Libra were included in the adjacent constellation of Scorpius, but the ancient Romans and Egyptians considered them to outline a separate object on their own. They saw them as a scale, or balance, since the sun was in Libra at the time of the autumnal equinox when the length of night and day were equal. We keep this identification with a scale today, but since then, precession of the Earth's axis has taken the location of the sun at the beginning of autumn to western Virgo. By the year 2440, the sun will be visiting Leo at this same time of the year.

You will see Libra in the space between Scorpius and Virgo where the ecliptic dips south. The constellation is on the meridian at 11pm at the start of the month of June, and 9pm around June 30th.

Libra's two brightest stars have the wonderful names of Zubenelgenubi, or "southern claw," and Zubeneschamali, or "northern claw." The translation from Arabic indicates this pair's former association with neighboring Scorpius. Zubenelgenubi, Alpha Librae, is an optical double star separated by a very wide 231", which makes it a suitable target for binoculars. The primary shines at magnitude 2.7, and its companion, 5.2. The spectral types are A3 and F5, respectively. The two stars show the same proper motion through space which implies that they are a true physical pair. If so, their optical separation as seen from 75 light-years away (as measured for the primary) makes for a true separation of about 4,800 AU (446.4 billion miles), or a speed of light trip of almost 4 weeks from one star to the other.

An Algol-type eclipsing binary star can be found in the form of Delta Librae. It has a period of just under 2 days 8 hours and can be seen dimming from maximum to minimum in about 5.5 hours as the dimmer component, which is about 3 times brighter than the sun, passes in front of the brighter star, which shines with the light of 46 suns. There is a magnitude 6.5 star 19' to the northeast of Delta that you can use for comparison. Delta normally shines at magnitude 4.8, but dims to 5.9 while in eclipse.

The one deep sky object in Libra that most small to moderately sized telescopes can capture is the globular cluster NGC5897. Don't expect to see anything like an M13 or M15, however. This is a sparsely packed collection of stars spread out over an area of 12.6' and shining at magnitude 8.6. Its appearance is diminished by the 40,000 light-years that separate it from the observer, and by the fact that it is not too far from the thickest parts of the summer Milky Way, so we are required to peer through the outskirts of our galaxy's obscuring dust clouds. At first,



Libra

it may take you a moment to realize that you have actually found it. Its soft glow is barely apparent against the dark background, and at high magnification may look like a dense galactic cluster rather than a globular. NGC5897 can be found at RA 15h 17.4 m Dec -21d 01', or 1.7 degrees southeast of Iota Librae.

It's unfortunate that peering even deeper into space in this area doesn't get any easier. There are close to twenty galaxies in Libra on a detailed star chart, but they are all very dim and elusive. One of the more comparatively bright galaxies can be found very near Zubeneschamali, or Beta Librae. This is NGC5885, a faint spiral of magnitude 12 sitting 51' southwest of this star. Its coordinates are RA 15h 15.1', Dec -10d 5.2'. A dark sky and generous aperture are necessary to spy this distant galaxy. It shouldn't present anything more than a smudge with dimensions of 3.6'x 3.1', but there is some satisfaction in having found a galaxy in Libra.

The Constellation of the Season, written by Chris Lancaster, is the basis of his book, "Under Dark Skies - A Guide to the Constellations, Trafford Publishing (http://bookstore.trafford.com/Products/SKU-000158114/Under-Dark-Skies.aspx). While the information was accurate at the time of the original writing, the reader should be aware that the sky does change over time. In particular, separation and position angles of double stars may have increased or decreased. This article is presented as originally written. Consult current observing resources for correct separations and position angles.

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