

Reflector

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June 2013



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2013 National Young Astronomer Awards

Deep-Sky Objects—Eleventh of a Series

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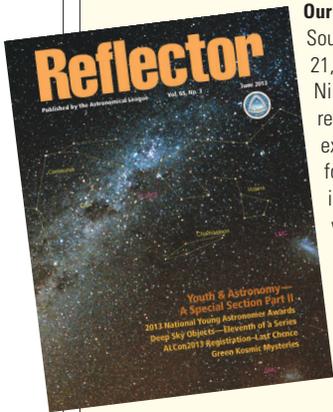
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Our cover: Our contributor, **Al Marcella**, took this image of the Milky Way and the Southern Cross in Booderee National Park at Murrays Beach, southern Australia, on May 21, 2011, between 5:45 and 8:30 p.m. He captured the image with a tripod-mounted Nikon D300 with a Tokina f/2.8 11–16 mm lens, ISO 800, with programmable shutter release. The image was processed with DeepSkyStacker to concentrate 100 20-second exposures taken at 21-second intervals and 30 dark images. Photoshop CS4 was used for minor adjustments, with Nik software used to reduce background and sky noise. Al is a member of the Astronomical Society of Eastern Missouri (ASEM). Annotations were added by Dan Crowson, ASEM.

To our contributors: The copy and photo deadline for the September 2013 issue is July 15. Please send your stories and photos to our magazine editor, Ron Kramer (editor@astroleague.org), by then.

The Astronomical League invites your comments regarding the magazine. How can we improve it and make it a more valuable source for you, our members? Please respond to the email address above.



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Chris Ragaisis, on CloudyNights

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Joe Lalumia

"Four-for-four, Birren's work bats 1000."

Jim Barnett, review on CloudyNights

Reflector

The Astronomical League Magazine

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Background: NASA/ESA/The Hubble Heritage Team (STScI/AURA)

NEAF 2013

The Astronomical League was well represented at April's Northeast Astronomy Forum. Thanks to vice president **John Goss**, secretary **Bill Bogardus**, and treasurer **Tom Lynch** for greeting our many visitors at the League booth. This is certainly a special place to see a large number of national as well as international vendors, many of whom are introducing new products.

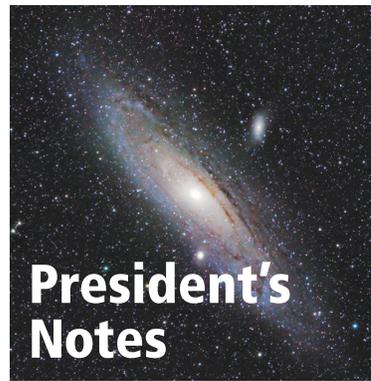
2013 NCRAL Convention

It was my honor to attend the League's 2013 North-Central Regional Convention held at the Kahler Grand Hotel in Rochester, Minnesota. Many outstanding speakers and side trips helped make this an impressive event. The convention's theme was "seeing is believing." It included presentations exploring the function of the eye and the effects of laser pointers on the eyes by several physicians connected to the Mayo Clinic and a fascinating talk from a local television meteorologist. Many thanks to the Rochester Astronomy Club for planning such a wonderful event.

The March *Reflector* featured **Youth in Astronomy** and the opportunities for getting them involved in the hobby. The NCRAL Convention featured a side trip to the planetarium complex at Mayo High School. Larry Mascotti manages this outstanding facility. It has been open since 1966 and now serves as a regional science resource for southeastern Minnesota. Larry notes that "students from 35 school districts have participated in its Minnesota State Science Standards-based classroom lessons." In 2007, the planetarium became the first school-based facility in the world to employ the digital scaling software Uniview (scalingtheuniverse.com). Further, Mr. Mascotti states that "this new digital planetarium large-screen-format projection equipment plus the video globe makes this student-centered learning facility unique



Left to right: Tom Lynch, Bill Bogardus, and John Goss staff the League's booth at NEAF.



President's Notes

and leverages our ability to communicate ideas to students well beyond the confines of traditional planetarium equipment. Real data from the armada of robotic Solar System mapping emissaries can be displayed as well as the latest 3-D galaxy map of the Universe obtained from

the world's great observatories. Students literally become immersed in these new views of the cosmos. These educational teaching tools also provide new resources to teach concepts pertaining to earth sciences and issues related to global climate observations."

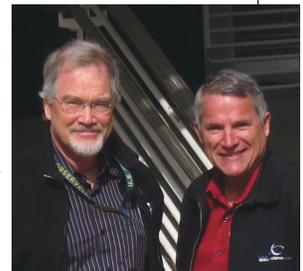
The convention featured several outstanding talks, several of which were presented by physicians and astronomers who are members of the Rochester Astronomy Club. One talk was a report by a Mayo Clinic physician comparing the dangers of red and green lasers. The research indicates that misusing green lasers can cause more permanent eye damage than misusing red ones.

Gerry Kocken was presented with the 2013 NCRAL Region Award. He was also elected regional chair.

Visit to U.S. Naval Observatory, Washington, D.C.

Geoff Chester, public affairs officer for the U.S. Naval Observatory (USNO), gave my family and I an outstanding private tour of that great facility in late April. It provides a wide variety of astronomical information to the public as well as serving as the official source of time for the U.S. Department of Defense and the entire United States. We met with a couple of the staff astronomers as well.

We were fortunate to tour the James M. Gilliss Library, which contains one of the world's most complete hard copy collections of astronomical literature. One of the newest additions to the USNO is the correlator facility. This was dedicated in early 2013 and is described in Mr. Chester's news release: "A newly-developed next-generation software-based



Geoff Chester, USNO Public Affairs Officer, and Carroll Iorg.

Continued on page 7

TITLE PHOTOGRAPH COMPLIMENTS OF TOM S. MARTINEZ, ASAC

Losing the Dark

The March 1 issue of IDA's *Night Watch* has a short announcement that the video *Losing the Dark* is now available. This video is a "public service announcement" planetarium show that is a collaboration between Loch Ness Productions (see lochnessproductions.com/shows/ida/ld.html) and the International Dark-Sky Association. You can view a flat-screen version of the show on YouTube. It even has closed captioning. This 6.5-minute video gives a superb overview of light pollution, its cause and effects, and suggestions for its solution.

Our starry skies are a treasure that is vanishing because light pollution washes away the stars. This, of course, threatens amateur and professional astronomy. It also disrupts wildlife and may have a detrimental effect on our health. Almost all cities and sizeable suburban areas worldwide have a bright yellow glow in their nighttime skies. This is easily visible from space—see the wonderful short YouTube video by M. Ángeles López Cayuela at youtube.com/watch?v=xe2VxIY39Ic.

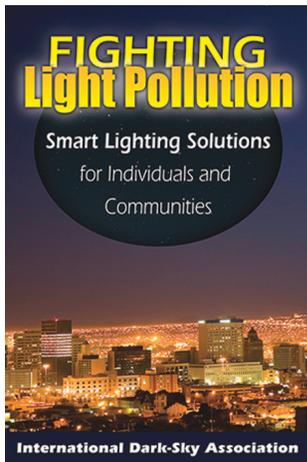
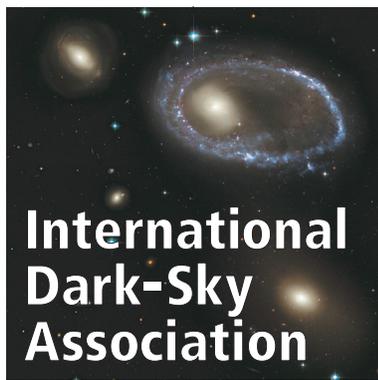
Amazingly, *Losing the Dark* has no license fee. It comes in many formats and languages and is available for downloading in one's desired format. Loch Ness Productions and IDA are making *Losing the Dark* available to planetariums, educators, amateur and professional astronomers, and any other interested viewers around the world. It is hoped this message will greatly increase public understanding and public action toward combating light pollution. *Losing the Dark* should be a good opening

Attention ALCors, members-at-large, charter members-at-large, patron members, and life members

Election ballots must be received by the national office on or before July 1 to be counted. Ballots were emailed to voting members in April, but if you need a ballot please contact the national office.

Attention ALCors

The annual society dues statements were emailed in April from our national office; payment is due on June 30, 2013. The League greatly appreciates your support and cooperation.



warm-up showing for a standard planetarium production, similar to the coming attractions in a movie theater setting.

Be sure to watch *Losing the Dark's* YouTube version at youtube.com/watch?v=dd82jzstF1o. Its message is succinct, contains gorgeous imagery, and is encourag-

ing by offering three suggested solutions to the problem. Unsurprisingly, these suggestions are simple common sense and the same as what IDA and many others have advocated for years: illuminate only those areas that need lighting at night, use only fully shielded fixtures shining the light down on the ground, and turn off unnecessary lights. While not stated specifically in the short video, it is understood that there should be proper lighting levels—that is, use only the amount of light necessary for the task at hand. Don't over-light. Don't throw more light after bad lighting.

I would be most remiss if I did not acknowledge the sponsors who made *Losing the Dark* possible. I apologize beforehand if I forget to mention someone or if I do not list everyone with the proper citation! *Losing the Dark* was made possible by donations from Starmap, the Fred Maytag Family Foundation, the International Planetarium Society, Inc., and through generous donations by IDA members. The writer and narrator is Carolyn Collins Petersen, and audio/video production was done by Mark C. Petersen. Please also look at the production notes to learn about the music, the time-lapse photography, and the animation.

I must also give much thanks to the indefatigable Dr. Connie Walker, of National Optical Astronomical Observatory and the IDA Education Committee, who spearheaded IDA's effort in this splendid production. Connie is also the leading force behind Globe at Night (see globeatnight.org). ✨

TIM HUNTER

Co-Founder and Past President, IDA
3225 N. First Avenue
Tucson, Arizona 85719-2103
Phone: 520-293-3198; FAX: 520-293-3192
E-Mail: ida@darksky.org; darksky.org

Reflector

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National Officers

President

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Astronomical League National Headquarters
9201 Ward Parkway, Suite 100 • Kansas City, MO 64114
816-444-4878 • president@astroleague.org

Vice President

John Goss

932 Lee Lane • Fincastle, VA 24090
540-966-4606 • vicepresident@astroleague.org

Secretary

Bill Bogardus

190 Pheasant Place
Greenport, NY 11944-2784
631-477-2246

secretary@astroleague.org

Treasurer

Tom Lynch

43 Elm Street • Lynbrook, NY 11563
516-593-8580 • treasurer@astroleague.org

Executive Secretary

Ron Whitehead

3685 Beacon Hill Court • Beavercreek, OH 45440-3553
937-233-5843 • executivesecretary@astroleague.org

National Office

Joe Alburty, Office Coordinator
Astronomical League National Headquarters
9201 Ward Parkway, Suite 100 • Kansas City, MO 64114
816-DEEP-SKY

National office: leagueoffice@astroleague.org

Society rosters: rosters@astroleague.org

League sales: leaguesales@astroleague.org

National Observing Program Coordinators

Michael G. Benson Aaron B. Clevenson
ocentaurus@aol.com aaron@clevenson.org

Reflector Staff

Editor

Ron Kramer
Mobile: 704-661-0406
rjipublishing@aol.com

Advertising Representative

Mary Riley
312-799-1713
advertising@astroleague.org

Assisting Editor

Kevin Jones
j11.kevin@gmail.com

Assistant Editor

Kristine Larsen
Larsen@mail.ccsu.edu

Design/Production

Chuck Beucher
cbeucherjr@kc.rr.com

Photo Editor

Terry Warner
614-425-7336
astrowagon@verizon.net terry_warner2000@yahoo.com

Letters to the Editor

Send to: editor@astroleague.org

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October 12, 2013

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<p>Displays</p> <ul style="list-style-type: none"> • Club information • Astrophotos • Light pollution • Tonight's sky 	<p>Discussions</p> <ul style="list-style-type: none"> • Relative distances • Moon landing hoax • Life elsewhere • Black Holes
<p>Demonstrations</p> <ul style="list-style-type: none"> • Telescope varieties • Telescope basics • How to find objects 	<p>Telescope Views</p> <ul style="list-style-type: none"> • Solar filtered • Moon • Daytime Venus • Daytime Jupiter • Landmarks

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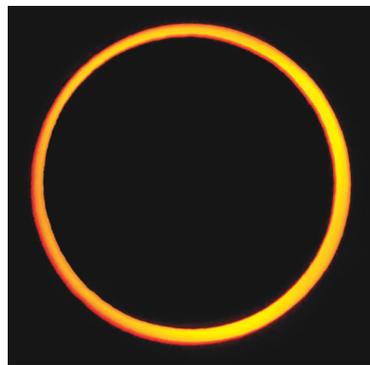
For two and a half years

I have been a passionate amateur astronomer. I have an Orion SkyQuest XT10i, and often host star parties at my house for my classmates at school.

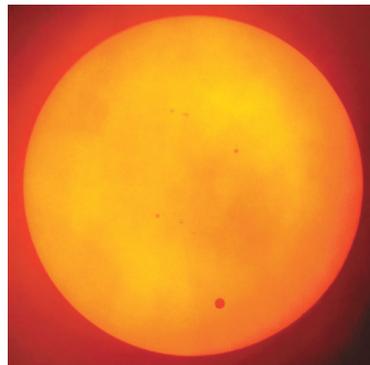
My first major event was the lunar eclipse of December 21, 2010. It was mostly cloudy from my observing site, so I only saw a few brief glimpses. I went to the middle of nowhere in the plains of eastern New Mexico to view the eclipse of May 20, 2012. On June 5, I held a star party for the Venus transit. It was partly cloudy, but we could still see it. I remember my excitement the moment the black disk of Venus crossed over the Sun's limb.

I was very excited about Comet Pan-STARRS because no other bright comets have come near the Earth within the past couple of years, so this would be my first naked-eye comet. I had gotten a new, better camera (Canon Rebel T3), so I got some great pictures of Pan-STARRS. I had planned to just see it on the night of the March 10, but I caught comet fever after that first observing session, and watched the comet the nights of the 12th and 13th. I got lots of pictures and submitted two to spaceweather.com. I also plan to see it at my astronomy club's Messier Marathon on the 16th.

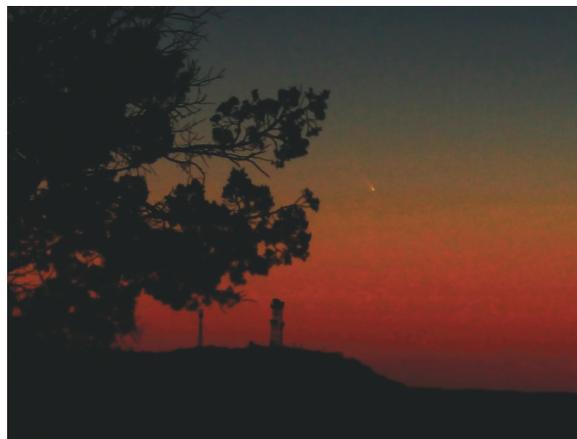
I read the March 2013 issue of the



May 20, 2012 annular eclipse



June 5, 2012 transit of Venus



Comet Pan-STARRS, March 10, 2013

Reflector and the articles about the "graying of astronomy" interested me. I realized most of the pictures in the "Astrophotos from Younger Members" section were from teens and young adults. I began wondering if this really represented the age distribution of younger astronomers. I'm only 12 years old and I'm really into astronomy! It seems like there should be more younger people doing astronomy, based on what I have noticed.

Hagan Hensley,
San Antonio League of Sidewalk Astronomers

Congratulations to the staff and the contributors on the special section in the *Reflector* on youth and astronomy. I know this excellent execution required a great deal of planning and hard work on everyone's part. Well done.

However, occasionally there's a surprising ray of hope. My daughter teaches in a school

attended by a majority of underprivileged and troubled students. Not long ago, an eight-year-old presented her with a drawing depicting the transit of Venus!

Several days later my daughter brought him in a couple of the transit images we had taken and told him they were for him. She said he had tears in his eyes and thanked her over and over. She told me it was one of

her best days in the classroom in a long time.

Robert Kerr, *Bloomington, MN*

The wife and I are newly joined members of the Cedar Amateur Astronomers, Inc., attending their informative lectures and viewings (when the night sky cooperates). We also enjoy reading *Reflector* from cover to cover.

We read with interest the articles about how to attract the younger generation into astronomy. Substituting "model trains" for

"astronomy, telescopes," etc. there would be virtually no difference what was written. The train modeling magazines we subscribe to also lament the dearth of young people getting into modeling. Biggest obstacle is many modelers (at least in Iowa) are "lone wolves," loathe to share the hobby, mostly from fear of robbery of their trains. Unlike astronomy, where members bring their equipment to star parties and are unlikely to suffer stolen equipment from home.

The wife and I model O-gauge (Lionel-size) trains. Granted it is expensive, more so than a telescope. Like astronomy, trains have many facets. Some train people are artists with intricate almost life-like modeling that incidentally has a loop of train track through it. Others like us have intricate electronics controlling train movements, but just Plasticville buildings and some ready-made trees stuck here and there as backdrop. And of course there are all levels in between for the modeler. From the *Reflector* articles, I surmised that there are just as many facets, from simple low-cost binocular observing to expensive high-end computer controlled tracking telescopes, to camera/video and attendant photo processing software, to very detailed sky databases that apparently pinpoint what heavenly object will be where at what time. And like trains, every level in between.

Sincerely, Sael & Joann Dillon,
Marion, IA

As President of the Baton Rouge Astronomical Society, I just wanted to send along a little information about what our club has been up to the past few months regarding light pollution in our community.

This past January, we launched a new website focusing on dark-sky advocacy in our community. Inspired by the actions of other clubs, we also started a program to recognize businesses, organizations, and individuals in our community that utilize good outdoor lighting fixtures. We were fortunate enough to merit a front-page story in a recent edition of our local newspaper, *The Advocate*.

We've just begun our campaign for dark skies, but we are certainly off to a good start!

Sincerely, Ben Toman
BRAS President

P.S. Here are links to our new website, which will only get better with more content, and the article from *The Advocate*.
darksky.braastro.org
theadvocate.com/home/5126477-125/stars-hard-to-find-because



USNO Master Clock

President's Notes | Continued from page 4

correlator has achieved initial operating capability at the U.S. Naval Observatory in Washington, D.C. This new device combines specialized software with high-speed computer processors and mass-storage capability to more efficiently process very long baseline interferometry data.... The facility was named in honor of the late Dr. Gart Westerhout, a pioneer in radio astronomy who served as the USNO's scientific director from 1977-1993."

The Alvan Clark telescope was a highlight of our tour. In August 1877, the astronomer Asaph Hall discovered the two moons of Mars, Phobos and Deimos, using the instrument. This discovery brought the world's attention to the USNO. Also it was a real treat to see the Master Clock complex



Alvan Clark refractor

that is so essential in keeping the nation's time, including its crucial part in keeping GPS and other similar systems operational.

Thanks, Geoff, for setting up and conducting this special tour.

Dues Statements and Officer Election Ballots Have Been Sent Electronically

2013 dues statements and officer election ballots have been electronically sent to societies. Please return these promptly.

ALCon 2013 in Atlanta July 24-27, 2013

We hope to see many of you in Atlanta at ALCon 2013. Please check the convention website (alcon2013.astroleague.org) for the most current information.

Great skies!

Carroll Jorg

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2013 NATIONAL YOUNG ASTRONOMER AWARDS

By John Jardine Goss, Astronomical League Vice President

The Astronomical League is

pleased to announce the top finishers for the 2013 National Young Astronomer Award. Thousands of high school students from across the country were eligible to compete for this year's award. Our national judges, all noted astronomers, once again were Dr. David Hans Hough, professor at Trinity University, San Antonio, Texas; Dr. David L. Lambert, from the University of Texas at Austin; and Dr. Robert Stencel, professor at the University of Denver. We appreciate their valuable contributions to this program.

All top finishers receive a complimentary membership in the International Dark-Sky Association. The first and second place finishers each receive an expense-paid trip to the 2013 ALCon "Summer Skies, Southern Hospitality" in Atlanta, and the first place finisher receives a lifetime pass to McDonald Observatory. The League would also like to recognize Explore

Scientific, the sponsor of the program, for generously donating one of its fine telescopes to the first place finisher.

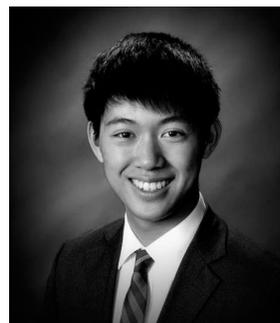
First Place: Mark Moretto

A senior at Briarcliff High School in Briarcliff Manor, New York, Mark Moretto is awarded first place in the



2013 NYAA competition for his work, "Deep Impact Spectral Observations of Naturally Occurring Mini-Outbursts." The mechanisms behind gaseous outbursts from comet nuclei are poorly understood. Mark sought to obtain better insight into their causes by studying carbon dioxide and water, the primary molecular species that are released, sometimes explosively.

Mark used data from the Deep Impact mission to Comet Tempel 1 to find that that carbon dioxide was an active driver of outbursts rather than a byproduct. He suspects "that the outbursts can be the result of the thermal lag within the nucleus causing the sublimation of volatiles, which can condense and freeze as they rise and encounter cooler regions, blocking the gas escape pathways." Pressure may



Second place: Henry Lin

Henry Lin, a senior at Caddo Parish Magnet High School in Shreveport, Louisiana, is the 2013 NYAA second place finisher. In his "Cool-Core Bias in Sunyaev-Zel'dovich Galaxy Cluster Surveys," he modeled standard galaxy clusters and cool-core clusters.

Henry found that Sunyaev-Zel'dovich

surveys are slightly biased towards detecting cool-core clusters and that this bias causes the masses of cool-core clusters to be overestimated by about 4% on average. His results also confirm that galaxy clusters are useful as cosmological probes.



Third Place: Kevin Beach

Kevin Beach, a senior at Chippewa Hills High School in Remus, Michigan, is this year's third place finisher. His research topic was "Analysis of Standard Geomagnetic Indexes and Development of the Geomagnetic Variational Intensity Scale."

Kevin's project developed and investigated the Geomagnetic Variational Intensity Scale (GVIS) as a possible replacement system for the Kp index and Dst index currently used to determine the effects of solar particle events on the geomagnetic field. Several parameters were examined, including solar wind velocity, solar wind density, solar wind dynamic pressure, and z-axis interplanetary magnetic field strength. These values and statistical tests indicate that the GVIS is the most robust system during periods of strong solar winds. ✨

SCAE

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Formed by connecting lines between the three bright stars Deneb, Altair, and Vega, the Summer Triangle looms high overhead this time of year for Northern Hemisphere observers. This region of the sky contains a wealth of galactic and globular star clusters; emission, reflection, and planetary nebulae; bright stars; and of course the Milky Way. Thus, the Summer Triangle is a great starting point for exploring deep-space objects on a clear, dry, moonless summer night.

The best emission nebulae in the area reside in the constellation Cygnus. They include the Veil Nebula (see the June 2012 *Reflector*), the North America Nebula, the Pelican Nebula, and the Crescent Nebula. All of these nebulae are located within or adjacent to the Northern Cross asterism and are easy to find. This month, I want to introduce readers to a lesser-known nebula in Cygnus, IC 5146, located near the border with the constellation Lacerta.

Also known as the Cocoon Nebula, IC 5146 is a striking emission nebula 12 arcminutes in diameter. An open star cluster, Collinder 470, is embedded within the nebula. Both are located 4000 light-years away and span 15 light-years of space. Published magnitude estimates for IC 5146 range from 7 to 10. In reality, the cluster is probably magnitude 7 and the nebula is magnitude 10, but you are seeing both simultaneously.

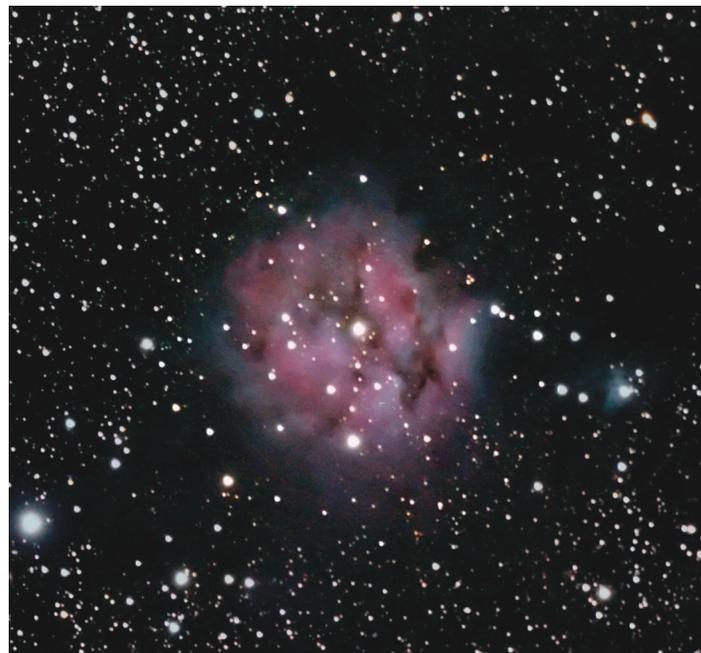
One way to find the Cocoon Nebula is to star hop 9 degrees due east of Deneb to the 4th magnitude star Rho Cygni and then hop another 3.75 degrees northeast. Another way to find the Cocoon Nebula is to locate the stars 80 and 81 (Pi-1 and Pi-2) Cygni. These stars, magnitudes 4.7 and 4.3, are 2 degrees apart and are found 12 degrees east-northeast of Deneb. To find IC 5146 follow an

DEEP-SKY OBJECTS

ELEVENTH OF A SERIES

THE COCOON NEBULA

By Dr. James Dire, Kauai Educational Association for Science & Astronomy



imaginary line from 80 Cygni through 81 Cygni south two more degrees.

The Cocoon Nebula is a stellar nursery, similar to the Orion Nebula and the Carina Nebula (which contains Eta Carinae). The stars in Collinder 470 formed out of the gases within this giant molecular

cloud. Like most stellar nurseries, the Cocoon Nebula contains emission, reflection, and dark nebulae. Light from the hot young stars in the nebula scatters off of dust grains resulting in blue reflection nebulae. The nebula's gas is mostly hydrogen, which emits red light at 656.3 nm when

excited by the embedded stars' radiation. Thus, long-exposure images of IC 5146 show beautiful blue and red colors.

The accompanying image of IC 5146 was taken with a 190 mm f/5.3 Maksutov-Newtonian telescope with a Canon 30D camera. This two-hour exposure shows the brightest regions of the Cocoon Nebula in detail comparable to the view in an 8–12 inch telescope at 100x magnification. Note the dark lanes scattered throughout the center of the nebula. The image covers a region 40 by 30 arcminutes. Longer exposures show that the nebula extends throughout this field of view, but these regions are difficult to see visually.

The colors captured with the Canon 30D are subtle compared to images taken with astronomical CCD cameras. However, the human eye won't even perceive this much color when viewing the Cocoon Nebula in the telescope eyepiece.

The bright star to the lower left (southeast) of the nebula is SAO 51425 and is magnitude 7.5. To the upper left (northeast) is SAO 51438 at magnitude 7.6. And the brightest star to the lower right (southwest) of the nebula is SAO 51374, magnitude 8.3. The two brightest stars located "within" the nebula in my image both shine at magnitude 9.7. One of these two appears to be at the center of the nebula, where several dark lanes intersect. All five of these brighter stars are foreground objects located from 80 to 1000 light-years away. Most of the remaining stars appearing inside of the nebula are actually part of the embedded star cluster.

You may notice in the image or in a telescope the reduction in background Milky Way stars around the visible nebula and trailing off towards the northwest. This is a dark nebula known as Barnard 168, which extends from the Cocoon Nebula northwest for 1.75 degrees. ✨

New Advertising Representative—Mary Riley

Mary was introduced to astronomy early in life by her father, who was a high school science teacher and amateur astronomer. While growing up in Milwaukee, Wisconsin, her father routinely set up his telescope in the back yard on starry nights for family viewing. Over time, she learned her way around the night skies and developed a passion for astronomy. She also tagged along with her father to attend meetings and star parties hosted by the **Milwaukee Astronomical Society**, of which her father was a member. Mary holds degrees in cultural anthropology (PhD, Tulane University) and law (JD, Northern Illinois University) and



currently works as a legal consultant and freelance writer in Chicago. In past years, she has been a member of the Midlands Astronomy Club in Columbia, South Carolina, where she served two terms as treasurer. At present, she is a member of the **Chicago Astronomical Society**. She is thrilled to serve the Astronomical League by acting as volunteer advertising representative for the *Reflector*.



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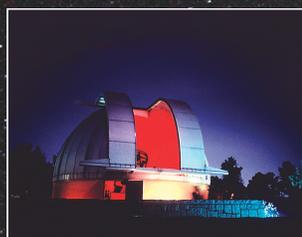
Emory Conference Center Hotel

- Shuttle service between hotel and presentations at Fernbank Science Center and Agnes Scott College Bradley Observatory for those without transportation
- Be sure to ask for the Astronomical League rate. 1-800-933-6679, www.emoryconferencecenter.com/index.cfm
- Saturday night's Awards Banquet



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Tim Puckett, Supernovae Research



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Charles Wood, Sky and Telescope Lunar 100 creator

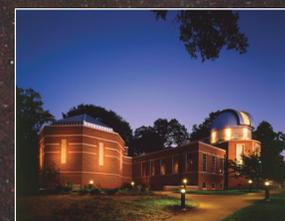


Star BQ, Friday, July 26, Agnes Scott College Bradley Observatory:

Bradley Observatory Tour; 30-inch Beck Cassegrain; Planetarium Presentation

Other ALCon 2013 Excursions

- Atlanta Astronomy Club's Villa Rica Observatory; Full size roll-off-roof observatory with 20-inch Newtonian reflector
- Atlanta Astronomy Club's observing site at the Deerlick Astronomy Village



Check www.ALCon2013.astroleague.org for more information as it becomes available.



OH BOY, ASTRONOMERS FIND

By Dave Toteson
Chisago City, Minnesota

The color green is rare in astronomy. Stars, nebulae, galaxies, and other objects produce light at many wavelengths, but our eyes perceive these emissions in a way only rarely seen as our retina's most sensitive color. Green is in the middle of the spectral window between near-ultraviolet and infrared, and we even possess certain cells in our body sensitive to those wavelength extremes. Specifically, we carry melanocytes that tan our skin in response to ultraviolet radiation, and thermoreceptors that sense the cold of a January day in Minnesota or the heat of a July campfire. Since so much radiation is produced in the middle of the visual spectrum, why are very few astronomical objects seen as green?

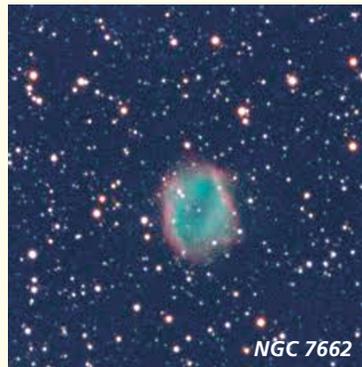
Our retinas have two main types of visual receptors: rods and cones. Rods are used for scotopic, or night, vision, and are most sensitive in low-light environments. Cones are used in brighter situations and come in three "flavors" of wavelength sensitivity: red, green, and blue. Occasionally, there is a relative or absolute deficiency in one of these types—a condition that runs in my wife's family—and the various forms of color blindness ensue. Since rods come only in one type, there is no perception of color at lower light levels and astronomical objects at the eyepiece with lower photonic density are seen in shades of gray. Once light intensity exceeds a certain threshold, retinal cones are stimulated and color perception is initiated. This explains why intrinsically brighter objects and larger apertures are more likely to achieve this effect. Other factors, such as atmo-

spheric seeing, affect objects on the edge of color perception. The rare combination of still air with clarity increases opportunity for viewing color. I've often wondered about the relative contributions of the factors affecting how much color is noted: the wavelength curve of the incoming light, variation in individual sensitivity, atmospheric particulate density, and the size of atmospheric cell turbulence. I was recently impressed by increased blue sensitivity of one of my observing colleagues whose new intraocular lens after cataract surgery outperformed the lenses of those of us 10 to 20 years younger. I think when it is my time for that procedure I will request one lens for each end of the wavelength spectrum. Hmm, maybe we are sensitive to submillimeter radiation.

Astronomical objects whose emissions peak near 500 nm, in the middle of the green portion of the spectrum, usually also emit significant radiation at blue and red wavelengths. Many objects—including our own Sun—stimulate all three types of cones, causing these objects to be perceived as white as a result of this simultaneous stimulation. The prime exceptions to this situation are certain planetary nebulae. These most beautiful of heavenly bodies emit much of their radiation from doubly ionized oxygen molecules in their extended outer atmospheres. Powerful ultraviolet radiation from the evolving central star ionizes the oxygen molecules,

which recombine with electrons to emit light at specific wavelengths. The two most significant emissions are in the green portion of the spectrum. Very little of their light is emitted in blue or red. As only our green cones become stimulated, we are able to enjoy a truly rare astronomical experience: a deeply green-colored planetary nebula, such as NGC 7662 in Andromeda or NGC 6210 in Hercules.

We can see green in planetaries, but not in stars, for the above reasons. But is that the

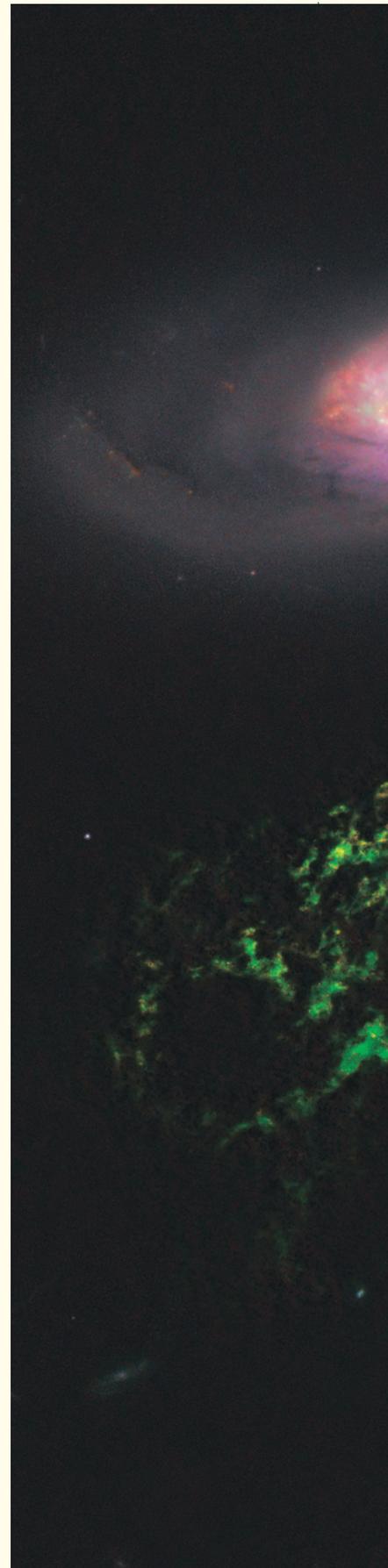


end of it? Are there no other green astronomical deep-sky objects? Do processes exist that could cause large, extended objects, even galaxies, to be seen as green? Only a few

years ago, most astronomers would have answered no. A confluence of two events conspired to allow cautious researchers to shed such spectral bias and "go green."

The first was the decision to image one quarter of the sky for the Sloan Digital Sky Survey (SDSS) using five different color filters, including a green filter centered on 477 nm. Many new objects awaited discovery within the millions of objects, as faint as 25th magnitude, imaged as part of this survey. Searchable by magnitude, color, and position, the massive Sloan database set the stage for the second development.

In 2007, astronomers at Oxford University in England envisioned employing the amateur community and public to assist in classifying galaxy types. Expecting a limited initial response, the results



D GREEN KOSMIC MYSTERIES



IC 2497 (Hubble Space Telescope)

were astounding, with 70,000 contributions pouring in hourly during the first day! Over 50 million classifications were eventually collected, assisting astronomers in many research projects. Of course, unexpected things were found, one of which was an unusually shaped and colored object next to the tilted spiral galaxy IC 2497 in southwestern Leo Minor. First spotted by Dutch schoolteacher Hanny van Arkel, this object has since been intensively studied, as it defied initial explanation. Appearing to be an ionized region of gas, no source of its energizing output could be found. The eventual conclusion that best fit the data appeared to be that the core of the nearby spiral galaxy hosted an actively emitting quasar that shut off 70,000 years ago. From a theoretical standpoint, this helped constrain and improve knowledge of quasar energy cycles. Like a rock heated by a short phaser burst on *Star Trek*, the nebula glowed for a period of time after its energizing blast ended. Nicknamed the “Voorwerp,” Dutch for “object,” this cosmic conundrum was visible at the 2012 Texas Star Party through Larry Mitchell’s 36-inch f/5 telescope. A very good view was also obtained by several observers using Jimi Lowrey’s 48-inch reflector with a green Astrodon filter. A 2012 study by Bill Keel identified 154 more of these detached ionized clouds, a bevy of voorwerps for focused observers.

A second class of objects was discovered soon after the Galaxy Zoo project began, and their viridity piqued the interest of classifiers when they were initially unable to assign them into known categories. It is enlightening to follow this thread on the website’s forum,

and see how those involved came to realize these small, green objects were a new class of galaxies never before seen. In retrospect, this is understandable, given their distance of 1.5 to 5.0 billion light-years, and their faintness. The brightest of this class glow dimly at magnitude 19, and are only one-tenth the diameter of our Milky Way and 1% of its mass. What they lack in size they make up in productivity. These “Green Pea” galaxies possess highly robust star formation rates, exceeding our Milky Way’s by a factor of 500. Similar to planetary nebulae, their color comes from doubly ionized oxygen: many young, energetic stars radiate ionizing ultraviolet light into surrounding gas that causes the whole small galaxy to be affected and glow with the same color. At the same 2012 Texas Star Party I used my 32-inch f/4 reflector at 650x to see SDSS J094458.2-004545.5, a magnitude 19.5 member of this new group in western Sextans, just east across the border from Iota Hydrae.

Mischa Schirmer of the Gemini Observatory in Chile was searching through data from the Canada France Hawaii Telescope and came across an unusual object in Aquarius. Bright green in color, it proved at first a verdant vexation. Larger than and not as uniformly round as the Green Pea galaxies, this new discovery showed the same narrow-line emissions of its smaller counterparts, but now the effect was seen through nearly the whole galaxy. The archetype galaxy even displayed areas similar to M82, where ionization extended to regions possibly pushed outward by pressure from an internal ionizing process. Researchers were puzzled as to how such a

process could be sustained, as there was no apparent active nucleus fueling the starburst. The solution came from studying the cores of these “Green Bean” galaxies, which were smaller and less active than would be expected from the energy signature seen in the surrounding material. This narrow emission-line region mirrored the case for the object adjacent to IC 2497 discussed above, but displayed power two orders of magnitude greater. With a “Chelyabinskian” flash of insight, this new type of galaxy was explained as the aftermath of its very active nucleus shutting off. In this case the affected region was not Ural glass, nor an adjacent galactic gas cloud, but the whole galaxy. Again, since most quasars and active nuclei were much more active in the younger Universe, almost all these objects are very far away. Using data from SDSS, in a paper submitted in early 2013, Schirmer and his colleagues reported eighteen of these new “*Phaseolus verdani*.” They vary from magnitude 16.9 to 19.2 and the archetype, called J2240-0927, is magnitude 18.4 and quite visible on plates from the Second Palomar Observatory Sky Survey. I have made charts to hunt them down, and expect both it and its seventeen brethren will be visible in my 32-inch reflector.

Citizen science has come a long way in a short time. Professional astronomers have partnered with the power of human brains and eyes on interesting, productive projects that engage both the public and the amateur astronomy community in current research. With real possibility for discovery, opportunity awaits at both the keyboard and the eyepiece. ✨

YOUTH & ASTRONOMY II

As a continuation from the March issue, the following five articles address additional concerns about the future of our hobby. From loaner telescope programs to asking where the young people have gone, the authors are wondering, as most of us are, where the astronomers will come from in the future. Between the constant distractions of sports, video games, television, working, dating or marriage, and changes in lifestyle, many young people have little time in their busy schedules to entertain thoughts of a hobby which can require a great deal of time and money.

It is becoming more and more difficult to pique the interest of children, teenagers, and young adults. One of the primary purposes of astronomy clubs, societies, and organizations has been and always shall be outreach programs, which work to educate the public about all things astronomical.

The *Reflector* will continue to address these concerns and will present additional articles about youth and astronomy in future issues.

STRIKING SPARKS OUTREACH PROGRAM

By Larry McCune, *Striking Sparks Coordinator*
Sonoma County Astronomical Society, Santa Rosa, CA

The Sonoma County Astronomical Society (SCAS) conducts the "Striking Sparks" telescope awards program for Sonoma County, California school students to promote an interest in science and astronomy. The program was inspired by a member who helped a student build a telescope. That student went on to a career in astronomy. With that success, members quickly expanded the program by pitching in to grind mirrors and build more telescopes for awards. After

exhausting the telescope builders, we now purchase the telescopes with donated funds. This year, the 27th year of the program, we awarded the 246th telescope.

Students in grades one through eight can enter the contest, while they are young enough to develop an interest in astronomy before becoming too involved in other activities. We promote the program through the school district and with the teachers that we contact with our school classroom and night



sky programs offered by the SCAS members. Telescopes are awarded to winning students who are nominated by their teachers and write essays about their interest in astronomy. To enter the annual contest, students must attend an SCAS meeting or an astronomy program at the Robert Ferguson Observatory. Our board members judge each application based on the interest in astronomy described in the essay, the teacher's nomination letter, and how the student would use the telescope to involve others in astronomy.

Many of the Striking Sparks winners have been active in sharing their telescopes at school astronomy nights, club field trips, and astronomy events. They quickly learn how to use their telescopes and view

the night sky with the assistance of member mentors. We have stimulated their participation by awarding additional eyepieces and accessories based on their continued involvement.

Striking Sparks has been very successful in promoting continued education in science and astronomy. The winners have been involved in young astronomer activities to share their enthusiasm and experiences with others. Several have developed professional careers in astrophysics and other sciences. It has been rewarding to see the growth in the students' confidence, skills, and knowledge that developed with the telescope awards program.

Additional information is available at sonomaskies.org and rfo.org. ✨

PUT TELESCOPES IN THE HANDS OF THOSE WHO ARE MOST INTERESTED: THE LIBRARY LOANER TELESCOPE PROGRAM

By John Jardine Goss, *Astronomical League Vice President*

Many clubs have loaner scopes for their members. The New Hampshire Astronomical Society (NHAS, nhaastro.com), led by member Marc Stowbridge, takes a slightly different path by developing a "Library Loaner Scope" program where library patrons

can check out low-cost, quality telescopes in the same manner as they do books.

The NHAS selected a modified Orion StarBlast 4.5-inch Dobsonian reflector as their telescope of choice. This 13-pound instrument is easy to use, is very portable, and comes with

quality optics. Novice observers can easily obtain their first views of the moon and its craters, Jupiter and its Galilean satellites, and Saturn and its rings. The brighter deep sky objects can be seen as well.

To help keep unauthorized fingers from meddling with the optical collimation, access to the primary mirror is physically restricted. A Celestron 8–24 mm zoom eyepiece is semi-permanently installed to prevent the inevitable loss of removable eyepieces. Full zoom (60x) splits the Trapezium stars in the Orion Nebula, while the lowest power (20x) and widest field (2°) captures the entire nebula.

The biggest problem the NHAS has encountered is the program's success. Just one telescope isn't enough. With a



one- or two-week check out period, the waiting list can grow quickly to three months!

Other clubs across the U.S. have also discovered that similar programs, while publicizing their clubs, put telescopes in the hands of people who have the desire to explore the night sky. ✨

WHERE HAVE ALL THE YOUNG PEOPLE GONE?

By John Wagoner, President of CLASS, Dallas, Texas

My club, the City Lights Astronomical Society for Students (CLASS), works with young people. We take science and astronomy into the inner city, and show young people that they have choices when it comes to hobbies, interests, and career fields.

I find that it is easy to get young people interested in astronomy. You just have to make yourself available. Each summer, the 29 branches of the Dallas Public Library hold a summer reading program for young people and have guest speakers talk about various subjects. Usually ten to twelve branches will ask me to present my PowerPoint presentation "A Tour of the Universe," covering all aspects of astronomy. This is an excellent time to reach young people and their parents.

After-school programs are big in Dallas as well. Many non-profit organizations in the inner

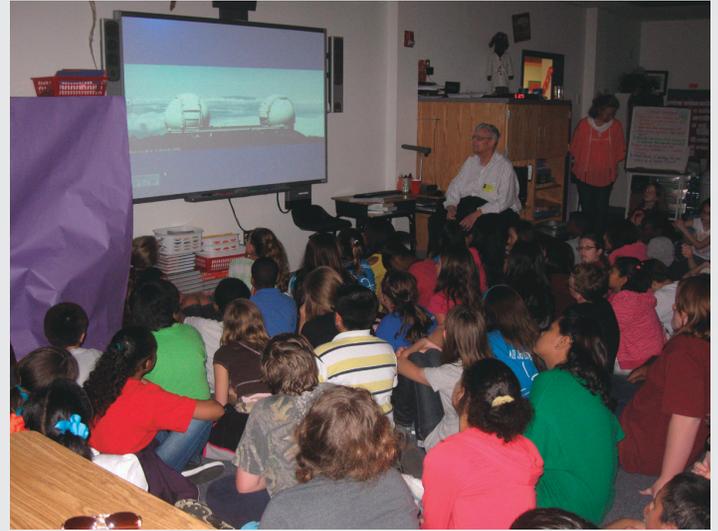
city have after-school programs to try to enhance the learning experiences of students. These organizations are simply crying for help in this area and I have no problem volunteering to give presentations. Also, elementary, middle, and high schools can easily be convinced to start after-school programs, especially in astronomy and science.

CLASS is a member of the Coalition for Science After School (afterschoolscience.org) that helps bring STEM (science, technology, engineering, and mathematics) programming to schools. The Coalition has some wonderful resources that you can use to start an astronomy program for a school. CLASS also offers star parties and solar observing sessions to schools, libraries, churches, and non-profit organizations working with the community.

Even if you don't specialize in the inner city like CLASS, you can still offer all of the above

services to your community, and direct young people and parents to your organization while offering tremendous outreach. Are young people interested in astronomy? A definite and resounding yes. Whenever I

finish a presentation, questions come flying out of the audience nonstop for almost as long as the original presentation. To paraphrase Ray Kinsella from *Field of Dreams*, "If you give it, they will come." ✨



Students enjoying the CLASS presentation "A Tour of the Universe."



Daytime student outreach with a solar star party.

WHY THE DEMISE OF AMATEUR ASTRONOMY?

By Fred Rayworth, Las Vegas Astronomical Society

I can't honestly say I remember this incident as if it were yesterday—however, it's still a vivid enough memory that I can recall significant details. One evening, my grandpa took me out in the backyard of his house in Playa del Rey, California. He showed me this light moving across the sky. We tried to spot it through his old ship's

spyglass, but it was like trying to see it through a soda straw. That was 1957 and the object was Sputnik, or as we found out some 50+ years later, the booster rocket trailing behind it. That was the first time I actually noticed the sky above.

From there it was monster movies on KTTV Channel 11, then *Star Trek*, and finally

seeing those Solar System maps in science class. Luckily for me, what little astronomy we were exposed to in science class didn't scare me off. I noticed the sky above and wanted to find out what was up there. On one of my summer trips to visit my grandpa in his new home in Laguna Beach, he took me to Mt. Palomar. Before long, I was pestering my parents for a telescope. The Sears catalog telescope pages became tattered long before the toy pages.

Finally, in December 1966, at Christmas my 60 mm alt-az-mounted refractor arrived. Those early, heady days of discovery have lived with me for a lifetime. Unfortunately, I rarely see that happening with kids nowadays.

Back then, I didn't belong to a local astronomy club. There was only one astronomy magazine, *Sky & Telescope*. There weren't many major telescope manufacturers, but boy were they classics! They included Cave, Telescopic, Byers, Unitron, Jaegers, and Edmund Scientific, to name a few. I also had a mentor and a few astronomy friends, but when I

joined the military, I became a solo act for over two decades. Yet, I was inspired, I kept going, and astronomy grew into a hobby I loved. In the late 1960s, I sensed a wider movement for organized amateur astronomy. It had always been around before that, but the big groups centered on planetariums in major cities and, from what I could gather at the time, consisted mostly of amateur telescope makers and college professors.

I've seen the hobby explode and then change into something far different from what drew me to it when I was a kid. I

don't want to discount the importance of academic astronomy, but part of the problem with our hobby is differentiating it from the classroom science. Though they should and could go hand in hand, that's not necessarily the focus of the majority of us amateurs. My guess is that the vast majority of students that take either a high school or college-level astronomy class will never pursue amateur astronomy. Why? Because those classes are actually intense math and physics classes. Depending on the instructor, they're often neither easy nor fun for the average student. Most take them as electives and treat them as just

mistaken, there's quite a bit of math involved in being an architect. He thought what we do was scary? In another instance, there was a young lady that had just taken a college-level astronomy course. When asked if she would be interested in pursuing amateur astronomy, she said no way! She was already having nightmares over the class. Then there were the unofficial polls I've done as well as several of my buds. Most of us have never taken a college-level astronomy course.

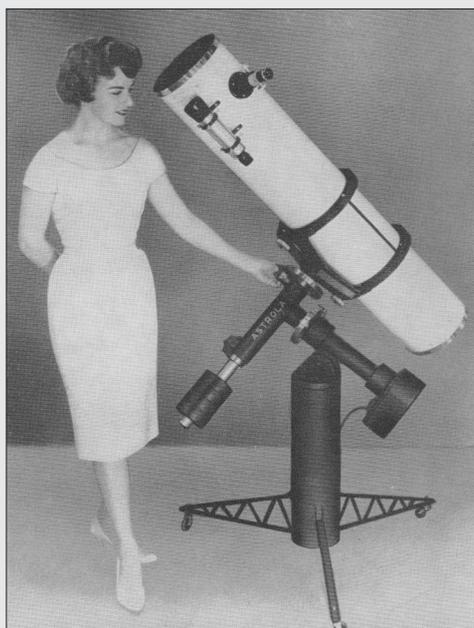
My point is not that college-level astronomy courses are bad; it's just that they're not representative of what we're about. Depending on the instructor and the curriculum,

primary goal. I'm here to have fun and enjoy observing.

For those not intimidated by (or haven't heard about) the math, they learn of astronomy from outreach or some other source. Then what? They may pick up an astronomy-related magazine, and there are advertisements for all types of astronomy equipment. There are lots of ads for high-end astrophotography gear, high-end observing gear, eyepieces that cost more than my first car. Really? There seems to be an exceptional number of ads and articles concerning astrophotography. It's understandable that most new converts to amateur astronomy think that it's all about taking pictures. Whatever

happened to good old-fashioned astronomy with a pencil and pad? What about notes and an eyepiece sketch? What about telescope making?

It's unfortunate, but many new and experienced amateurs spend more time looking at the latest equipment than being out under the stars. Many seem to be more interested in the hardware and software rather than in developing a long-term observing plan.



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a variation of trig or calculus, or think they'll be an easy elective only to be surprised at the difficulty. They can't wait to move on to something else. Others that don't even take astronomy hear about this and don't want anything to do with amateur astronomy because they think the math is too hard. What?

A fellow amateur was talking to an architect not long ago and they broached the subject of amateur astronomy. The guy said there was no way he'd be interested in amateur astronomy because the math would be too hard. If I'm not

they can chase many students away from a math-free love of viewing the stars. I, for one, almost never use math in astronomy, except to maybe calculate the magnification of an eyepiece. I don't look at a faint fuzzy and start thinking formulas. I couldn't care less!

On the other hand, there's nothing wrong with pursuing astronomy for science. It's an essential element that needs to be promoted. However, it's not necessarily what we're about. I, for one, am a non-scientific amateur. If I happen to do something that advances science, fine, but that's not my

I think all of these factors combined are having a very negative effect on our hobby. Just think of a high school kid coming to a star party, wanting a decent telescope to see the night sky. He or she starts talking to people and hears some solid advice on modest equipment that their dad or even they might be able to afford with a part-time job. Then, as they wander around, they overhear an equipment enthusiast. They get the impression they'll never be satisfied with the view they'll get from the modest equipment they intended to get. They'll just

have to have such-and-such “or else.” The equipment enthusiast builds up the anticipation. The kid finally gets a view through some high-end gear expecting to see Hubble-like images. Instead they see the same faint fuzzies they saw earlier in a modest scope, with minute differences that they don’t yet have the skill to detect. Whether one is an equipment enthusiast or not, we all need to be careful what we say about our gear. We don’t need to give new amateurs unrealistic expectations.

Fortunately, most of us don’t.

Right now, outreach seems to be our best and only chance of encouraging new people to join our ranks. What remains of us visual observers should be out there when we can, encouraging the new people with sound advice. Luckily, at least in my group now, we don’t have too much of that kind of talk. However, I’ve seen enough of it in my time to know it still exists, and it’s not going away.

Another big thing is the young people themselves. Today, it’s all about apps. Everyone expects to be able to punch a button and instantly see something in a telescope. Using a finderscope to actually search for something in the sky is alien, even to

adults. Go-to seems to be the solution, but that adds a huge expense, at the cost of shrinking aperture. Nobody has to learn to find anything in the sky—just punch a button. Also, if the newbie goes cheap, of course that go-to isn’t going to work as advertised, let alone the optics. They’ll get frustrated and the piece of junk goes right into the closet. Strike one more potential amateur off the list.

I don’t know what the answer is to “why the demise of amateur astronomy,” except that as amateurs, especially for us visual observers, we have to keep up the good fight. We absolutely need good astronomy teachers that not only make their classes fun, but can differentiate between the hard science and the hobby. We need new astronomers to make the discoveries that advance the science. We need high-end gear because it drives the market and improves the modest gear in the long run. We need astrophotography because those photos show people what’s up there and draw people to our hobby. Despite all that, we cannot forget the basics, the lone observers out in the backyard, taking notes and making sketches. ✨

ARE WE WITNESSING THE END OF AMATEUR ASTRONOMY AS WE KNOW IT?

By John Jardine Goss, *Astronomical League Vice President*

Our hobby—the one we have come to love, the one that has given us much comfort and inspiration while we spent many hours under starlit skies—is in decline. Why do fewer and fewer people seem to truly love the splendor that lies above?

When I joined my astronomy club 17 years ago, I was about the average age of the people who went to the meetings. Now

in 2013, I am still about the average age. As older members have “aged out” of the club and the hobby, younger people have not joined in sufficient numbers. Why aren’t young people—those younger than thirty or forty, let alone young adults and teenagers—entering the hobby?

From my personal experience, I find this a challenge to answer because I did not

belong to a club in my youth, but enjoyed exploring the night sky by myself. Now being the advanced age of two years shy of 60, I wonder why people in their 30s or 20s or teens don’t seem to be active in the hobby.

After ten years of discussions with astronomy club members, League officers, star party attendees, conference registrants, astro-vendors and magazine people, I have concluded that the dearth of the young can be attributed to three general areas of concern—plus a wild card.

1. Our Unnatural Night

Light pollution certainly plays a major role in amateur astronomy’s decline among the young. After all, if people can’t see the stars, they are less likely to be interested in the night sky. It is unfortunate that people of all ages have become conditioned to seeing only a smattering of stars. They think that’s how the sky should appear. Of course, we know otherwise!

2. Beautiful Astro-Images

What were recently considered incredible astro-images are thought of today as commonplace. Young people see these spectacular images taken through giant earthbound telescopes, from telescopes in space, and from spacecraft orbiting other planets and come to expect nothing less.

Where does this leave the much less impressive visual views obtained directly through amateur scopes? Unfortunately, actual eyepiece views pale in comparison and, as a result, aren’t as enticing to neophytes as they were 20 or 30 years ago. Strangely, in a very real sense, advances in the tools of astronomy for the first time have become visual observing’s worst enemy—next to the scourge of light pollution.

If all of this is indeed the case, then an obvious strategy would be to feature technology in your club’s activities. Hold astrophotography lessons. Use

smartphone sky apps to point out the stars and planets and use the same phones to capture images taken through telescopes. Feature video imaging at public gatherings. Design and maintain a captivating and relevant website and start a Facebook page.

3. Societal Change

Our society has changed, especially in the way it engages the young. Years ago, teens and pre-teens were expected to explore largely on their own. Today, their time is structured, and their “leisure” activities are monitored, supervised, and directed. All the well-intentioned parental oversight has smothered self-directed exploration. As a result, the natural world—of which the night sky is a part—is no longer a joy waiting to be discovered. Parents, ignorant of what the sky offers, bypass amateur astronomy in favor of more structured pursuits for their children.

The result of this style of growing up was covered in the book *Last Child in the Woods* by Richard Louv. While it didn’t mention the night sky, it did thoroughly discuss people’s—especially children’s—need of exposure to nature for their proper mental and physical development. Other than when they play sports, our children spend most of their time indoors, removed from nature, removed from the stars.

4. Wild Card

When newsworthy celestial events occur, amateur astronomy clubs see a temporary spike in membership that may last three years. This will be tested this year with the passing of two possibly bright comets.

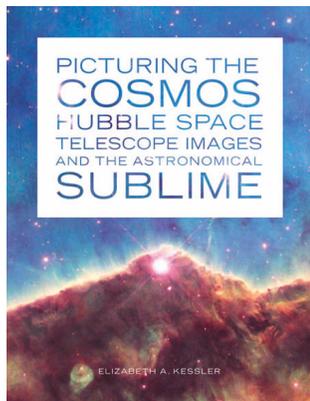
Are we witnessing the end of amateur astronomy as we know it? We are if people do not enter the hobby in the numbers that they once did. This issue contains many perspectives, with many ideas on the survival of our hobby. ✨

New Book

Picturing the Cosmos: Hubble Space Telescope Images and the Astronomical Sublime

A revealing look at the Romantic impulse behind the Hubble Telescope's awe-inspiring deep-space images

The vivid, dramatic images of distant stars and galaxies taken by the Hubble Space Telescope have come to define how we visualize the cosmos. In their immediacy and vibrancy, photographs from the Hubble show what future generations of space travelers might see, should they venture beyond our solar system. But their brilliant hues and precise details are not simply products of the telescope's unprecedented orbital location and technologically advanced optical system. Rather, they result from a series



of deliberate decisions made by the astronomers who convert raw data from the Hubble into spectacular pictures by assigning colors, adjusting contrast, and actively composing the images, balancing the desire for an aesthetically pleasing representation with the need for a scientifically valid one.

In *Picturing the Cosmos*, Elizabeth A. Kessler examines the Hubble's deep-space images, highlighting the remarkable resemblance they bear to nineteenth-century paintings and photographs of the American West and their invocation of the visual language of the sublime. Drawing on art history and the history of science, as well as interviews with astronomers who work on the Hubble Heritage Project, Kessler traces the ways that the sublime, with its inherent tension between reason and imagination, not only forms the appearance of the images, but also operates on other levels. The sublime informs the dual expression—numeric and pictorial—of digital data and underpins the relevance of the frontier for a new era of exploration performed by our instruments rather than our bodies. Through their engagement with the sublime, the Hubble images are a complex act of translation that encourages an experience of the Universe as simultaneously beyond humanity's grasp and within the reach of our knowledge.

Strikingly illustrated with full-color images, this book reveals the scientific, aesthetic, and cultural significance of the Hubble pictures, offering a nuanced understanding of how they shape our ideas—and dreams—about the cosmos and our places within it.

Elizabeth A. Kessler teaches at Stanford University. She has been awarded fellowships by the Smithsonian Institution's National Air and Space Museum and Stanford University.

Available from University of Minnesota Press
280 pages, 7 x 9, 59 color plates
ISBN 978-0-8166-7957-7, \$29.95 paperback
ISBN 978-0-8166-7956-0, \$60.00 cloth
www.upress.umn.edu/book-division/books/picturing-the-cosmos

New Member Clubs

Astronomy in the Parks Society

Southeast Region, 5 members
Lloyd Watkins, ALCor
150 Roberta Dr., Hendersonville, TN 37075
615-824-3005
watkinslk@comcast.net

San Juan Stargazers

MARS Region, 2 members
Pagosa Springs, CO
sjstargazers@gmail.com
SanJuanStargazers.com
Natalie Carpenter, ALCor
970-946-4050
natalie@pagosa5.com



Fargo-Moorhead Astronomy Club

North-Central Region, 6 members
Lois Ivers Altenburg, ALCor
1146 5th St. N.
Fargo, ND 58102-3713
701-232-2701
baltenbu@medicine.nodak.edu



San Mateo County Astronomical Society

Western Region, 53 members
P.O. Box 974, Station A, San Mateo, CA 94403
smcas@live.com
smcas.com
Bob Franklin, ALCor
2703 Prindle Rd., Belmont, CA 94002
650-722-1130
Bfrank1654@aol.com



Eastern Ozark Astronomical Society

Mid-States Region, 6 members
Denny Henke, ALCor
220 Henke Lake Rd.
Fredericktown, MO 63645
573-561-5204
dennyhenke@me.com



Thames Amateur Astronomical Society

Northeast Region, 28 members
Jay Drew, ALCor
6 Merrywood Ln., East Lyme, CT 06333
860-739-4089
drewclan@aol.com

Amateur Astronomers Have Lost an Icon

By Sue Rose

December 9, 2012, the astronomical world lost a true friend. Sir Patrick Caldwell Moore left us to study the universe he loved. He was the voice of Great Britain's *The Sky at Night* for over 55 years, a Guinness World Record, and there isn't a person in the United Kingdom who doesn't recognize his familiar voice, persona, and famous monocle because of it. He introduced them all to the night sky.



Although the program never aired in the United States, his books have crossed the pond and are probably in the library of nearly every amateur astronomer. He helped anyone who asked and especially took children under his wing, shepherding them through the cosmos.

I was lucky enough to be invited to his home many years ago on one of my trips to England and we became friends. When I discovered he was the originator of the Caldwell observing list, we worked to get it included in the Astronomical League award program. Patrick personally reviewed many logs, and signed almost all the certificates up until 2 years ago. He was very pleased with the many comments from those who enjoyed the hunt for the objects he selected. I had the pleasure of presenting an honorary Astronomical League membership plaque and the first silver and gold Caldwell observing pins to him in 2001.

With his urging, I have been compiling many of the observations submitted over the years and will eventually put them into a book.

On my last visit, we agreed to modify the Caldwell Award requirements to allow those with poor eyesight to use go-to capabilities. Honorary certificates will be issued upon submission with recording requirements remaining the same.

The Astronomical League, the Caldwell Award recipients, and I have lost a true friend and supporter. His legacy will live on.

Honors for Wilma Cherup, former Executive Secretary

We are pleased to inform Astronomical League members that asteroid (15151) **Wilmacherup** has been named after **Wilma A. Cherup** (1915–2010), long-time executive secretary of the Astronomical League from 1954–1977. She was a lively council member in the early days and formative years of the organization. Active in her local club as well, Wilma was a lifetime member of the Amateur Astronomers Association of Pittsburgh. League members considered her home address to be the League "headquarters" as it was the primary public contact listed in many articles and books. For 23 years, she communicated with many budding young astronomers and amateurs and encouraged their astronomical interests. As young people growing up in the Space Age, we too appreciated her personal letters and the clubs of the Astronomical League that we later visited or joined.

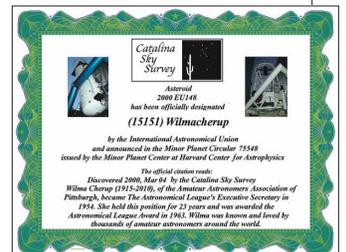
So it is with great pleasure that we forward the International Astronomical Union's official citation for asteroid Wilmacherup and make a donation in her memory to jump-start the League's new *Target NEOs!* Observing Program that continues the tradition of teamwork between professional and amateur astronomers.

The official citation:
(15151) Wilmacherup, discovered March 4, 2000, by the Catalina Sky Survey. Wilma Cherup (1915–2010), of the Amateur Astronomers Association of Pittsburgh, became the Astronomical League's Executive Secretary in 1954. She held this position for 23 years and was awarded the Astronomical League Award in 1963. Wilma was known and loved by thousands of amateur astronomers around the world.

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**Cordially, Rik and Dolores Hill,
Tucson, Arizona**



facebook

"Like us on Facebook." Maybe you've heard that somewhere before but this time it's about the Astronomical League's Facebook page. For the last few months our presence on the social network has been growing and we are steadily collecting followers. We've been trying to post on a variety of interests to astronomy buffs and would welcome your participation.

In a recent activity report, we have over 700 "likes" and nearly reaching a quarter of a million friends of fans. That's a lot of people who we are reaching out to about astronomy. Perhaps you can help spread the interest. If you have a Facebook account, do a search for the Astronomical League and become a Friend. Please contribute and see you there.

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Editor's Note: Congratulations to all these outstanding astronomical observers! All awards except the Herschel 400 require current Astronomical League membership for eligibility. If you have questions about an award, please ask the corresponding Observing Club Chair. Their contact information can be found under the Observing Club site at astroleague.org/observing. If further assistance is required, please contact either of the national Observing Program coordinators.

Analemma Award

No. 2, James Murray, Fort Worth Astronomical Society; No. 3, Alex Vrenios, Member-at-Large

Asteroid Award

No. 46, Les Rudy, Gold, Member-at-Large

Binocular Double Star Award

No. 51, Pete Samsury, Member-at-Large; No. 52, Lloyd Watkins, all 120 pairs, Cumberland Astronomical Society

Binocular Messier Award

No. 974, Michael A. Pascavage, Delaware Valley Amateur Astronomers; No. 975, Will Young, Astronomical Society of Southeast Texas; No. 976, Cindy Krach, Haleakala Amateur Astronomers; No. 977, Alan Diamond, Member-at-Large; No. 978, Bradley Touchet, Member-at-Large; No. 979, Nancy Rauschenberg, Minnesota Astronomical Society; No. 980, Wayne Donohoo, Evansville Astronomical Society; No. 981, Mike Fowler, Atlanta Astronomy Club; No. 982, Glen W. Sanner, Huachuca Astronomy Club; No. 983, Douglas Wiese, High Desert Astronomy Club

Caldwell Award

Silver: No. 189, Nelson Walker, Member-at-Large; No. 190, Dave Lacko, Member-at-Large; No. 191, Ken Hugill, Minnesota Astronomical Society; No. 192, Dave Reardon, Tri-City Astronomy Club; No. 193, Nicholas Anderson, Back Bay Amateur Astronomers; No. 194, Greg M. Brown, Member-at-Large; No. 195, Bruce Scodova, Richland Astronomical Society; No. 196, Cindy Krach, Haleakala Amateur Astronomers; No. 197, Bob Anderson, Member-at-Large

Comet Award

No. 61, David P. Rudeen, Silver, Etna Astros

Deep Sky Binocular Award

No. 339, Brian Reasor, Raleigh Astronomy Club;



No. 340, Brian Chopp, Neville Public Museum Astronomical Society; No. 341, Mike Ramirez, Northeast Florida Astronomical Society

Flat Galaxy Award

No. 17, Frank Colosimo, Honorary, Chesmont Astronomical Society

Galaxy Groups and Clusters Award

No. 29-DA, Kathy Machin, Astronomical Society of Kansas City

Globular Cluster Award

No. 227, Patrick Birck, Prescott Astronomy Club; No. 228, Preston Pendergraft, Member-at-Large; No. 229, Douglas Wiese, High Desert Astronomy Club

Herschel 400 Award

No. 484, Steve Vincent, Cumberland Astronomy Club; No. 485, Keith F. Rawlings, Astronomical Society of Kansas City; No. 486, Glen Sanner, Huachuca Astronomy Club

Herschel II Award

No. 82-DA, Carl J. Wenning, Twin City Amateur Astronomers

Local Galaxy Group and Galactic Neighborhood Award

No. 23-M, Robert Jardine, Astronomy Connections; No. 24-M, Nick Anderson, Back Bay Amateur Astronomers

Lunar Award

No. 809, Dave Dundore, St. Louis Astronomical Society; No. 810, Rich Winters, Member-at-

Large; No. 811, Mark Jones, St. Louis Astronomical Society; No. 812, Rex Koivisto, Rose City Astronomers; No. 813, Jim Tallman, Back Bay Amateur Astronomers; No. 814, Charlie Webster, Member-at-Large; No. 815, Brandon D. Jordan, Member-at-Large; No. 816, Robert A. Anderson, Member-at-Large; No. 817, Ryan Behrends, Hill Country Astronomers; No. 818, Edward Fraini, Houston Astronomical Society; No. 819, Robert Fink, Member-at-Large

Lunar II Award

No. 48, James Barbasso, North Houston Astronomy Club; No. 49, Jack Fitzmier, Atlanta Astronomy Club

Messier Award

Honorary: No. 2400, Brian Reasor, Raleigh Astronomy Club; No. 2584, Emory Horvath, Member-at-Large; No. 2599, Steve Fast, Houston Astronomical Society; No. 2624, Willie K. Yee, Amateur Observers' Society of New York; No. 2625, Bill Smith, Member-at-Large; No. 2626, Bradley E. Schaefer, Baton Rouge Astronomical Society; No. 2627, Bruce Bookout, Colorado Springs Astronomical Society; No. 2628, Terry N. Trees, Oil Region Astronomical Society; No. 2629, Brent Johnson, Hawaiian Astronomical Society

Meteor Award

No. 158, Daryl Stager, 24 hours, Member-at-Large; No. 159, Barrett Rollen Scott, 6 hours, Member-at-Large

Outreach Award

No. 234-M, Steve Bentley, Master, Flint River Astronomy Club; No. 236-M, Larry Higgins, Master, Flint River Astronomy Club; No. 267-S, Charles Turner, Stellar, Flint River Astronomy Club; No. 280-S, J. Robert Kirkham, Stellar, Member-at-Large; No. 299-M, Kelley Miller, Master, Texas Astronomical Society of Dallas; No. 363-S, R. G. Rienks, Stellar, Member-at-Large; No. 382-S, Walter M. Newell, Stellar, South Shore Astronomical Society; No. 403-M, Trevor McGuire, Master, Baton Rouge Astronomical Society; No. 407-S, David Manning, Stellar, Springfield Astronomical Society; No. 443-S, Cal Powell, Stellar, Northern Virginia Astronomy Club; 0445-S, Dr. Willie K. Yee, Stellar, Amateur Observers' Society of New York; No. 457-S, Louis Dorland, Stellar, Omaha Astronomical Society; No. 469-O, Carlos Flores, Outreach, Flint River Astronomy Club; No. 470-O, Glennon Greenway, Outreach, St. Louis Astronomical Society; No. 471-O, Lois Fitter, Outreach, St. Louis Astronomical Society; No. 472-O, Jim Tallman, Outreach, Back Bay Amateur Astronomers; No. 473-M, Kevin Bert, Outreach, Stellar, and Master, Northern Cross Science Foundation; No. 474-O, Eddie Agha, Outreach, Astronomical Society of Eastern Missouri; No. 475-O, Mark Pryor, Outreach, Omaha Astronomical Society; No. 476-O, Amy E. White, Outreach, Astronomical Society of Eastern Missouri; No. 477-O, Aaron Calhoun, Outreach, Flint River Astronomy Club; No. 478-O, Paul Brewer, Outreach, Northern Virginia Astronomy Club; No. 479-O, Tom Lynch, Outreach, Amateur Observers' Society of New York; No. 480-O, Skylar Holst, Outreach, Astronomical Society of Long Island; No. 481-O, John R. Holst, Outreach, Astronomical Society of Long Island; No. 482-O, Tom Pennino, Outreach, Astronomical Society of Long Island; No. 483-O, Sara Sheidler, Outreach, Popular Astronomy Club; No. 484-O, Eric Sheidler, Outreach, Popular Astronomy Club; No. 485-S, Alan Sheidler, Outreach and Stellar, Popular Astronomy Club; No. 486-O, Kenneth J. Anderson, Outreach, Astronomical Society of Long Island; No. 487-S, Jim Kaminski, Outreach and Stellar, Member-at-Large; No. 488-O, Anne L. Bauer, Outreach, Popular Astronomy Club; No. 489-S, Wayland P. Bauer, Outreach and Stellar, Popular Astronomy

Title photograph: M64, the Black Eye Galaxy; NASA and the Hubble Heritage Team (AURA/STScI)

Club; No. 490-M, Jim Wessel, Outreach, Stellar, and Master, Houston Astronomical Society; No. 491-S, Christopher Todd, Outreach and Stellar, Howard Astronomical League; No. 492-O, Ryan VanWinkle, Outreach, Member-at-Large; No. 493-O, Joe Auriemma, Outreach, Flint River Astronomy Club

Planetary Nebula Award

No. 25, Nick Anderson, Basic, Manual, Back Bay Amateur Astronomers; No. 56, Christian Weis, Advanced, Manual, Tucson Amateur Astronomy Association

Southern Binocular Award

No. 78, Bryan R. Tobias, San Antonio League of Sidewalk Astronomers; No. 79, Bradley E. Schaefer, Baton Rouge Astronomical Society

Southern Sky Award

No. 37, Lisa Judd, Denver Astronomical Society; No. 38, Bradley E. Schaefer, Baton Rouge Astronomical Society

Sunspotter Award

No. 145, Will Young, Astronomical Society of Southeast Texas; No. 146, Bradford Wilson, Member-at-Large; No. 147, Robert Clark, Westminster Astronomical Society; No. 148, Robert Fink, Member-at-Large

Universe Sampler Award

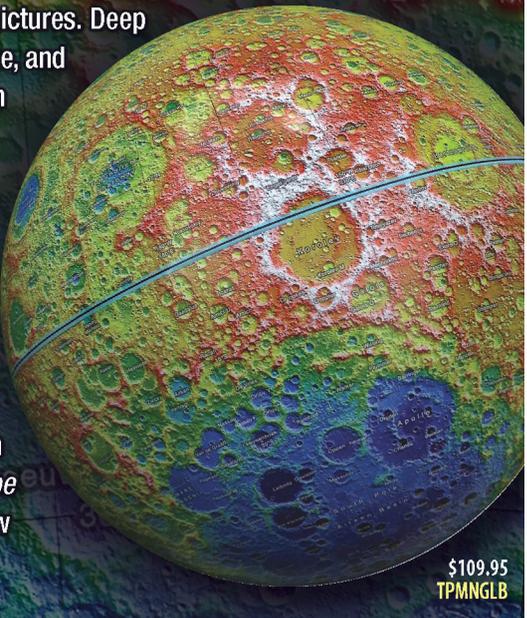
No. 110, Eric Johnson, Telescope, Member-at-Large



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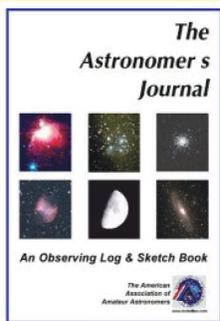
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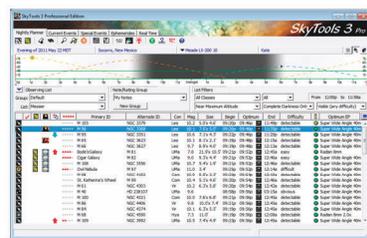
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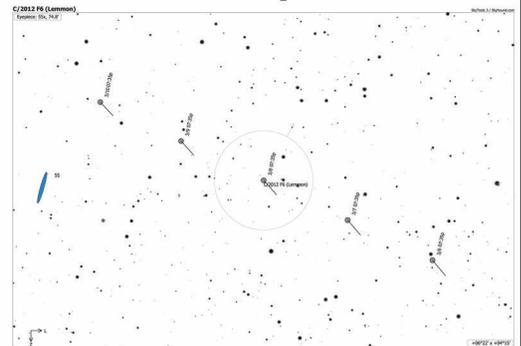


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June 5-9

Rocky Mountain Star Stare
Colorado Springs Astronomical Society, Gardner, CO; rms.org

June 6-9

Cherry Springs Star Party
Cherry Springs State Park, Coudersport, PA
cherrysprings.org

June 6-9

Wisconsin Observers Weekend
Hartman Creek State Park, Waupaca, WI
new-star.org

June 7-8

Apollo Rendezvous
The Boonshoft Museum of Discovery and John Bryan Observatory, Dayton, OH
mvas.org

June 7-8

Craters of the Moon Star Party
Craters of the Moon National Monument, Idaho Falls Astronomical Society, Arco, ID
ifastro.org

June 7-9

2013 Bootleg Astronomy Star Party
Green River State Wildlife Area, Harmon, IL
bootlegastronomy.com

June 8-13

Grand Canyon Star Party
South Rim: Tucson Amateur Astronomy Association; North Rim: Saguaro Astronomy Club of Phoenix; Northern AZ
nps.gov/grca/planyourvisit/grand-canyon-star-party.htm

June 14-15

Stars Over Yellowstone
Madison Campground, Yellowstone National Park, WY
smasweb.org/?page_id=546

July 6-10

Golden State Star Party
Frosty Acres Ranch, Adin, CA
goldenstatestarparty.org

July 10-13

Green Bank Star Quest
National Radio Astronomy Observatory, Green Bank, WV; greenbankstarquest.org

July 10-14

Mason Dixon Star Party
Private Footlight Ranch, Wellesville, PA
masondixonstarparty.org

July 11-14

Sky Tour
Huron Valley Astronomers Group
North-Central OH
nwo-astronomy.org/nwo-astronomy_010.htm

July 12-13

Connecticut River Valley Astronomers Conjunction
Northfield Mountain Recreation and Environmental Center, MA
philharrington.net/astroconjunction

July 12-13

Stars Over Yellowstone
Yellowstone National Park, WY, Madison Campground
smasweb.org/?page_id=546

July 24-27

Astronomical League Convention/ALPO/Atlanta Astronomy Club
Fernbank Science Center, Atlanta, GA
alcon2013.astroleague.org

August 1-4

Indiana Family Star Party
Camp Cullom, Frankfort, IN
home.comcast.net/~jmmahony1/PGO

August 2-3

Maine State Star Party
Cobscook Bay State Park, Edmunds, ME
downeastaa.com

August 4-9

Nebraska Star Party
Merritt Reservoir, Valentine, NE
nebraskastarparty.org

August 6-11

AstroBlast Star Party
Oil City, PA
www.oras.org

August 6-11

Oregon Star Party
Ochoco National Forest, Prineville, OR
oregonstarparty.org

August 7-10

Table Mountain Star Party
Eden Valley Ranch, Oroville, WA
tmspa.com

August 8-11

Stellafane
Breezy Hill, Springfield, VT
stellafane.org/stellafane-main/convention

August 9-10

Stars Over Yellowstone
Madison Campground, Yellowstone National Park, WY
smasweb.org/?page_id=546

August 9-11

Julian Starfest
Menghini Winery, Julian, CA
julianstarfest.com

August 9-11

Northwoods Starfest
Beaver Creek Reserve, Hobbs Observatory, Fall Creek, WI; cvastro.org

August 29-September 2

Iowa Star Party
Whiterock Conservancy's Whiterock Resort, Coon Rapids, IA
iowastarparty.com

September 4-7

Northern Nights Star Fest
Long Lake Conservation Center, Palisade, MN
mnaastro.org/NNSF

September 4-8

Brothers Star Party for Oregon Observatory
Brothers, OR
mbsp.org

September 5-8

Great Lakes Star Gaze
River Valley RV Park, Gladwin, MI
greatlakesstargaze.com

September 6-8

Black Forest Star Party
Cherry Springs State Park, Potter County, PA
bfsp.org/starparty

September 6-8

Idaho Star Party
Bruneau Dunes State Park, ID
boiseastro.org

September 6-8

Jersey StarQuest
Hope Conference Center, Hope, NJ
princetonastronomy.org/sqmainpage.html

September 6-10

Almost Heaven Star Party
Spruce Knob, WV
ahsp.org

September 28-October 6

Okie-Tex Star Party
Kenton, OK
okie-tex.com

September 28-October 6

Twin Lakes Star Party
Pennyrile Forest State Park, Dawson Springs, KY
wkaa.net/starparty

September 29-October 6

Peach State Star Gaze
Crawfordville, GA
atlantaastronomy.org/IPSSG

Mid East Region

in conjunction with the

★ **Green Bank Star Quest** ★

ANNUAL MEETING

SATURDAY JULY 13

Nominations are open for MERAL offices

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Astronomical League



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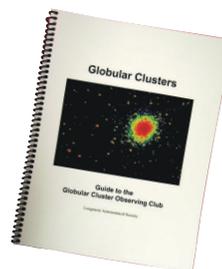
"Guide to the Stars" 16" Planisphere

\$21 plus \$3.15 S&H



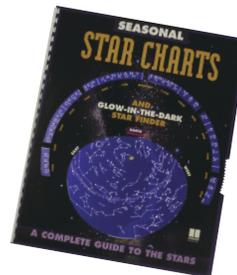
Globular Clusters

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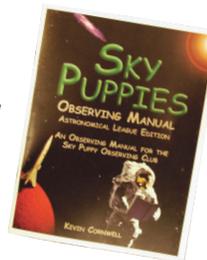
Seasonal Star Chart

\$24 plus \$3.60 S&H



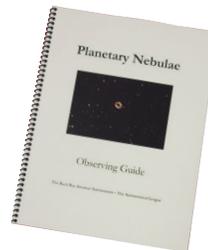
Sky Puppies Observing Manual

For the Sky Puppy Observers Club
Regularly \$15,
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Planetary Nebulae

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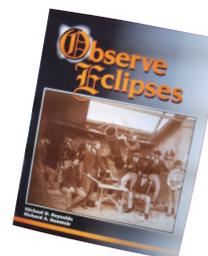
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Observe Eclipses

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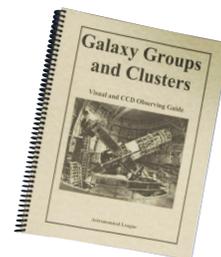
Universe Sampler

\$10 plus \$1.50 S&H



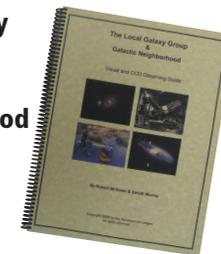
Galaxy Groups and Clusters

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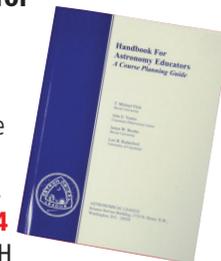
Local Galaxy Group and Galactic Neighborhood

\$21 plus \$3.15 S&H



Astronomy for Educators Handbook

A Course Planning Guide
5.5" x 7.25"
Regularly \$12,
Sale price \$4
plus \$1.80 S&H



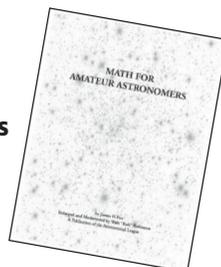
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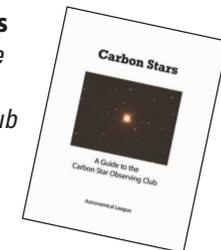
Math for Amateur Astronomers

\$10 plus \$1.50 S&H



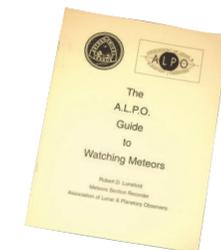
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The Astronomical League invites its members to submit astrophotography for publishing in the *Reflector*. When sending photos, please include a brief explanation telling us when and where the photo was taken, your club affiliation, what equipment was used, and any computer processing that was involved.



Phil Schmidt, member of the Astronomical League and the Austin Astronomical Society, took this image on February 2, 2013, at 6:03 p.m. CST. He was at the AAS Eagle Eye Observatory on Lake Buchanan, near Burnet, Texas. Using a homemade sun funnel, per transitofvenus.nl/wp/observing/build-a-sun-funnel, with some modifications, this was an unplanned picture taken on the spur of the moment as an Orion XT10g (1200 mm FL) tracked the sun down to the horizon. View is looking west across Lake Buchanan toward a wooded ridge, about 3 miles away. Dr. Schmidt is a Donald J. Douglass Centennial Professor and University Distinguished Teaching Professor in the Department of Mechanical Engineering at the University of Texas at Austin. Image was taken with an iPhone 5.