

# THE OBSERVER

## East Valley Astronomy Club

### From the Desk of the President by David Douglass

The 2012 All Arizona Star Party was a success. All who attended seemed to have an excellent time. Special "Thanks" goes out to Claude Haynes, who once again chaired the event, and arranged for the refreshment tent, and Saturday evening meal.

The October EVAC meeting saw the opening of nominations for officers and board members for 2013. We actually have names for all positions, and it appears an actual election will be needed for board members. There are 5 positions, and 7 nominations. There is a separate information article here in The Observer will all the names. Nominations stay open in the Nov meeting until the actual election.

Those attending the Oct meeting heard that EVAC has submitted a request to NASA for a special guest speaker. If approved, attendance at that meeting is expected to be very high. Seating and standing room are expected to be limited. Priority will be given to EVAC members "in good

### The Backyard Astronomer Prescott, a Small Telescope & a Crummy B&B

by Bill Dellings

The plan: A three day getaway from the Valley of the Furnace for my wife and me. Find a nice B&B, local hiking trails, and check out the night sky with a small telescope.

The B&B looked great in the online photos; out of town, beautiful background setting and not another house within sight. I knew we were in trouble when we found it 50 feet from State Route 89, with its nonstop road noise. Without going into gory details, let's just say avoid any B&B in

standing", meaning with their dues paid up. The Treasurer will be happy to receive your 2013 dues at the Nov meeting. You can also pay your 2013 dues via Pay-Pal on-line at the EVAC web site. Additional information is contained elsewhere in this issue of The Observer.

Comments were also received at the Oct meeting about the continued use of the Boyce Thomson Arboretum facility (BTA). This issue will be discussed further by the board, and officers, and will be reviewed with BTA. When all is done, we will announce what arrangements have been made with BTA. Thanks to all that participated in the discussion so far.

Most everyone knows about the annual "NEAF" (North East Astronomy Forum and Telescope Show) trade show held in New York. The promoters of that event have decided to start a "West Coast" version, called the "Arizona Science and Astronomy

the Prescott area with the words "Log Cabin" in its name.

But the place did have one saving grace - our room had a small patio outside protected from any lights.

One night I took advantage of this refuge from light pollution to get in a two hour observation session with my Tele Vue 85mm refractor.

First I assessed the night sky. Better than where I live, between Apache Junction and Gold Canyon. But it still seemed brighter than I expected. This

*Continued on page 4*

### UPCOMING EVENTS:

*Public Star Party - November 9*

*Local Star Party - November 10*

*General Meeting - November 16*

*Deep Sky Observing Night - November 17*

*Check out all of the upcoming club events in the Calendars on page 8*

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# The Backyard Astronomer

*Continued from page 1* might be explained by the fact the B&B was only about 2 miles from downtown Prescott as the crow flies. Still, I could make out all the stars in the Little Dipper naked eye except its dimmest star, Eta Ursa Minoris in the bowl.

The Double Cluster in Perseus and M31 in Andromeda were naked eye objects. The Milky Way was significantly brighter than my home site. I also noted I could pick out the faint constellation Capricornus much more easily at this location than at home. Conclusion - this is a darker site than I have at home.

Using the 85mm scope on a non-driven alt-az mount, I scooped up the Double Cluster, NGC 869 and 884. At 29x and a 2.2 degree real field, the duo was glorious. The two clusters fit in the field with room to spare. Hundreds of pinpoint stars sprinkled on a dark carpet.

The large open cluster just below Mirfak, the Perseus OB Association (Melotte 20) was quite splendid in the 8 degree field of my Swarovski 7x42 binoculars. (It takes the wide field of binoculars to gather all its stars).

Using the 85mm again, M31 spread across the 29x, 2.2 degree field. Its two attendant galaxies M32 and NGC 205 were visible, the latter requiring a bit of averted vision.

The Pleiades were, as usual, spectacular.

M15, a globular star cluster in Pegasus, was disappointing even at 100x; the 85mm could not resolve its stars, perhaps a victim of inadequate aperture.

Abutted against the Prescott National Forest, the Prescott area offers many interesting trails. The Peavine Trail (5.4 miles round trip) along the Granite Dells of Watson Lake offers a flat and wide trail for hikers, bicyclists, an even baby strollers!

Adventurous hikers can navigate the more difficult Lakeshore Trail closer to the water, requiring some climbing through the unique granite boulders of the Dells. Along the way we saw numerous types of water birds and as luck would have it, a bald eagle.

About three miles north is another shorter hike of three miles, the Constellation Trail, which winds through the northeastern corner of Willow Lake. The trail name intrigued

me. Did it have something to do with the stars? No. Its namesake was an Air Force C-121 Constellation that crashed here in 1959, killing the crew. There is a memorial plaque commemorating the incident at the trail head and small area set aside for hikers to place small pieces of wreckage they may find. Parking for the Constellation Trail is at the Phippen Museum, a western museum featuring the work of the late cowboy artist George Phippen. Western artifacts and sculptures are also on exhibit.

The old downtown part of Prescott is pretty much centered around Courthouse Plaza (Yavapai County Courthouse), a picturesque 1916 building set in the middle of a park covering



*NGC 869 and NGC 884 - The Double Cluster*

*Perseus*

*November 25, 2006*

*Takahashi Epsilon 210 Astrograph F/3*

*SBIG STL11000M Camera*

*30R 20G 30B*

*Photo courtesy of Jon Christensen*

one city block. Nearby is a parking garage where you can park and walk two or three blocks in either direction and take in the numerous interesting restaurants and shops Prescott has to offer. There is much to see and do in this former capitol of Arizona (1864-1867, 1877-1889), just remember its elevation of 5,347 feet means chilly winter temperatures for Valley desert rats.



# NASA Spacecraft Sees Huge Burp At Saturn After Large Storm

NASA's Cassini spacecraft has tracked the aftermath of a rare massive storm on Saturn. Data reveal record-setting disturbances in the planet's upper atmosphere long after the visible signs of the storm abated, in addition to an indication the storm was more forceful than scientists previously thought.

Data from Cassini's composite infrared spectrometer (CIRS) instrument revealed the storm's powerful discharge sent

the temperature in Saturn's stratosphere soaring 150 degrees Fahrenheit (83 kelvins) above normal. At the same time, researchers at NASA's Goddard Spaceflight Center in Greenbelt, Md., detected a huge increase in the amount of ethylene gas, the origin of which is a mystery. Ethylene, an odorless, colorless gas, isn't typically observed on Saturn. On Earth, it is created by natural and man-made sources.

Goddard scientists describe the unprecedented belch of energy in a paper to be published in the Nov. 20 issue of the *Astrophysical Journal*.

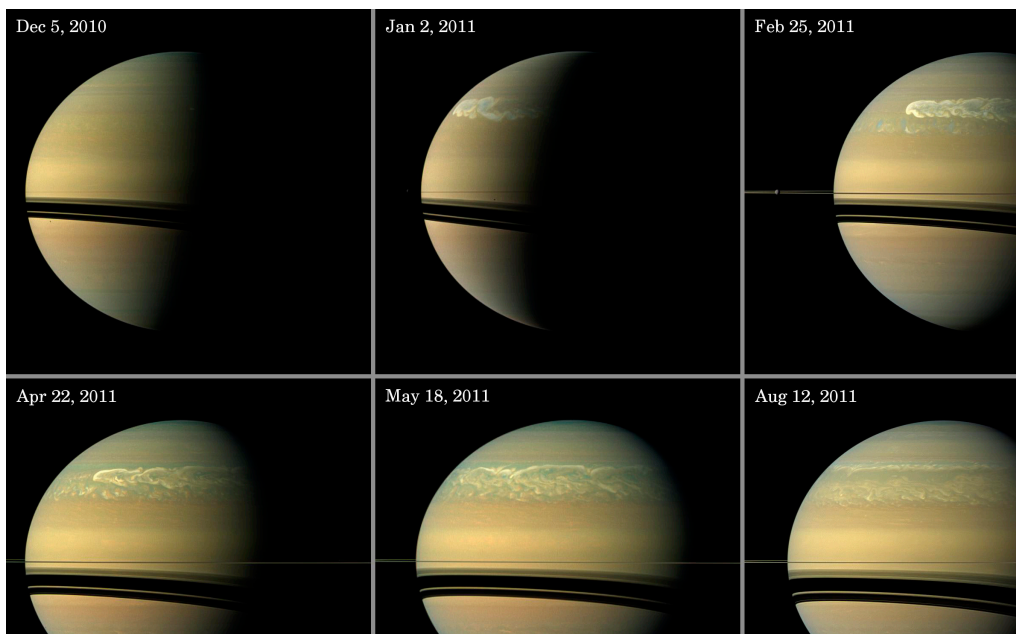
"This temperature spike is so extreme it's almost unbelievable, especially in this part of Saturn's atmosphere, which typically is very stable," said Brigette Hesman, the study's lead author and a University of Maryland scientist who works at Goddard. "To get a temperature change of the same scale on Earth, you'd be going from the depths of winter in Fairbanks, Alaska, to the height of summer in the Mojave Desert."

First detected by Cassini in Saturn's northern hemisphere on Dec. 5, 2010, the storm grew so large that an equivalent storm on Earth would blanket most of North America from north to south and wrap around our planet many times. This type of giant disturbance on Saturn typically occurs every 30 Earth years, or once every Saturn year.

Not only was this the first storm of its kind to be studied by a spacecraft in orbit around the planet, but it was the first to be observed at thermal infrared wavelengths. Infrared data from CIRS allowed scientists to take the temperature of Saturn's atmosphere and to track phenomena that are invisible to the naked eye.

Temperature measurements by CIRS, first published in May

2011, revealed two unusual beacons of warmer-than-normal air shining brightly in the stratosphere. These indicated a massive release of energy into the atmosphere. After the visible signs of the storm started to fade, CIRS data revealed the two beacons had merged. The temperature of this combined air mass shot up to more than minus 64 degrees Fahrenheit (above 220 kelvins).



*Series of images tracking the development of Saturn's giant storm, as seen at visible wavelengths during much of 2011. While the clouds from this turbulent storm have long since faded, the glow of the giant vortex associated with the storm, visible only at infrared wavelengths, is likely to persist until 2013.*

According to Hesman, the huge spike of ethylene generated at the same time peaked with 100 times more ethylene than scientists thought possible for Saturn. Goddard scientists confirmed the release of the gas using the Celeste spectrometer mounted on the McMath-Pierce Solar Telescope on Kitt Peak in Arizona.

The team still is exploring the origin

of the ethylene, but has ruled out a large reservoir deep in the atmosphere.

"We've really never been able to see ethylene on Saturn before, so this was a complete surprise," said Goddard's Michael Flasar, the CIRS team lead.

A complementary paper led by Cassini team associate Leigh Fletcher of Oxford University, England, describes how the two stratospheric beacons merged to become the largest and hottest stratospheric vortex ever detected in our solar system. Initially, it was larger than Jupiter's Great Red Spot.

Their paper in the journal *Icarus*, which combines CIRS data with additional infrared images from other Earth-based telescopes, including NASA's Infrared Telescope Facility at Mauna Kea, Hawaii, also reports a powerful collar of clockwise winds -- encompassing a bizarre soup of gases -- around the vortex.

"These studies will give us new insight into some of the photochemical processes at work in the stratospheres of Saturn, other giants in our solar system, and beyond," said Scott Edgington, Cassini deputy project scientist at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif.

To read more about the Fletcher paper, visit:

[http://www.esa.int/esaSC/SEMLPIMFL8H\\_index\\_0.html](http://www.esa.int/esaSC/SEMLPIMFL8H_index_0.html)

# Nominations for Officers & Board Members

## 2013 Calendar Year

At the October 19<sup>th</sup> EVAC General Membership Meeting, the following people were nominated for the various officer and board member positions for calendar year 2013. The nomination process will remain open for the November General Membership Meeting on Nov 18. At that time, the process will close, and the election will immediately follow. All positions are still open to additional nominations at this time.

President	David Douglass
Vice-President	Ed Thomas
Secretary	Marty Pieczonka
Treasurer	Ray Heinle

Board Member(s) (5 Positions – 7 Nominations)

David Hatch	Bob Alba	David Shiel	
Ron Barstad	Chris West	Shane Eigell	Alex Rivera



## From the Desk of the President

*Continued from page 1* Expo", which is scheduled for this Nov 10th, and 11th, in Tucson, at the Tucson Convention Center. Over 65 exhibitors are already scheduled to be there. This is really a big event for Arizona, and promises to be an excellent opportunity to see and talk with lots of vendors.

The weather is finally cooling off, and observing conditions are improving. The fall and winter skies are coming back, and I for one am glad to see them again. It is time to enjoy our chosen hobby. Lets all "keep looking up".



## November Guest Speaker: Dr. Gerard van Belle

Gerard Theodore van Belle (born 1968, in Tallahassee, FL) is an American astronomer. He received a bachelor's degree in physics from Whitman College in 1990, a master's in physics from The Johns Hopkins University in 1993, and a Ph.D. in physics from the University of Wyoming in 1996.

Dr. van Belle is an expert in near-infrared interferometry, and has utilized this technique to measure the sizes of hundreds of nearby stars. The first direct measurement of stellar shape was carried out by a team led by him using the Palomar Testbed Interferometer to make observations of the rapidly rotating star Altair.

Dr. van Belle has also contributed to practical considerations of operating astronomical interferometers, particularly regarding considerations of calibration of these complicated instruments.

After schooling, Dr. van Belle took a position at the Jet Propulsion Laboratory as an instrument architect for NASA's Keck Interferometer, and later joined the Michelson Science

Center (now NASA Exoplanet Science Institute) at Caltech in 2003.

He has participated in the commissioning of the Palomar Testbed Interferometer, and the CHARA Array.

In 2007, he became a member of the astronomy faculty at the European Southern Observatory (ESO), and instrument scientist for the PRIMA instrument of ESO's VLTI facility; later in early 2011 he was also appointed instrument scientist for the MATISSE instrument of the VLTI.

Since August 2011 he has been a member of the astronomer faculty at Lowell Observatory.



*Aerial view of the Palomar Testbed Interferometer*

☾ **LAST QUARTER MOON ON NOVEMBER 6 AT 17:37**

○ **NEW MOON ON NOVEMBER 13 AT 15:09**

☽ **FIRST QUARTER MOON ON NOVEMBER 20 AT 07:32**

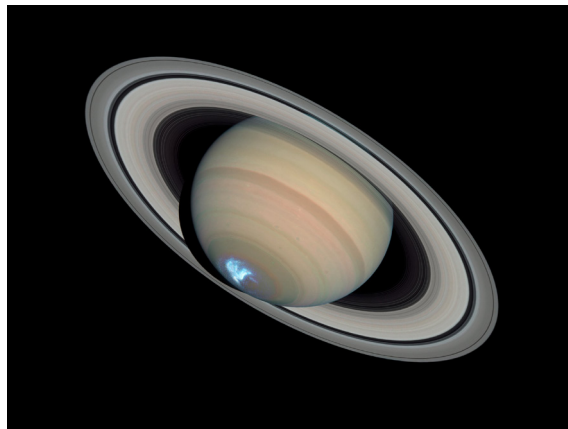
● **FULL MOON ON NOVEMBER 28 AT 07:46**

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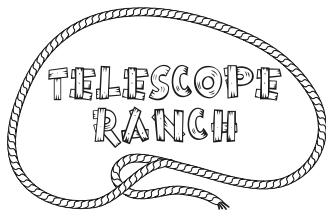


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# Upcoming Meetings

November 16

December **Holiday Party**

January 18

February 15

March 15

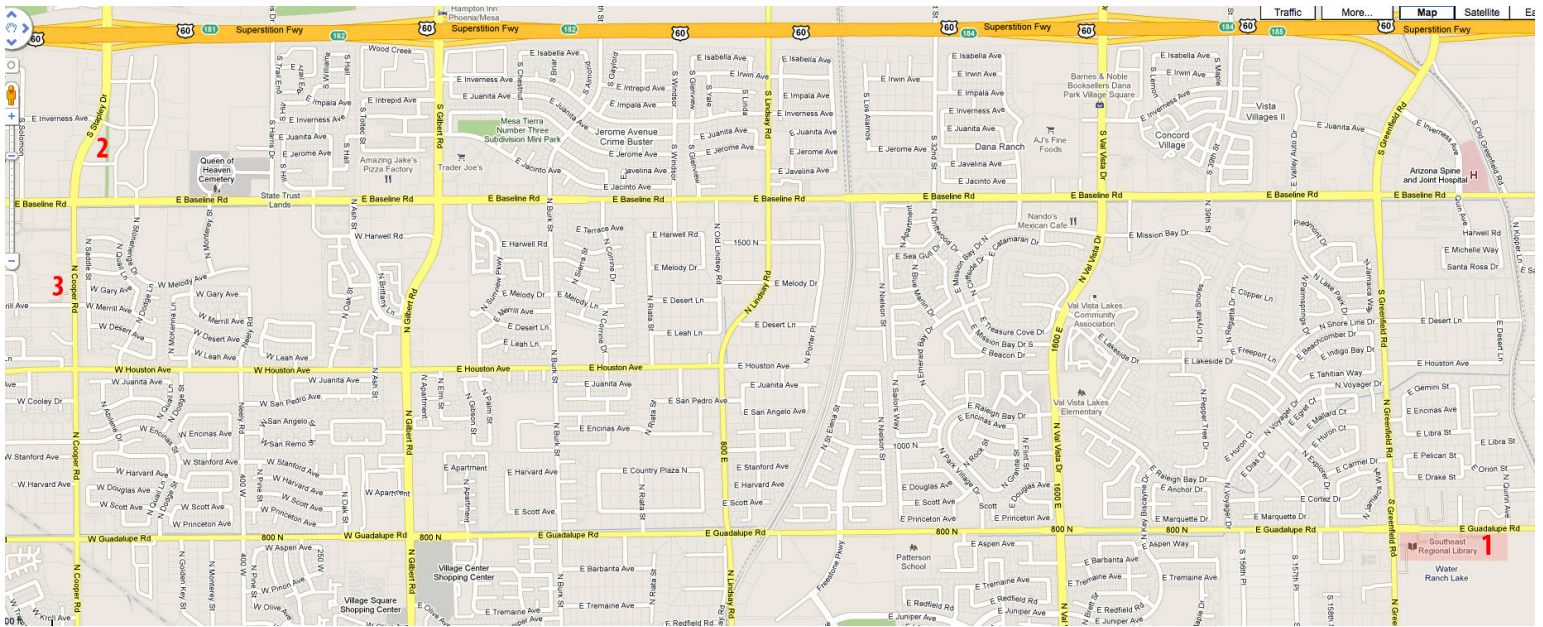
April 19

The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

Our meetings are held on the third Friday of each month at the Southeast Regional Library in Gilbert. The library is located at 775 N. Greenfield Road; on the southeast corner of Greenfield and Guadalupe Roads. Meetings begin at 7:30 pm.

All are welcome to attend the pre-meeting dinner at 5:30 pm. We meet at Old Country Buffet, located at 1855 S. Stapley Drive in Mesa. The restaurant is in the plaza on the northeast corner of Stapley and Baseline Roads, just south of US60.

**Visitors are always welcome!**



**2**

**Old Country Buffet**  
1855 S. Stapley Drive  
Mesa, Az. 85204

**1**

**Southeast Regional Library**  
775 N. Greenfield Road  
Gilbert, Az. 85234



## NOVEMBER 2012

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	<b>9</b>	<b>10</b>
11	12	13	14	<b>15</b>	<b>16</b>	<b>17</b>
18	19	20	21	22	23	24
25	26	27	28	<b>29</b>	<b>30</b>	

**November 9** - Public Star Party & SkyWatch at Riparian Preserve

**November 10** - Local Star Party at Boyce Thompson

**November 15** - Poston Junior High Star Party

**November 16** - General Meeting at SE Library

**November 17** - Deep Sky Observing Night

**November 29** - Kino Junior High Star Party

**November 30** - Porter Elementary Star Party

## DECEMBER 2012

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						<b>1</b>
2	3	4	5	6	<b>7</b>	<b>8</b>
<b>9</b>	10	11	12	13	<b>14</b>	15
16	17	18	19	20	<b>21</b>	<b>22</b>
23	24	25	26	27	28	29
30	31					

**December 5** - Edu Prize Gilbert Star Party

**December 7** - Local Star Party at Boyce Thompson

**December 13** - Akimel A-AI Middle School Star Party

**December 14** - Public Star Party & SkyWatch

**December 15** - Deep Sky Observing Night

**December 21** - General Meeting at SE Library

**December 29** - Az Cultural Academy Star Party



# East Valley Astronomy Club -- 2012 Membership Form

Please complete this form and return it to the club Treasurer at the next meeting or mail it to EVAC, PO Box 2202, Mesa, Az, 85214-2202. Please include a check or money order made payable to EVAC for the appropriate amount.

**IMPORTANT: All memberships expire on December 31 of each year.**

Select one of the following:

- New Member
  Renewal
  Change of Address

**New Member Dues** (dues are prorated, select according to the month you are joining the club):

- |   |   |
|---|---|
| <input type="checkbox"/> <b>\$30.00 Individual</b> January through March  | <input type="checkbox"/> <b>\$22.50 Individual</b> April through June       |
| <input type="checkbox"/> <b>\$35.00 Family</b> January through March      | <input type="checkbox"/> <b>\$26.25 Family</b> April through June           |
| <input type="checkbox"/> <b>\$15.00 Individual</b> July through September | <input type="checkbox"/> <b>\$37.50 Individual</b> October through December |
| <input type="checkbox"/> <b>\$17.50 Family</b> July through September     | <input type="checkbox"/> <b>\$43.75 Family</b> October through December     |
- Includes dues for the following year*

**Renewal** (current members only):

- \$30.00 Individual**
 **\$35.00 Family**

**Name Badges:**

- \$10.00** Each (including postage) Quantity: \_\_\_\_\_

Name to imprint: \_\_\_\_\_

**Total amount enclosed:**

*Please make check or money order payable to EVAC*

- Payment was remitted separately using PayPal
  Payment was remitted separately using my financial institution's online bill payment feature

Name:

Phone:

Address:

Email:

City, State, Zip:

- Publish email address on website

URL:

How would you like to receive your monthly newsletter? (choose one option):

- Electronic delivery (PDF) *Included with membership*
 US Mail **Please add \$10 to the total payment**

**Areas of Interest** (check all that apply):

- |  |   |
|--|---|
| <input type="checkbox"/> General Observing   | <input type="checkbox"/> Cosmology        |
| <input type="checkbox"/> Lunar Observing     | <input type="checkbox"/> Telescope Making |
| <input type="checkbox"/> Planetary Observing | <input type="checkbox"/> Astrophotography |
| <input type="checkbox"/> Deep Sky Observing  | <input type="checkbox"/> Other            |

Please describe your astronomy equipment:

Would you be interested in attending a beginner's workshop?  Yes  No

How did you discover East Valley Astronomy Club?

**PO Box 2202**  
**Mesa, AZ 85214-2202**  
**www.evaonline.org**

All members are required to have a liability release form (waiver) on file. Please complete one and forward to the Treasurer with your membership application or renewal.

# Liability Release Form

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**In consideration of attending any publicized Star Party hosted by the East Valley Astronomy Club (hereinafter referred to as “EVAC”) I hereby affirm that I and my family agree to hold EVAC harmless from any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), which may directly or indirectly be connected to EVAC and/or my presence on the premises of any EVAC Star Party and related areas.**

**I further agree to indemnify any party indicated above should such party suffer any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), caused directly or indirectly by my negligent or intentional acts, or failure to act, or if such acts or failures to act are directly or indirectly caused by any person in my family or associates while participating in an EVAC Star Party.**

**My signature upon this form also indicates agreement and acceptance on behalf of all minor children (under 18 years of age) under my care in attendance.**

**EVAC only recognizes those who are members or invitees and who also have a signed Liability Release Form on file as participants at an EVAC Star Party.**

---

*Please print name here*

---

*Date*

---

*Please sign name here*

**PO Box 2202  
Mesa, AZ 85214-2202  
[www.eastvalleyastronomy.org](http://www.eastvalleyastronomy.org)**

# A Cosmic Tease: Trials of the Herschel Space Telescope Science Teams

by Dr. Marc J. Kuchner



Vast fields of marble-sized chunks of ice and rock spun slowly in the darkness this week, and I sat in the back of a grey conference room with white plastic tables spread with papers and laptops. I was sitting in on a meeting of an international team of astronomers gathered to analyze data from the Herschel Infrared Observatory. This telescope, sometimes just called Herschel, orbits the Sun about a million miles from the Earth.

The meeting began with dinner at Karl's house. Karl charred chorizo on the backyard grill while the airplanes dribbled into Dulles airport. Our colleagues arrived, jetlagged and yawning, from Germany, Sweden, and Spain, and we sat on Karl's couches catching up on the latest gossip. The unemployment level in Spain is about twenty percent, so research funding there is hard to come by these days. That's not nice to hear. But it cheered us up to be with old friends.

The meeting commenced the next morning, as the vast fields of ice and rock continued to spin—shards glinting in the starlight. Or maybe they didn't. Maybe they didn't exist at all.

You see, this team is looking at a series of images of stars taken by a device called a bolometer that is blind to ordinary starlight. Instead, the bolometer inside Herschel senses infrared light, a kind of light that we would probably refer to as heat if we could feel it. But the idea of pointing the bolometer at the stars was not to collect ordinary starlight. It was to measure heat coming from the vicinity of these stars, like an infrared security camera, in case there was something else to be found lurking nearby.

And lo and behold, for a handful of stars, the bolometer measurements were off the charts! Maybe something was

orbiting these stars. From the details of the bolometer readings—which channels lit up and so on—you would guess that this stuff took the form of majestic fields or rings of icy and rocky particles. It would be a new kind of disk, a discovery worth writing home to Madrid about.

There are several teams of astronomers analyzing data from the Herschel Space Telescope. They call themselves by oddly inappropriate sounding acronyms: GASPS, DUNES, DEBRIS. For the time being, the scientists on these teams are the only ones with access to the Herschel data. But in January, all the data these teams are working on will suddenly be released to the public. So they are all under pressure to finish their work by then. The team whose meeting I was sitting in on would like to publish a paper about the new disks by then.

But it's not so simple. The stars that this team had measured were relatively nearby as stars go, less than a few hundred light years. But the universe is big, and full of galaxies of all kinds—a sea of galaxies starting from maybe a hundred thousand light years away, and stretching on and on. Maybe one of those background galaxies was lined up

with each of the stars that had lit up the bolometer—fooling us into thinking they were seeing disks around these stars.

The team argued and paced, and then broke for lunch. We marched to the cafeteria through the rain. Meanwhile, vast fields of marble-sized chunks of ice and rock spun slowly in the darkness. Or maybe they didn't.

What else did Herschel recently uncover? Find out at <http://spaceplace.nasa.gov/comet-ocean>.

Dr. Marc J. Kuchner is an astrophysicist at the Exoplanets and Stellar Astrophysics Laboratory at NASA's Goddard Space Flight Center. NASA's Astrophysics Division works on big questions about the origin and evolution of the universe, galaxies, and planetary systems. Explore more at <http://www.science.nasa.gov/astrophysics/>.



*Samuel Pierpoint Langley, who developed the bolometer in 1878. His instrument detects a broad range of infrared wavelengths, sensitive to differences in temperature of one hundred-thousandth of a degree Celsius (0.00001 C). In 1961, Frank Low developed the germanium bolometer, which is hundreds of times more sensitive than previous detectors and capable of detecting far-infrared radiation.*



## If It's Clear...

by *Fulton Wright, Jr.*

*Prescott Astronomy Club*

**NOVEMBER 2012**

*Celestial events (from Sky & Telescope magazine, Astronomy magazine, and anywhere else I can find information) customized for Prescott, Arizona. Remember, the Moon is 1/2 degree or 30 arcminutes in diameter. All times are Mountain Standard Time.*

On Sunday, November 4, the rest of the USA goes off daylight savings time. We in Arizona ignore the situation except for noting that some national TV programs come on an hour later that they did for the last few months.

On the night of Tuesday, November 6, at 12:10 AM (Wednesday), the last quarter Moon rises.

On Wednesday, November 7, from 8:11 PM to 10:58 PM you can see an entire transit of Io in front of Jupiter. Because Jupiter hasn't reached opposition yet, the shadow precedes the satellite across the planet.

On Tuesday, November 13, it is new Moon and you have all night to hunt for faint fuzzies.

On Wednesday, November 14, from 10:05 PM to 12:41 AM (Thursday), you can watch an entire transit of Io in front of Jupiter.

On Sunday, November 18, from 8:57 PM to 12:01 AM (Monday), you can watch an entire transit of Europa in front of Jupiter.

On Tuesday, November 20, the Moon is at first quarter phase

and sets at 12:46 AM (Wednesday). Before that, at 10:16 PM, the Moon occults the double star, 51 Aqr. The star isn't especially bright (magnitude 6) but the components are about equal brightness, 0.4 arc seconds apart (hard to see visually), and should disappear about 0.7 time seconds apart. Thus, you can verify it is double, even though you can't resolve it visually. They should reappear from behind the Moon's bright limb at 11:16 PM, taking about 1 time second to do so, but at an altitude of only 15 degrees.

On Monday, November 26, before sunrise, you can see Venus and Saturn less than a degree apart. The pair rises about 4:55 AM. Twilight interferes about 6:15 AM (nautical twilight starts). The pair is also close the next morning.

On Wednesday, November 28, at 7:17 AM, the full Moon sets and the sun rises. The Moon will be very near the maximum of its penumbral eclipse at the time. (The Moon never gets to the partial phase where some of the umbra falls on it.) The eclipse starts at 5:19 AM, but that event is unobservable. Astronomical twilight starts at 5:46 AM. Nautical twilight starts at 6:17 AM. Civil twilight starts at 6:48 AM. Will you be able to see a slight darkening of the upper right limb of the Moon before twilight or Moonset interferes? It's a close call. Tonight, when the Moon rises (about 5:40 PM) it is near Jupiter.

On Friday, November 30, from 8:22 PM to 10:35 PM you can watch an entire transit of Io in front of Jupiter. This one is especially interesting because Jupiter is almost at opposition, which means the shadow on the planet appears very close to the satellite.

***Looking for that perfect weekend activity?  
Why not resolve to getting involved?  
Contact Dave Coshow to join the staff at GRCO  
Email: [grco@evaconline.org](mailto:grco@evaconline.org)***

# Night Sky Network Toolkits - Telescopes: Eyes on the Universe

by Lynn Young

EVAC participates in the Night Sky Network (NSN) and helps provide information to the network and the supporting agencies. We report our outreach efforts and how many observers we have at the various events. In return, the NSN provides the participating clubs with "toolkits" that contain materials and activities to explain astronomy techniques and equipment. EVAC currently has five of these toolkits.

Our latest toolkit is Telescopes: Eye on the Universe. It includes materials and activities to prepare our visitors for their observing experience and enhance their understanding at the eyepiece.

Amateur astronomers provide the public with the often life-altering experience of directly observing the detail of Saturn's rings, the swirling clouds surrounding star nurseries, the nebula expelled from dying stars, and the light, traveling for eons, arriving from a distant galaxy.

As our visitors observe these wonders, they also ask many questions about what they see, or what they don't see! Why does the image of the Moon look upside-down? Why doesn't it look like the photos?

What power is your telescope? Can you see the flag on the Moon? Where are you looking? Why isn't it in color?

This toolkit contains some activities to help explain these concepts in a fun and interactive way that also educates the participants. But you say, I don't have the time to explain these concepts because of the line of waiting observers. In parenthesis is the approximate time needed to answer the question. Some of the activities are:

"Ready to Observe?" This set of activities helps answer common questions we get at the telescope and provides tools to help your visitors understand what to expect and how to enhance their experience. Why don't I see any color? (30 seconds) Where are you looking? How much of the sky are we seeing in the scope? (1-10 minutes) Why is the image upside down? (1-3 minutes and you can demonstrate the effect with a dinner spoon) It includes an exercise to illustrate averted vision and the lack of color that is printed on a small card that can be kept at the telescope.

"What Power is your Telescope?" Using a few simple props, this show the basics of how telescopes work. it includes quick, simple demos that can be done at the telescope to

help explain basic telescope concepts. (2-10 minutes)

"Why Doesn't It Look Like the Photos?" There are activities to show why images we see in the telescope do not look like the pictures in magazines. It also helps explain why NASA needs different kinds of telescopes to help us understand the universe. (3-10 minutes)

"Can You See the Flag on the Moon?" Activities to show how much detail you can expect to see in the telescope and the difference between resolution and magnification are clearly explained (3-5 minutes).

Not only do the toolkits have the materials to conduct these activities, but also a training dvd and a complete manual.

The training dvd goes though the assembly of the activities

(cutting, pasting, gluing, or inserting skewers in some foam backing) and how to present the activity in an easy to understand manner. On the resources cd is a list of materials needed for each activity if you want to assemble more copies or you have exhausted your current supplies. It also includes Power-Point presentations on the activities if you have a large audience or are presenting inside.



This toolkits contain supplementary material on related topics. Want to impress your audience with colorful images? The Telescopes toolkit contains a dvd titled Hubble Source 2005 video collection which can be shown to the public with information about the Hubble telescope and it's mission. It also has a cd on the Chandra X-ray observatory. Each of these disks are able to be duplicated for the members of EVAC to utilize in our outreach efforts.

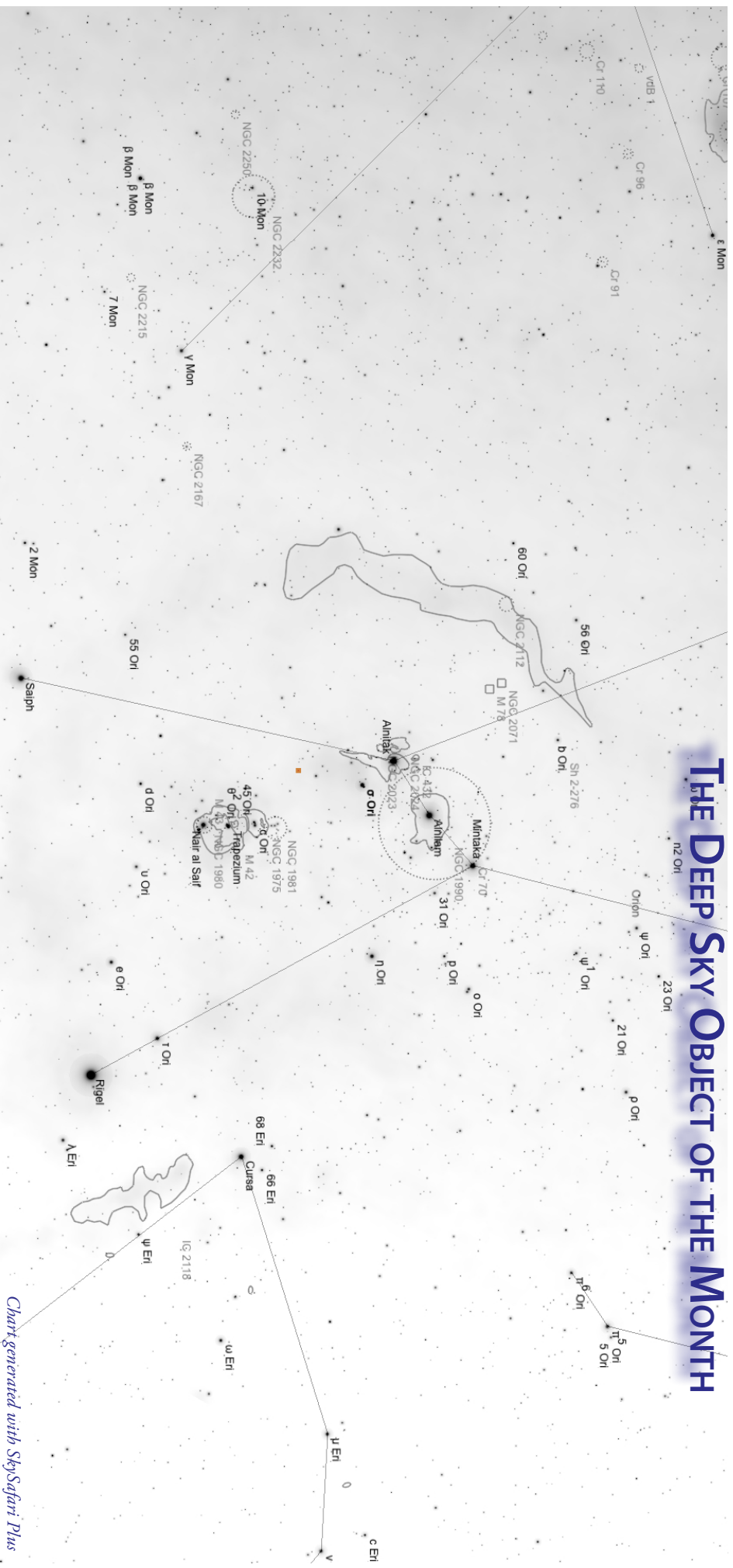
Other items in the toolkit include the articles "How Far Can You See" by Phil Plait and "Making the Photon Connection" by James Mullaney, that can be printed to use as handouts at events.

Want to brush up on your history of telescope technology? Included on the resources cd is "Telescopes from the Ground Up", a reproduction of the website by the same name. And you don't need an internet connection to browse the site since it is contained on the resources cd in the toolkit.

Interested? Just contact me if you would like to look over the kit or want copies of the disks to study the contents.

Next installment - **Space Rocks**

# THE DEEP SKY OBJECT OF THE MONTH



Sigma Orionis is a quintuple system in the constellation Orion, whose five stars shine together at magnitude 3.66 just south of Alnitak in Orion's belt.  $\sigma$  Ori is the pinnacle of a small star cluster that lies about 1150 light years away. In turn, the cluster is a part of the Orion OB1 association, which includes many of the other stars in the constellation.

There are few multiple stars more attractive than  $\sigma$  Orionis. Amateur telescopes show a quartet of stars, the brightest of which is also a close double,  $\sigma$  Ori AB. Its two components are merely 0.25" apart. The brighter star,  $\sigma$  Ori A, is a blue class O9.5 star with an apparent visual magnitude of +4.2.  $\sigma$  Ori B is a class B0.5 star with an apparent visual magnitude of +5.1. The pair orbit each other every 170 years at a distance of about 90 AU.  $\sigma$  Ori A and B are very hot stars, around 32,000 and 29,600 K, with luminosities of 35,000 and 30,000 suns. The stars' temperatures and luminosities give masses of 18 and 14 solar masses, making the close AB pair among the most massive visual binaries known.

The next brightest stars in the system are  $\sigma$  Ori D and E, which lie about 4,600 and 15,000 AU from the AB pair, respectively. Both are seven solar mass B-type dwarf stars with magnitudes of 6.62 and 6.66. Sigma Orionis E is a prototype of the strange "helium-rich" stars, which have large amounts of helium. Even odder, the helium in "E" seems to be concentrated toward particular patches that involve a combination of the rotational and magnetic field axes. The faintest star in the system is  $\sigma$  Ori C, a class A main sequence star.  $\sigma$  Ori C is closest to the AB pair, about 3,900 AU away.

## Sigma Orionis (48 Ori) Double Star in Orion

RA: 05h 39m 27.18s Dec: -02° 35' 42.3" Sep: 0.2" @ 78.4° Magnitude: 6.73 & 3.80



# Fried Planets

by Dr. Tony Phillips

An international team of astronomers has just caught a star in the act of devouring one of its planets. BD+48 740, a red giant they observed using the 9.2-meter Hobby-Eberly Telescope at the McDonald Observatory in Texas, appears to have the fumes of a scorched planet in its atmosphere. This is consistent with a rocky world, recently destroyed.

Could the same thing happen to Earth? Yes indeed, says Alex Wolszczan, a member of the research team from Penn State University: "A similar fate may await the inner planets in our solar system when the sun becomes a red giant some five billion years from now."

A new ScienceCast video looks into the case of the planet-devouring red giant BD+48 740. Play it: <http://www.youtube.com/watch?v=21RkSui1cG8>

Researchers who specialize in stellar evolution have long known that the inner planets are in danger. The trouble starts in the distant future when the sun's core runs out of hydrogen fuel for nuclear fusion. To keep the fires burning, the sun will begin to fuse hydrogen outside the core, in a layer closer to the stellar surface. This will turn the sun into a red giant, at least 200 times wider than it is today. Mercury, Venus, Earth and possibly even Mars could be engulfed.

The fate of Earth is not a certainty, however. Some researchers believe that Earth's orbit might spiral outward, keeping the planet at a safe distance from the approaching inferno. This could happen if solar winds carry away a significant fraction of the sun's mass in the years leading up to the red giant phase.

On the other hand, the sun might expand so quickly that our planet has no chance to escape. Earth would get caught in

the sun's rapidly advancing atmosphere and spiral inward to oblivion.

Observations of red giant BD+48 740 lend credence to the second possibility.

"Our detailed spectroscopic analysis of BD+48 740 reveals that the red giant contains an abnormally

high amount of lithium," says Monika Adamow who led the study at the Nicolaus Copernicus University in Torun, Poland.

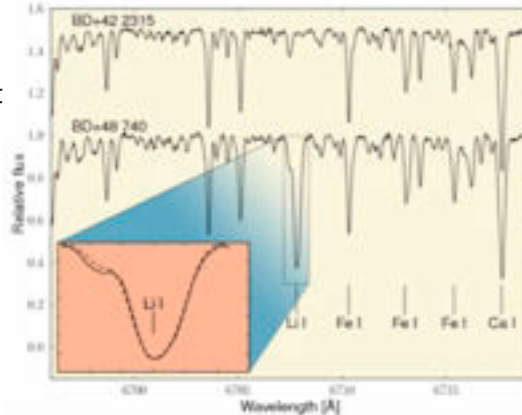
A spectroscopic analysis of light from BD+48 740 reveals lithium fumes in the star's atmosphere. [more]

Because lithium is easily destroyed in stars, finding lots of it in an old red giant is unexpected. The most likely source is a planet. Wolszczan explains: "It is probable that the lithium production in BD+48 740 was triggered by a mass the size of a planet that spiraled into the star and heated up

while the star was digesting it."

The team found another piece of evidence, too. BD+48 740 has a gas giant planet 1.6 times bigger than Jupiter which has not yet been devoured. The big planet has a highly elliptical orbit. In fact, it is the most elliptical orbit ever found for a planet around an older star. Its orbit, which almost surely started out circular, was probably altered by some catastrophic event--like its star having an inner planet for lunch.

One day, he says, our own solar system may end up the same way. In five billion years, the fried planet could be Earth.



*A spectroscopic analysis of light from BD+48 740 reveals lithium fumes in the star's atmosphere.*



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