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### Take Note!

- ◆ Family Astronomy Program Launched
- ◆ Fundamentals of Astronomy Class in March/April
- ◆ Sharing the Sky Star Party April 20th
- ◆ Grand Canyon Star Party June 8 - 15
- ◆ CAC Recognition Patio Underway
- ◆ 3000 visit TAAA exhibit at Tucson Festival of Books
- ◆ 200 Galileoscopes have First Light
- ◆ Be sure to make your Globe at Night Observations

## M42 & M43—Great Orion Nebula



*M42, the Great Orion Nebula. This image was taken by TAAA member Ray Morris. He used a Celestron C-8 on a Celestron CGEM mount. The imaging camera is a Canon EOS 1000D/Rebel XS. This image consists of twenty-two 1-minute exposures and twenty 15-sec exposures (to get the Trapezium details). He processed it with 10 darks and 20 biases. He stacked the 1-min exposures separate from the 15-second exposures and combined them in Photoshop, preserving the Trapezium details. Image copyright © Ray Morris, used by permission.*

## Dan Brassell to be Memorialized at Chiricahua Astronomy Complex

TAAA member Dan Brassell passed away on February 19th. Dan was also a member of the Sonoran Astronomical Society in Green Valley.

Dan worked in libraries across the country. In 2008, he retired as the director of the Medfield (MA) Public Library.

He and Cathy, his wife of 44 years, then moved to Sahuarita where he became active in our local astronomy clubs. He enjoyed taking his telescope to star parties at area schools. Each summer, he attended the Grand Canyon Star Party.

Cathy has purchased a Memorial Brick which will be laid into the



Dan Brassell 1944—2013

Chiricahua Astronomy Complex patio. Dan is survived by Cathy, two sons and one daughter, plus four grandchildren.

## From Your Editor

Here it is! The long awaited quarterly issue of *Desert Skies*. As a monthly newsletter published since March 1983, *Desert Skies* has kept TAAA members informed of upcoming events. As the TAAA has grown, so has the number of events each month. In March 2013 alone we have 22 events! Over recent years, our newsletter had evolved into announcements of events with a limited amount of space to devote to much else.



In January 2013, we introduced our Monthly Events Bulletin which now contains notice of our events. That publication is sent to all TAAA members and is the source for keeping you informed of activities. This allows us to open up the pages of *Desert Skies* to articles of interest to our members and others in the local astronomical community. You'll find a few events announced here, but the Monthly Events Bulletin is your primary location for learning about upcoming events.

I hope you enjoy this first quarterly edition. I'm sure you'll find something interesting. Read on...

Terri Lappin  
Publications Editor

## Special Event

### Astronomy Day Annual Sharing the Sky Event



Mark your calendars for Saturday, April 20th, from 3 to 10 PM. The Sharing the Sky annual event will be held on the University of Arizona Mall across from UA Science Flandrau (planetarium). The Sharing the Sky Star Party is open to the public and will feature hands-on activities for kids and adults, plus solar viewing during the day and night sky viewing after sunset.

TAAA members are needed to help with these activities. If you don't have a telescope and would like to help, your assistance with these activities and collecting donations for David and Wendee Levy's Sharing the Sky

Foundation would be appreciated. We would like to request that members supporting the event who own canopies, bring them and set them up to enhance the early-afternoon sun protection over the donation tables and hands-on activities.



David and Wendee Levy would like to thank all of you for supporting this worthwhile event. Support from the TAAA is essential for the success of this activity. Show your support by wearing a Sharing the Sky t-shirt. Contact Liz Kalas at 520-620-6502 or [lizkalas@cox.net](mailto:lizkalas@cox.net) to order a t-shirt (\$10 each, \$13 each for large sizes). There will be a volunteer sign-up sheet at the April 5th TAAA General Meeting or, if you are unable to attend the April meeting, you can call or e-mail John Kalas at 520-620-6502 or [jckalas@cox.net](mailto:jckalas@cox.net) to volunteer.



The mission of the Tucson Amateur Astronomy Association 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 Science, Technology, Engineering and Mathematics (STEM) events in the Tucson community. 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.

### Sharing the Sky Star Party

Saturday, April 20

3PM—10PM

UofA Mall  
at Cherry & University

Solar Observing

Hands-on Activities

Evening Star Party

Raffle Prizes\*

\* Raffle tickets are given out in exchange for a donation to the Sharing the Sky Foundation. Minimum \$1 donation. Must be present to win.



## Programs

### Family Astronomy Program Launched

Text and Photos by Bob Gilroy, TAAA Vice President

On January 5, 2013 the parents of 11 children representing 7 families met for a 90 minute meeting to discuss the launching of this latest observing program designed for families with children of varying ages. It is the meshing of two Astronomy League Observing Clubs that will address the different skill levels of children of various ages. The "Sky Puppy" Observing is for children under the age of 11 and "Universe Sampler" for children of all ages. The parents will be the director of the program for their children while the TAAA representatives will be the coordinators for this project. We will be meeting on the third Saturday of every month from 6:00 pm to 8:00 pm. The fourth Saturday will be held as a backup if we have to cancel the third Saturday.

On January 26, 2013 the first Astronomy Event for our Family Observing Program was held at the Drake Building and it went very well. The first hour of the two-hour event was dedicated to hands on projects while the second hour was for observing. In the first hour, we discussed what a solar system is and

For the second hour the gods smiled upon us. The forecast was for clouds and rain and it was like that for most of the day. However, when it came time for our observing session, the weather had cleared significantly with very few clouds. We got to identify some constellations and name some of the bright stars.

We got a close-up view of both the moon and Jupiter. Some of the children even got to operate the telescope.

Our next event is scheduled for April 20, 2013. This will be held in the Flandrau Science Center. We will start out with a review of the objects in the solar system

and the order of the planets and their moons. Then we will be talking about the myths surrounding constellations with the children telling a cultural story about a particular constellation that they chose followed building their own planisphere. During the second hour, we will identify the bright stars in certain constellations. We will also be observing Jupiter and the moon.

We will continue on these themes for the next few months. Come out and join us. We can always use a couple extra scopes. If you want to participate in this program email Robert Gilroy at [bobgilroy@tucsonastronomy.org](mailto:bobgilroy@tucsonastronomy.org).



**The Next Family  
Astronomy Night  
is April 20th**



# Programs

## Introduction to the Fundamentals of Astronomy

**March 16th**

We cover Basic Astronomy, including celestial motion, the celestial coordinate system, and types of celestial objects.

**March 23th**

The subject will be Equipment Basics, including telescopes, mounts, eyepieces, filters, and other observing accessories.

**April 6th**

We discuss Observing Basics, including locating objects, seeing conditions, and hints and tips on observing various types of objects.

The TAAA Astronomy Fundamentals Special Interest Group (AFSIG) will give its popular "Introduction to the Fundamentals of Astronomy" class this March/April. This class is aimed at giving the beginning amateur astronomer a good start in the hobby. Topics covered including the basics of the night sky, equipment used, and observing techniques.

The classes will be held at the regular AFSIG meeting location: Room 253 in the USGS building at 6th and Park on the UA campus. Each day will consist of several presentations, with frequent breaks and a break for lunch. We expect the class to run from 9:00 AM until midafternoon on each day.

The class is free to TAAA members and there is plenty of room on the roster. If you are interested, send an e-mail to [fundamentals@tucsonastronomy.org](mailto:fundamentals@tucsonastronomy.org) or contact one of the AFSIG Committee members.



Last year's classes were well attended and fun.

## Astronomy Fundamentals Special Interest Group Observing Clubs

- ★ Open to all TAAA members
- ★ Guided or work on your own
- ★ Stepping stone into the Astronomical League Observing Clubs
- ★ Join at any time
- ★ Certificate at completion

**Lunar Observing Club** meets sporadically depending on schedule compatibility and the moon cycle. The purpose of this club is to identify and log 30 specified lunar features – some of which are easy while others are more difficult. This is a great club in which to participate as it is ideal for observing from your back yard or patio. Dark skies are not really necessary and some features are even visible through light clouds. If you are interested in participating in the Lunar Observing Club or if you just want to be added to our email list to keep posted about our activities, email Bob Eby at [r.eby@comcast.net](mailto:r.eby@comcast.net)

**Constellation Observing Club** meets monthly on our regularly scheduled TIMPA night. The purpose of this club is to identify and log 20 constellations, their brightest stars and deep sky objects. This is a great way to learn your way around the night sky. If you are interested in participating in the Constellation Observing Club or if you just want to be added to our email list to keep posted about our activities, email Paul and Cathy Anderson at [paulanderson@tucsonastronomy.org](mailto:paulanderson@tucsonastronomy.org).

**Solar System Observing Club** meets monthly on our regularly scheduled TIMPA night. The purpose of this club is to observe and log the different features and actions of the planets and their moons and other interesting solar system objects. If you are interested in participating in the Solar System Observing Club or if you just want to be added to our email list to keep posted about our activities, email Brian O'Connell at [boc7@inbox.com](mailto:boc7@inbox.com).

**Double Star Observing Club** meets monthly on our regularly scheduled TIMPA night. The dark night sky is filled with millions and millions of stars. Some are close by (relatively speaking) but most are far away. Some are single stars (like our sun) but others are multiple star systems. Of these multiple star systems, we can detect and split many double stars with our equipment. The purpose of this club is to observe and log the different types and colors of double stars. If you are interested in participating in the Double Star Observing Club or if you just want to be added to our email list to keep posted about our activities, email Tom Watson at [watson1987@cox.net](mailto:watson1987@cox.net).



## TAAA News

### *Recognition Patio at Chiricahua Astronomy Complex Soon Underway*

Text Contributed by Bill Lofquist, Coordinator of CAC Strategic Planning Committee, Fundraising Team

The first order of 49 bricks for our Recognition Patio at the Chiricahua Astronomy Complex (CAC) are on their way!

The Patio will be located adjacent to the walkway between the concrete handicapped parking pads and the restrooms. It will connect the walkway to the Outdoor Education/Activity Ramada—the Ramada being the first thing built with the funds that are being raised by contributions to the Patio. The Education/Activity Ramada will be an open sided 20' X 30' structure, including tables, giving us a multi-purpose area for many activities at the CAC site.

Our next step is asking TAAA members to provide us with the names of the vendors of all of the astronomy equipment that you use. If you also include the names of any mail order houses that you use, we will contact these and invite them to contribute to the Patio by purchasing a brick. Send your list of vendors to Bill Lofquist at [billlofquist@tucsonastronomy.org](mailto:billlofquist@tucsonastronomy.org).

Of course, many TAAA members have already ordered bricks; we hope you'll let your friends know they, too, can purchase bricks in support of the mission of TAAA.

The order form for purchasing a brick can be found on the TAAA website at <http://tucsonastronomy.org/astronomy-complex-overview/taaa-recognition-patio-and-walkway-program/>, or just click on this brick icon.



Watch for regular updates about the progress of our Recognition Patio, or visit the CAC and watch as the patio grows.

### *Chiricahua Astronomy Complex Development Continues, Third Anniversary Celebrated*

Text Contributed by John Kalas, CAC Site Director



TAAA's Chiricahua Astronomy Complex in Cochise County.

February 2013 marked the 3rd Anniversary of the Chiricahua Astronomy Complex. The weather didn't cooperate, so the celebration was rescheduled to March 9th.

As seen in the picture above, development at the site continues. Note the roll-off roof observatory. With the addition of the chain-drive crank mechanism, the facility is now an easy one-person open and close operation.

A meeting was held on Saturday, February 23rd, with our contractor, Randy Maddox, to discuss future development at the site. Bill Lofquist and Joe Jakoby attended the session with Randy. Randy recommended construction techniques for future facilities such as the Education/Activity building including sleeping quarters. We also reviewed the upcoming construction of the



Mike Magras and his 6" refractor at CAC. Photo provided by Mike Magras.

engraved brick patio. Randy will be working up budgetary quotes for the various buildings, so the fundraising committee will be able to pursue the funds necessary to construct them.

## Featured Article

### Websites: Trips on the Internet Super-Skyway

Contributed by Rik Hill, [rhill@lpl.arizona.edu](mailto:rhill@lpl.arizona.edu)

Everybody was wired for the passage of 2012 DA14, the Tucson Rock, Gem, Mineral and Fossil show, the world's largest such show, was in full swing with it's rooms full of meteorites. Then, over Chelyabinsk, Russia a small asteroid entered the earth's atmosphere creating a large long train, sonic booms that shattered windows, ceilings and doors and upstaged everything else for a time. In the field of asteroid and meteor science, little else was talked about. This was the biggest impact since Tunguska.

Now known as the Chebarkul meteorite, named after the lake where most of the pieces landed, handfuls of pieces are being collected every day. These all belong to the Russian government so there are none legally on the open market (eBay included).

If you have not seen what happened on that day here are two websites with good collections of the video taken by cell phones and surveillance cameras:

<http://rt.com/news/meteorite-crash-urals-chelyabinsk-283/>

<http://say26.com/meteorite-in-russia-all-videos-in-one-place>

It appears that hundreds of people were injured, most by flying glass and debris. Indeed, several videos on the second link shows this in shocking detail.

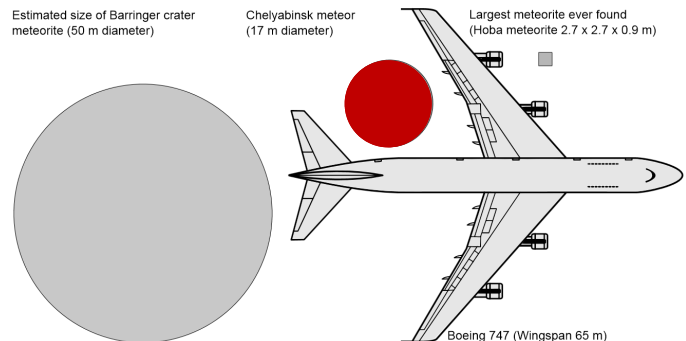
Now I called this a small asteroid. In fact, this is a technical detail. It has been officially determined that any body larger than 1 meter is an asteroid, not a meteoroid<sup>1</sup>. This object was 17 meters in size (about 10,000 tons) according to NASA/JPL. It came in at an estimated 40,000mph leaving the train composed of the melted outer surfaces of the pieces. The explosions heard and felt caused an estimated \$33 million in damage but an exact number is not yet known. There was one unsubstantiated claim that a factory was destroyed.

One of the early erroneous announcements was that this was associated with 2012 DA14. It is not associated with the larger asteroid as explained by JPL:

<http://www.jpl.nasa.gov/news/news.php?release=2013-061>

As is usual when these things happen, there were wild speculations and fantasies that were quickly carried by less reputable press outlets. The Russians shot down a missile, shot down the asteroid, it was a UFO, it was a secret US satellite all made it to the web news outlets.

Since it impacted the lake, leaving a 25 foot diameter hole, many pieces have been collected and it has been shown to be an ordinary chondrite. What makes these pieces valuable is that their time on the earth is known precisely and other materials in the pieces can be dated from there. This helps scientists, like those of the Lunar & Planetary



Size comparison of stony Chelyabinsk impactor, nickel-iron Meteor Crater impactor, nickel-iron Hoba meteorite and a Boeing 747. This diagram was found on Wikipedia, attributed to user Tobias1984.

Lab at the University of Arizona, determine conditions in the early solar system. Unfortunately the collecting techniques being used are not optimal. The best way would be to wear a plastic zipping sandwich bag inside out like a glove, pick up the piece, pull the bag over it and zip it shut. This keeps corrosive skin oils and moisture off the sample.

Many have wondered why this was not detected by surveys like SpaceWatch and the Catalina Sky Survey both at University of Arizona. First of all, it was small, much smaller than the usual ones observed in these surveys. Currently these surveys are tasked with finding 90% of the asteroids down to 150 meters in size. This rock was around one tenth that size! If a 60" telescope was pointed right at it the night before it hit, there might have been a chance it would be spotted but it would have been faint and moving very fast. But that would not have been possible either. This one came from the direction of the sun. All the big surveys are limited to solar elongations of 60 degrees.

As I'm dashing this off, another press release from NASA was issued today. It is well worth a read and puts to rest some of the myths that are budding. See it at:

[http://science.nasa.gov/science-news/science-at-nasa/2013/26feb\\_russianmeteor/](http://science.nasa.gov/science-news/science-at-nasa/2013/26feb_russianmeteor/)

So ignore most of the popular press on this one and watch the NASA and JPL press releases on this over the next couple months and you have some good information straight from the horse's mouth as they say. Remember this won't be the last time we get hit like this.

<sup>1</sup> Rubin, Alan E.; Grossman, Jeffrey N. (January 2010). "Meteorite and meteoroid: New comprehensive definitions". *Meteoritics & Planetary Science* 45 (1).

As always, if you have some feedback or a topic you'd like explored or have some interesting URLs you've turned up, please feel free to drop me a line at [rhill@lpl.arizona.edu](mailto:rhill@lpl.arizona.edu)



## Featured Article

### Prison Astronomy

Text by Julian Grajewski, [jnemaggie@yahoo.com](mailto:jnemaggie@yahoo.com), Hamburg, Germany

In the years of 1992 to 1994 I was working as a prison legal librarian at the state prison complex in Winslow, Arizona, a run down dismal town set one hour east of Flagstaff. The prison itself was built in a surreal, desertscape, appropriate for a prison and even a science fiction movie, just south of I-40.

A federally mandated program resulted in a division of powers between the administration and inmates that made life more humane for the inmates in accordance with the U.S. Constitution, which forbids cruel and unusual punishment. However, balancing the legal needs of the inmates against the security requirements of the prison took a psychological toll on me. At one point legal librarians were filing 700 lawsuits against the State of Arizona! I was always looking for ways to refresh my mind and, at the end of my term, to simply escape the stress of the job.

In the 27 months I worked in Winslow, I experienced four astronomically related events beyond the routinely dark seeing at the Homolovi Ruins State Park nearby. One event I could observe from the window of my office in the medium security Kaibab Yard: I had managed to identify the butte look-alike that was Barringer Meteor Crater by going to the meteor crater itself one night and taking an azimuth bearing by pointing to the light dome of the prison 15 miles away. Then it was a simple matter to note the back azimuth and extend it from my office window. My inmate law clerks were hungry for diversion from their benighted prison routine, especially the inmate on inmate violence that the administration could only limit. They marvelled at being able to see the wall of the crater, imagining the tremendous impact that formed it 49,000 years previously.

From the minimum security Coronado Yard office window, I could pick out East Sundown Mountain and West Sundown Mountain and

observed the sun as it set every evening over the course of a year to the right of those two reference points. One of my clerks, a Dineh Native American, took a special interest every evening, as he wanted to understand celestial mechanics. I won't tell you what he was in for.

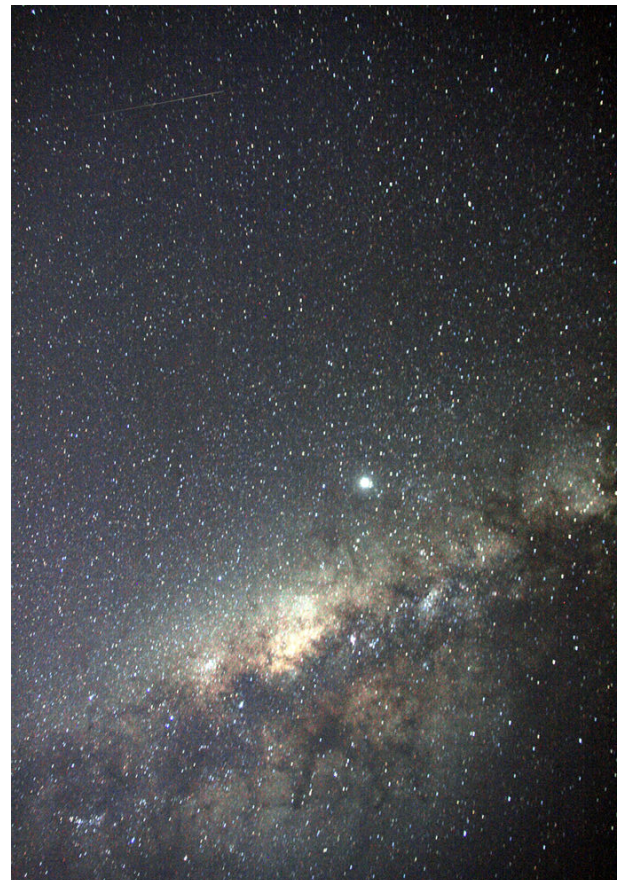
By looking out for the sun, we also observed a stationary point of white light that hung thirty degrees above the horizon for two days. It was not the planet Venus or Mercury. A meteorological balloon or a military mystery was my facile guess; I decided to be generous and did not contradict inmates who wondered about UFO's.

I observed the partial eclipse of 1993 from the front yard of my lodgings with a six-inch Dobsonian by eyepiece projection. I noticed a slight darkening of the sky at the climax, and at that moment a raven alighted on the peak of the roof and cawed at me as if asking, "What is going on here?"

In December 1993, a dike holding back the Little Colorado River gave way and flooded a large area. The flood deposited new sand along the banks creating a smooth beach about forty yards wide and hundreds of yards long that became an astronomical boon. One moonless night I discovered that I could walk on this clean white sand without tripping over rocks while fixing my eyes on the Sagittarius-Scorpius heart of the Milky Way that was inclined 90 degrees to the horizon, appearing like the photograph of it on page 90 of the January 2008 issue of Sky and Telescope

magazine. The winged feeling of floating in deep space, entering the core of our galaxy, was tremendous and I repeated the "space walk" several times.

An astronomical experience I could share with the inmates was the PBS broadcast of the night that comet Shoemaker-Levy 9 slammed into Jupiter in 1994. I invented an excuse and set up a television set on a side room of the Coronado Library behind the counter and let the inmates sneak a peek of the exchange between Terry Gross and David Levy. It was a noble night I will not forget; here we were surrounded by the darkness of the high desert sharing an historic astronomical event in real time with cast-offs from society enjoying a little intellectual relief from their bleak and brutal lives.



Public Domain image of the Milky Way Galaxy

## Featured Article

### Join the Worldwide GLOBE at Night 2013 Campaign

Text by Connie Walker, NOAO Associate Scientist, Education and Public Outreach

What would it be like without stars at night? What is it we lose? Starry night skies have given us poetry, art, music and the wonder to explore. A bright night sky (aka light pollution) affects energy consumption, health and wildlife too. Spend a few minutes to help scientists by measuring the brightness of your night sky. Join the GLOBE at Night citizen-science campaign ([www.globeatnight.org](http://www.globeatnight.org)). The next campaign starts March 31 and runs through April 9. One additional campaign will occur April 29 through May 8.

GLOBE at Night is a worldwide, hands-on science and education program to encourage citizen-scientists from 8 to 80 years old worldwide to record the brightness of their night sky. During the campaign dates in 2013, children and adults match the appearance of a constellation (Orion or Leo in

the northern hemisphere, and Orion and Crux in the southern hemisphere) with seven star charts of progressively fainter stars ([www.globeatnight.org/observe\\_magnitude\\_orion.html](http://www.globeatnight.org/observe_magnitude_orion.html)).

Participants then submit their choice of star chart at [www.globeatnight.org/webapp/](http://www.globeatnight.org/webapp/) with their date, time and location. This can be done by computer (after the measurement) or by smart phone or pad (during the measurement). From these data an interactive map of all worldwide observations is created ([www.globeatnight.org/map/](http://www.globeatnight.org/map/)).

Over the past 7 years of 10-day campaigns, people in 115 countries have contributed over 83,000 measurements, making GLOBE at Night the most successful, light pollution citizen-science campaign to date ([www.globeatnight.org/analyze.html](http://www.globeatnight.org/analyze.html)).

The GLOBE at Night website is easy to use, comprehensive, and holds an abundance of background information ([www.globeatnight.org/learn.html](http://www.globeatnight.org/learn.html) and [www.globeatnight.org/observe.html](http://www.globeatnight.org/observe.html)). Guides, activities, one-page flyers and postcards advertising the campaign are available at [www.globeatnight.org/pdf/](http://www.globeatnight.org/pdf/). Through GLOBE at Night, students, teachers, parents, community members and astronomers are amassing a data



Campaign Dates

March 31—April 9

April 29—May 8

set from which they can explore the nature of light pollution locally and across the globe. Make a difference and join the 2013 GLOBE at Night campaign from March 31 to April 9 and April 29 to May 8. And if you are passionate about maintaining dark, starry night skies, consider making more than one GLOBE at Night observation and "Adopt-a-Street" ([www.globeatnight.org/Tucson/](http://www.globeatnight.org/Tucson/)) in your area during the campaign.

And just for fun, listen to a skit on GLOBE at Night in a 7-minute audio podcast at <http://365daysofastronomy.org/2012/12/17/december-17th-the-dark-skies-crusader-retires-globe-at-night-returns/>.

Enjoy!



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# Observing

## Planetary Nebulae with cosmic neighbors – observation suggestion and request

By Christian Weis, [weis@astroweis.de](mailto:weis@astroweis.de)

When observing the planetary nebula (PN) IC 1295 some time ago I stumbled upon NGC 6712 which is a globular cluster right next to the PN. When using low power, both objects appear in the same FOV. Suddenly, the idea was born to observe more of those beautiful combinations of planetary nebulae and other deep-sky-objects.

To compile a list of suitable targets, I first had to define requirements in order to carry out a search. Those are:

- ★ Angular distance of less than half a degree as this approximately is the maximum FOV I can achieve with my equipment
- ★ Apparent brightness of both involved deep sky objects has to be brighter than 15m (I can reach up to 17mag with my 18" Dobsonian telescope but that requires higher magnification which is diametrically opposed to angular distance)
- ★ Since living on 43° N I cannot observe objects that are too far to the south, so I chose a declination of north of -15° (a friend and observing buddy of mine who is also involved in this project lives even further to the north)

First, I tried to find objects via SIMBAD but quickly realized that I could not handle the amount of objects that I would have to deal with (far more than a million!). So, I used the Saguaro Astronomy Club database which contains data of more than 10,000 deep sky objects. Furthermore, this data already was available in a spreadsheet application that made further processing easier. Nonetheless, as not being overly experienced in programming, searching for the desired objects took me some 10 hours. But finally, I managed to compile a list of PNs that are

closer than half a degree to at least one other deep sky object with all involved objects being brighter than 15mag.

This list is shown in the table on the next page and should be self-explanatory.

When studying it, the experienced observer might wonder why Pease 1, the PN in the globular cluster M15, is not listed. Well, Pease 1 is not listed in the SAC database. However, if it was it would not fulfill all requirements as its brightness according to literature is around 15m5. This does not mean that Pease 1 is not interesting at all. Actually, the opposite is the case. If you have enough aperture, or in case of imaging, if you have the right equipment, you should give it a try. It is absolutely worth the efforts.

So far I have successfully observed 6 of the 14 entries and I must say that combining the beauty of a PN with another deep sky object is very rewarding. My favorite of the catalogue (even though I still have to observe some objects) is NGC 2438 – the PN in the open cluster M 46. If you study the table you will find out that NGC 2438 is listed twice. There actually is another PN less than half a degree to NGC 2438. This is PK 231+4.1. NGC 2438 and PK 231+4.1 were the first objects of the monthly *Desert Skies* Newsletter column "Planetary Nebulae of the month" in the January 2011 issue. Positioning M46 and NGC 2438 adequately at one corner of the FOV will result in PK 231+4.1 showing up at the opposite one. The view really is amazing, providing that you have enough aperture and a filter.

I plan to observe all entries of the list and to write an article together with my long-time observing buddy Frank Leiter (some of you might have heard of the Leiter-catalogue – that's him) for the German journal of the

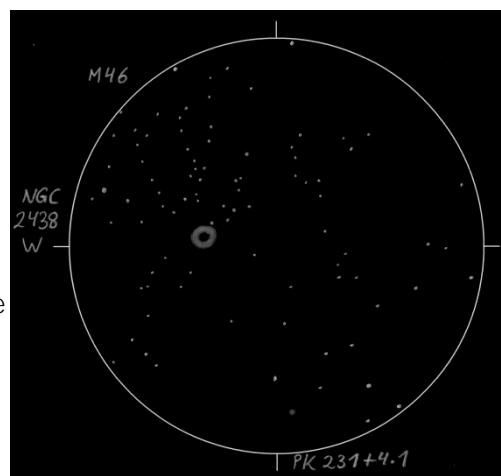
Vereinigung der Sternfreunde (literally: Club of friends of stars; i.e. the biggest German-speaking astronomy club). This article is supposed to be published in summer 2014.

If you want to join in and if you are willing to contribute, either visually or photographically, you are very welcome to do so. I will include your observations or photos in the article and – of course – I will mention you by name. As we will not receive any payment for the article, I cannot allure contributors with money. However, I will make sure that you receive a copy of the article along with an English translation of it. I will also write an article about the results for the *Desert Skies* Newsletter.

If you want to contact me regarding this matter, please do not hesitate at all. The best way to do so is to contact me via email: [weis@astroweis.de](mailto:weis@astroweis.de)

Even if you chose not to contribute and to observe on your own – that is perfectly fine. This project is meant to be fun.

I wish all of you lots of success and fun observing these objects!



The two PNs NGC 2438 and PK 231+4.1 close to the open cluster M 46 at 94x as seen with an 18" Dobsonian on Nov. 16th, 2012. Observing conditions were excellent (fst 7m0).

## Planetary Nebula with Cosmic Neighbors Compiled by Christian Weis

#	Object	Alternate Name	Type*	Constellation	R.A.	Dec	brightness / mag	distance / °	Next object	Alternate Name	Type <sub>8</sub>	R.A.	Dec	brightness / mag
1	NGC 2438	PK 231+4.2	PN	PUP	07 41.8	-14 44	11	0.08	NGC 2437	M 46	OSt	07 41.8	-14 49	6.1
2	PK 38-3.2	M1-69	PN	AQL	19 13.9	+03 38	14	0.11	PK 38-3.3	K2-11	PN	19 14.3	+03 35	13.6
3	PK 107-2.1	M1-80	PN	CEP	22 56.3	+57 09	14.2	0.25	NGC 7423	Berk 57	OSt	22 55.3	+57 08	15
4	PK 52-4.1	M1-74	PN	AQL	19 42.3	+15 09	12.9	0.34	PK 51-3.1	M1-73	PN	19 41.2	+14 57	13.7
5	PK 43+11.1	M3-27	PN	HER	18 27.8	+14 29	13.9	0.34	NGC 6635	UGC 11239	GlX	18 27.6	+14 49	14.5
6	PK 21-0.1	M3-28	PN	SCT	18 32.7	-10 06	14.3	0.36	NGC 6649	OCL 66	OSt	18 33.5	-10 24	8.9
7	NGC 6543	PK 96+29.1	PN	DRA	17 58.6	+66 38	8.3	0.38	NGC 6552	UGC 11096	GlX	18 00.1	+66 37	13.6
8	PK 231+4.1	M1-18	PN	PUP	07 42.1	-14 21	14.4	0.39	NGC 2438	PK 231+4.2	PN	07 41.8	-14 44	11
9	IC 1295	PK 25-4.2	PN	SCT	18 54.6	-08 50	12.7	0.4	NGC 6712	GCL 103	KSt	18 53.1	-08 42	8.2
10	PK 210+1.1	M1- 8	PN	MON	06 53.5	+03 12	14.5	0.42	Biur 10	Berk 28	OSt	06 52.2	+02 56	10.4
11	NGC 246	PK 118-74.1	PN	CET	00 47.1	-11 52	10.4	0.44	NGC 255	MCG-2-3-17	GlX	00 47.8	-11 28	11.9
12	PK 103+0.2	M2-52	PN	CEP	22 20.5	+57 36	14	0.48	NGC 7261	OCL 237	OSt	22 20.4	+58 05	8.4
13	PK 89-0.1	Sh1-89	PN	CYG	21 14.0	+47 45	14.8	0.48	IC 1369	Cr 432	OSt	21 12.1	+47 44	8.8
14	NGC 1535	PK 206-40.1	PN	ERI	04 14.3	-12 44	9.4	0.49	NGC 1538	NPM1G-13 171	GlX	04 14.9	-13 12	15

\* Type

PN: Planetary Nebula

OSt: Open Star Cluster

GlX: Galaxy

KSt: Globular Star Cluster



# Observing

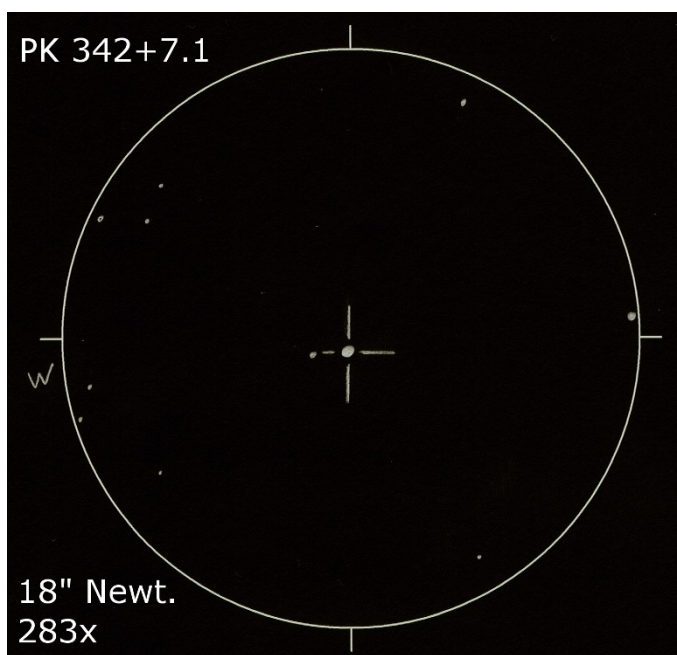
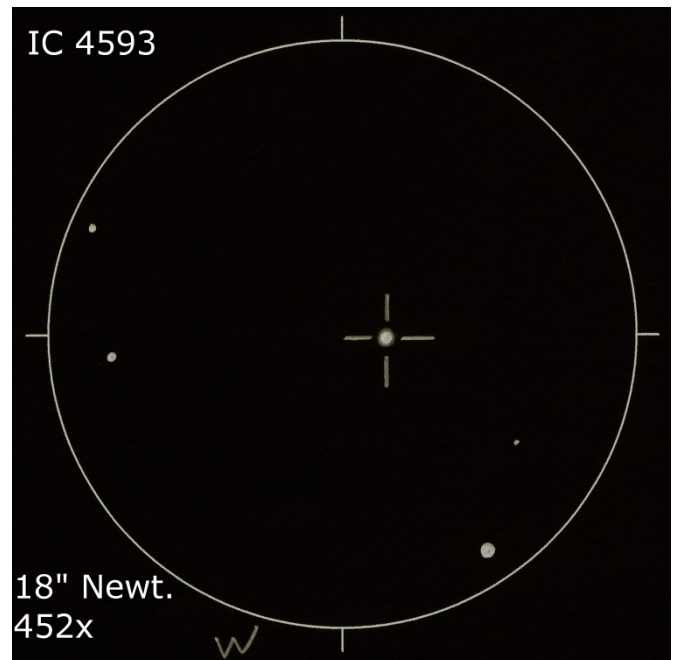
## Planetary nebulae of the quarter – Spring 2013

By Christian Weis, [weis@astroweis.de](mailto:weis@astroweis.de)

Planetary nebulae (PN) are fascinating objects that come in numerous forms of 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.

IC 4593 is quite an unknown planetary nebula in Hercules. This object is also called the White-Eyed Pea and was discovered in 1907 by Willamina Fleming. It is small but rather bright, so a 3" telescope will probably already show it. Of course, the bigger the aperture, the better the view. In his book "Planetary Pages" Kent Wallace describes a blinking effect using an 8" telescope and a filter. However, I found IC 4593 responding poorly to a filter when observing it with an 18" Newtonian having very good sky conditions. My description reads: small and structureless disk, diffuse, outer parts fainter than center, no central star; 452x, f8 7m0 (UMa)

**IC 4593**  
 RA: 16h 11.8min  
 Dec: 12° 4'  
 Constellation: Hercules  
 Brightness: 9m6 (10m7)  
 Central star: 11m1  
 Size: 12 x 10 arcsec  
 Distance: 6500 ly



PK 342+27.1 was discovered by Paul Merrill in 1942 and is also known as Merrill 2-1 (or shorter Me 2-1). It is a very small but reasonably bright PN in Libra and, by the way, the only PN that is listed in Libra in Doug Snyder's and Kent Wallace's extensive list. It can be seen as a star in telescopes as small as 6" in diameter. However, you will need a filter to identify it as a planetary nebula. I observed this object in March 2012 at my residence in Germany with my 18" Dobsonian and noted: bright, identified using an [OIII]-filter, stellar within seeing when not using a filter, appears as a small disk without any structures when inserting the [OIII]; 283x, f8 6m8 (Vir)

**PK 342+27.1**  
 RA: 15h 22.3min  
 Dec: -23° 38'  
 Constellation: Libra  
 Brightness: 11m6  
 Central star: 18m8  
 Size: 16 arcsec  
 Distance: 14,000 ly

# Observing

## Constellation of the Season Crater - The Cup

By Chris Lancaster

Crater plays a role in an elaborate story involving the nearby constellations of Corvus, the crow, and Hydra, the water serpent. The myth tells of Apollo, who sent Corvus for a cup (Crater) of spring water. Beside the spring, Corvus spotted a fig ripening on a nearby bush. The fig looked so delicious that the crow waited for it to ripen. When he returned to Apollo, he brought along with him a water serpent (Hydra), saying that the serpent had attacked him and that was the reason it took him so long to return. Apollo saw through the lie and banished all three to the sky. To find Crater, put yourself under some dark skies, since Crater's brightest star is magnitude 3.5 and most others are dimmer than magnitude 4. Look either 30 degrees west of Spica, the brightest star in Virgo, or 30 degrees south of the hindquarters of Leo. With not too much imagination, you should be able to see the shape of a cup which is tilted to the east.

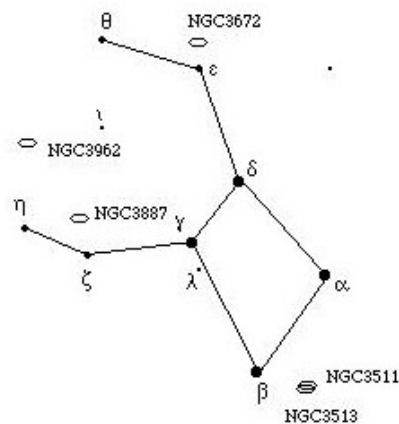
Looking toward Crater, which crosses the meridian just before midnight during the ides of March, will give you a view which is about 25 degrees away from the southern Milky Way. Through the sprinkling of nearby stars

lies an unobstructed view of far away galaxies. Most of these are dim and challenging, but a few are within the grasp of small telescopes.

On our way to these galaxies, let's stop at double star Gamma Crateris. This pair, 78 light years away, is separated by 5 arc seconds, which allows it to be easily split at high power. The primary shines brightly at magnitude 4.1. The secondary is several times dimmer at magnitude 9.5. Both show a pure white color.

NGC3511 is one of the brightest galaxies in Crater. It is located 2 degrees west of Beta Crateris. While it shines at magnitude 11.6, its light is spread over a broad oval measuring 5.7'x 2.0'. Nearby (only 10 arc minutes to the southeast) is NGC3513. Here is a S-shaped barred spiral glowing faintly at magnitude 12.1 and measuring 2.8'x 2.3'. If you center your scope on RA 11h 3m 35s Dec -23d 9' 57", you will have both galaxies in a low power eyepiece.

Within or near the cup of Crater are three more galaxies of note. NGC3887 is a spiral



located one and a half degrees north northeast of Zeta Crateris or RA 11h 47m 5s Dec -16d 52' 22". This is a tight spiral of magnitude 11.6 and is 3.3'x 2.5' in expanse. This galaxy shows a bright center with tightly wrapped arms which quickly disappear beyond its fuzzy boundaries.

Just above the lip of the cup is NGC3962. You'll find this elliptical galaxy about a third of the way between Eta and Theta Crateris and 1.5 degrees above the line connecting these two stars. Or you can dial up RA 11h 54m 40" Dec -13d 58' 23". NGC3962 shines at magnitude 11.9 but perhaps is easier to see because of its bright, condensed core. The entire galaxy occupies 2.5'x 2.2'.

Just over a degree north of Epsilon Crateris is NGC3672, yet another galaxy glowing with a fairly bright magnitude of 11.7. This spiral

galaxy, centered at RA 11h 25m 13s Dec -9d 47' 43", is a spiral with a fairly bright center and mottled spiral arms.

The galaxies so far described only scratch the surface of the total number of galaxies present in Crater. However, most of them are reluctant to show themselves in small backyard telescopes. Those with larger instruments may want to search for some of these others summarized in the table.

Galaxies found in Crater

Object	Mag.	RA	Dec	Size	Comment
NGC3571	13	11h 11m 30s	-19d 18' 04"	2.5'x 0.7'	Bright nucleus, distorted arms.
NGC3635	12.7	11h 20m 31s	-9d 0' 49"	1.2'x 0.9'	A very small and faint spiral.
NGC3637	12.9	11h 20m 40s	-10 16' 32"	1.6'x 1.5'	Paired with NGC 3636; 3' from 6.5 magnitude star.
NGC3715	12.0	11h 31m 32s	-14d 13' 57"	1.4'x 0.9'	Very small, round spiral.
NGC3732	13.0	11h 34m 12s	-9d 51' 00"	0.6'x 0.6'	Small, bright center.
NGC3865	13.0	11h 44m 52s	-9d 13' 59"	2.0'x 1.5'	Diffuse spiral.
NGC3892	12.0	11h 48m 0s	-10d 58' 00"	2.0' x 1.3'	Round spiral.
NGC3955	12.6	11h 53m 58s	-23d 9' 54"	2.0'x 0.9'	Spiral tilted almost edge-on.
NGC3956	12.9	11h 54m 1s	-20d 34' 00"	3.4'x 1.0'	Edge-on spiral.
NGC3957	12.9	11h 54m 1s	-19d 34' 06"	3.0'x 0.7'	Lenticular galaxy.
NGC3981	11.9	11h 56m 7.2s	-19d 53' 42"	5.2'x 2.3'	Double-armed spiral.
IC2627	12.6	11h 9m 53s	-23d 43' 35"	2.7'x 2.3'	Face-on spiral. Starlike nucleus.



## ★ *Community Involvement & Outreach*



### *Grand Canyon Star Party '13*

June 8 - 15, 2013

Jim O'Connor, GCSP South Rim Coordinator

It's time to lock down plans to attend the 2013 edition of the Grand Canyon Star Party. GCSP '13 is the 23rd annual collaboration between the National Park Service and astronomers from around North America to bring astronomy outreach to Park visitors. The event is held concurrently on both the North Rim, coordinated by the Saguaro Astronomy Club, and the South Rim, coordinated by TAAA. The level of public interest and involvement, and the opportunity for TAAA to make major contributions to public education and awareness, is profound.

We astronomers act as interpretive rangers, explaining the day and night sky around the Grand Canyon to the visitors just as the daytime Park Rangers and guides explain the geology of the park. Last year we had over 100 astronomers (about two dozen from TAAA) registered with the NPS on site, and as many as 1450 visitors on each of the eight nights of the session. Think 7000 feet with dark skies, where the visitor flow stops around 10:30pm, leaving the rest of the night for our own purposes.

General information regarding GCSP, including lodging links, is found at

<http://tucsonastronomy.org/gcsp>

If you intend to participate this year, email your intentions to me at:

[gcsp@tucsonastronomy.org](mailto:gcsp@tucsonastronomy.org)

Lodging at the Grand Canyon fills fast, so make your plans and reservations as soon as possible. For those astronomers intending to stay 6 or more nights, there are a limited number of no-cost campsites available. Requests for a free campsite will be accepted beginning March 1. Campsites will be assigned in order of request received beginning March 1 until none remain. If you intend to participate for six or more nights and wish consideration for a free site, please send an email to get on the list.

For further information and current status on the North Rim, please check

<http://www.saguaroastro.org/content/2013GrandCanyonStarPartyNorthRim.htm>

Please let me know if you're interested in supporting TAAA in this exciting and extremely rewarding event for one night, eight nights, or anything in between!

### *Grand Canyon Association Dark Sky Project*



**GRAND  
CANYON  
ASSOCIATION**

The 2012 Grand Canyon Association Dark Sky Project was fully funded to begin the necessary work to make Grand Canyon an official Dark Sky Park. This first step to ensure the project will not get bogged down is to hire a physical scientist as the park's Dark Sky Coordinator to oversee the project (and do nothing else!). That job packet request was sent to the National Park Service local human resources office and will be posted

very soon. Since this is funded by grant money (or soft money) the current hiring freeze will have no effect. Deanna Greco, the project manager, is very excited about getting this person going as soon as

possible. She has the resources and information necessary to proceed with the lighting inventory plan once this new hire is in place.

There will be opportunities for volunteers to work with the Dark Sky Coordinator. Let Jim O'Connor, GCSP South Rim Coordinator, or Helen Ranney at the Grand Canyon Association, know if you or someone you know is interested in being a part of that process.

For more information about this program and how you can support it, click on the Grand Canyon Association logo at the left.

Thanks to Grand Canyon Association friends and supporters who shared their contacts and passion, the NPS team is ready to go!

# ★ Community Involvement & Outreach

## Astronomy Magazine SkyWatch 2013

Text contributed by Edward Eastburn

Photos by Richard Buchroeder and Terri Lappin

The Astronomy Magazine SkyWatch held in Tucson was a wonderful day of solar observing in both white and H-alpha light as well as some good views of Venus and Mercury. The high winds that were predicted never developed and allowed for steady viewing all day. As the Sun set, the number of scopes and visitors increase exponentially. It was wonderful to see so many scopes pointed at a variety of objects for visitors to look at. I especially enjoyed the sound of joy from a young visitor who came with his first scope, a 60mm Refractor, as they were helped in using it and finding their first objects. Now that brought back memories! Hope everyone had a chance to come out and enjoy the weather, seeing and visitors. Thank you to Astronomy Magazine for a fun and informative event.



Edward Eastburn with his C-14 in daytime planetary viewing configuration



"I especially enjoyed the sound of joy from a young visitor who came with his first scope"





## Community Involvement & Outreach

### TAAA Joins Science City at Tucson Festival of Books

Text and Photos by Terri Lappin, [terrilappin@tucsonastronomy.org](mailto:terrilappin@tucsonastronomy.org), Starry Messenger SIG Chairperson

Through a generous invitation from Maria Schuchardt at the UA Lunar & Planetary Lab, the TAAA was able to participate in the University of Arizona's Science City at the Tucson Festival of Books this year. Science City is organized by the University of Arizona's (UA) College of Science and BIO5 Institute and the Arizona SciTech Festival. We were part of the Space and Light Tent.

In years past, we've had our own booth in the main part of the Festival of Books. It was a significant expense; one which the TAAA Board of Directors had to wrestle with each year. By taking part in Science City, there was no financial cost to the TAAA and we were given a larger area including electricity, a luxury we couldn't afford before.

This year's exhibit featured the telling of the story of a star's life. The story begins with the slow accumulation of gases and dust in a nebula. As pressures build, nuclear fusion begins and a star is born. That star may be a Sun-like star, with a long life span, or a massive star which ends with a supernova, possibly ending its life as a black hole. We made extensive use of the Night Sky Network

Outreach Toolkits to show all these phases of a star's life. Amazingly, it's all gravity – something our visitors experience all the time but gave little thought to how important it is in the life cycle of a star.



Pati Wilcox

It's always difficult to know how many people visit our booth at an event with an overall attendance of 120,000. This year was no different. At times, the Space and Light Tent was shoulder to shoulder full of people. Several times over the two-day event, for a period of 10-minutes, a designated volunteer counted interactions between the TAAA volunteers and the public, or when a member of the public took time to visit our booth. Counts ranged from 40 encounters per 10 minutes to 25 during the lulls in activity. Using those counts, it's estimated at least 3000 people visited our booth. This is in keeping with the number of visitors to our booth two-years ago when we last participated in the Festival of Books. However, at that time, we had an additional 4000 visitors to our solar telescopes which we didn't have this year.



Susan O'Connor and Mae Smith

The event was supported by many TAAA members. Most notably was Susan O'Connor who served as my co-coordinator for the event. Susan was present for all but a couple hours on Saturday. Her support in the planning stages, before the event, was most appreciated. Jim O'Connor, Susan's



Vernon Dunlap

husband, helped out on both Saturday and all day Sunday. Volunteering for a minimum of three hours each were Bryce Burchett, Vernon Dunlap, Jim Knoll, Karen Liptak, Mike Magras, Brian O'Connell, Mae Smith, Mike Thompson, Pati Wilcox, and Rizwan Zaki. Thank you to all who made this a successful event.



Bryce Burchett and Susan O'Connor



Karen Liptak and Jim O'Connor



## Community Involvement & Outreach

### *Raytheon's MathMovesU 2013, Galileoscope Build*

Text and Photos by David Acklam



On February 24th and 27th, Raytheon Missile Systems (RMS) hosted their fourth MathMovesU Galileoscope build at the Marriott University Park Hotel - Grand ballroom. This event is a part of Raytheon's Engineering Leadership Development Program (ELDP) that provides select recent graduates with training and assignment opportunities to develop their leadership and management skills. ELDP engineers from many different Raytheon Divisions came to Tucson to learn more about Raytheon's Missile System Division and have the opportunity to participate in community educational outreach through the MathMovesU program.

Raytheon once again teamed up with the University of Arizona Mathematics, Engineering, Science Achievement (MESA) program, the National Optical Astronomy Observatory (NOAO), volunteers from the University of Arizona Lunar and Planetary Laboratory UALPL and the Tucson Amateur Astronomy Association (TAA). High school math students from Sunnyside, Desert View, City High, Pueblo, Flowing Wells and Amphi and their teachers and chaperons were invited to participate in the Galileoscope build.

On February 24th, Chuck Dugan from NOAO lead the training session for the ELDP's to build their own Galileoscope.



Volunteers from TAA that had built Galileoscope's in the past, assisted in the training and provided support whenever needed by the ELDP's. Approximately 50 Galileoscope's were assembled using a special seven inspection point procedure similar to the six-sigma procedures used in Raytheon's production lines. This process has contributed to successfully and correctly assembling over a thousand Galileoscope's in the past three MathMovesU telescope build events.

On February 27th, approximately 200 students, including their teacher and chaperons were teamed up with the ELDP's to build their own Galileoscope's. Rob Sparks, NOAO, lead the build. Volunteers from TAA once again assisted as needed during the build. Bernie Merwald, RMS VP of Engineering, welcomed everyone and met with the students during the build. In a little over an hour, some 200 new Galileoscope's were successfully assembled and saw first light. Each student also received from Raytheon, a camera tripod to go along with their new Galileoscope.



Public Domain Photo

After the build was completed, a panel made up of 4 RMS engineers, 2 UA students, the Associate Dean of the College of Engineering, and Bernie Merwald addressed student questions. They conducted an excellent open discussion with the students regarding attending college, pursuing a degree in the Science, Technology, Engineering and Mathematics (STEM) curriculum and what is like to work at Raytheon.



The event ended with Bernie thanking all and encouraging the students to view the night sky with their new telescope. We all enjoyed a box lunch, and happily watched about 200 newly minted Galileoscope's join the Tucson community

TAA Volunteers were Vern Dunlap, Terri Lappin, Ken Shaver, Frank Lopez, and David Acklam.



## Classifieds

For Sale	Nagler 7mm eyepiece \$140. 2-inch ring to make a 2-inch eyepiece parafoal (same focus) with other eyepieces \$4. SAO Star Atlas (151 charts to mag 9 with all NGC objects but no labels) \$40. The Observer's Sky Atlas \$20. Deep-Sky Observer's Handbook Vol. 1-7 \$8 each. Hipparcos and Tycho Catalogues Vol. 2-13 \$1 each. Call Erich at 520-621-3994. <span style="float: right;">First Offered September 2012</span>
For Sale	Bound Astronomical Journals from the 1960s and 1970s FREE. You pick up. Contact Rik Hill at rhill24@cox.net or leave a message at 520-721-0123. <span style="float: right;">First Offered September 2012</span>
For Sale	28" scope for sale. Also willing to sell just the 28" primary mirror to build your own scope. Folded-Newtonian optics: 28" Nova F/4.5, standard coating, 2" thick Pyrex. 8" secondary flat mirror with enhanced coating, 3" elliptical. Scope transports in a mid-size car or small SUV. Eyepiece height: at 45 degrees is 5.5 ft; straight up is 7 feet. \$5800 for scope w/ all optics, eyepieces & finderscope. \$4800 for 28" mirror by itself. 5" elliptical available to make mirror set for a dobsonian. Trade or partial trade OK. Contact: Gary Vecere (520) 207-2898 or writetoogary@gmail.com. Located midtown near UA. <span style="float: right;">First Offered November 2012</span>
For Sale	Huge ATM's projects Garage sale! ① 10" f/8 Newtonian system, Sonotube, 4" pipe-part GEM. Very beefy! ② 10" f/5.9 ultra beefy thick fiberglass tube, 3 inch focuser, tube is a three-part system, top spins! 2" pipe-part GEM, collapses. ③ 8" f/8 newt system with old tracking mount. ④ 8" f/ 6 Newt optics, tube, assort. stuff to make telescope. ⑤ 6" f/8 and f/ 5 optics and stuff to make scope. Some 4.25" optics, old mounts and stuff. ⑥ 2.50" ID pillow block bearings, brand new, beefy, two sets for both axes. ⑦ 12" worm drive. ⑧ 12.50" mirror grinding kit, two full thickness blanks, lots of abrasives, pitch, even the 55 gal. drum grinding stand. ⑨ Lots of books, old S&T and Astronomy magazines, charts, atlases. Plus many additional items. All prices negotiable, make offers. Call for appointment to look it over. I will be set up for my neighborhood on Halloween night, weather permitting, northwest corner of Cloud and Sabino Canyon roads, so drop by then to see telescopes in actual operation. Free candy and other treats! Contact James Lehr Miller, 520-751-4961(after 10 am, please), starman1000@msn.com <span style="float: right;">First Offered November 2012</span>
For Sale	Celestron C4-R 102HD 102mm (4") Refractor Telescope. Mounted on Celestron CG-4 German equatorial mount with slow motion controls on both axes. Includes counterweight, latitude scale, setting circles. Price \$300. Contact Larry Lof at 520-881-2523 or email at larry.lof@loflopez.com. <span style="float: right;">First Offered December 2012</span>
For Sale	Losmandy G-11 Equatorial Mount, non go-to. Has been a real workhorse for me, but I've upgraded, so time to find it a new home. Included are AC and DC power adaptors, 7, 11 and 18 pound weights, shortie Newtonian legs plus adjustable legs, Polaris alignment scope. Recently cleaned and lubed tuned by D. Koenig at Starizona. Looking for \$1200 from TAAA members, \$1600 non-members. ketelsen@email.arizona.edu, or 520-419-6209. <span style="float: right;">First Offered December 2012</span>
For Sale	Celestron 14" Optical Tube Assembly. Includes 2 Telrads, dovetail for Astro-Physics 900 mount. (Mount not included.) Located in Schaumburg, IL. \$3000 or serious offer (FOB Schaumburg Ill). Contact Robert Callanan, 847-839-3115, callanan1221@comcast.net <span style="float: right;">First Offered December 2012</span>
For Sale	10" f/6 Cave Optical telescope, equatorial mount, precision clock drive, assorted eyepieces, sky charts, guidescope and counterweights for astrophotography. Rotating tube is damaged and needs replacing, otherwise complete. An excellent buy for the serious amateur. \$850. Contact James, 520-505-7932. <span style="float: right;">First Offered Spring 2013</span>

Ads will appear in a single quarterly issue of *Desert Skies*. Submitters may request that their ad be repeated in the following issue of *Desert Skies* provided the request is made by the issue deadline.

### 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. Submissions should be emailed to the editor at [taaa-newsletter@tucsonastronomy.org](mailto:taaa-newsletter@tucsonastronomy.org). Submissions should be in the form of a text or 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 specific author.

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