

PAStimes

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When things go Boom! Novae, Supernovae

by Eric Steinberg & Terri Finch

Eric writes: “White Dwarf”, “Nova”, “Supernova”, “Type Ia”, “Type II”. These are things that happen to stars at the ends of their lives. But what are the differences among them? What actually happens internally to make an entire star blow up? And why one type for a star and not another? If these questions intrigue you, join us at the December 4th PAS meeting as entertaining presenter Eric Steinberg provides clear ex-

planations of these fascinating stellar life-cycle events in a talk called “When Things Go Boom!” Hope to see you there for this explosive topic.

Eric Steinberg is a PAS member and avid astronomer. Fascinated by science and how things work from childhood, he began taking household items apart at the age of 3, and by age 6 had actually begun to

Continued on page 3



In Memoriam

Jerry L. Belcher, 74, husband of Linda Belcher, passed away Thursday, November 13, 2014. Jerry was preceded in death by his parents, brother and sister. He is survived by his wife Linda of 40 years, his son Brad Belcher, two grandchildren, and niece and nephews. Jerry worked for Good Samaritan Hospital for 45 years before retiring. He had many hobbies: skydiving, scuba diving, being a pilot and building rockets. He also loved astronomy and car races of all kinds. Jerry requested no services. Just remember him as full of life.

Jerry was with PAS since the early days at Phoenix College. He served as President and Vice President for several years, and acted as the club's

Rocketry Liaison.

The Arizona Republic has a Guest Book for Jerry's Obituary where by friends and family are posting their thoughts about Jerry in remembrance. If you wish to do so, here is the link: <http://www.legacy.com/guestbooks/azcentral/jerry-l-belcher-condolences/173177866?cid=full#sthash.QrER6MNI.dpbs> The Guest Book will remain online until 12/16/2014.

Terri Finch writes: Jerry was always supportive of PAS. He kept us apprised of the upcoming events in the night sky. He was a wonderful person to have in the club and as a friend. He will be missed. I never would (*Continued on page 3*)



PAS Meeting Nov 6

By Terri, Event Coordinator

It was a wonderful night for a PAS Meeting: We had the honor of having David Williams return to us from the ASU School of Earth and Space Exploration with a terrific presentation about Mars! When William and I arrived at Room LS-205, several members were already in attendance and our guest speaker was all set up

to do his talk.

The evening opened with Jerry Belcher offering the group purchase of the Astronomy Calendars. I took in group orders for the Year In Space Calendar. President Bruce shared the Award PAS received at the PVCC Awards Ceremony on Oct 29 and told the group a little about how and why



Continued on page 3

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December Upcoming PAS Events

By Terri, Event Coordinator, RSVP to Events@pasaz.org

Dec 4: PAS Meeting in Room LS-205, Doors open at 7pm, Meeting starts at 7:30pm. Read about the Guest Speaker on page 1 in this issue. Everyone welcome. Bottled water provided by President Bruce. Bring a snack to share.

Dec 5: PAS at DBG Luminaria Event - Luminaria is a public event at the Desert Botanical Gardens and there is a fee to attend. Contact DBG for more details.

Dec 6: PAS at DBG Luminaria

Dec 7: Free Telescope Workshop at Bookmans 19th Ave and Northern in Phoenix, 3:30pm to 5:30pm. RSVP is required with Terri. When you RSVP, email the Make and Model of the telescope you need assistance with. We also assist with suggestions and advice on what telescope to purchase. Seating is limited.

chase. Seating is limited.

Dec 9: School Star Party (Private)

Dec 11: Free Public Lecture at PVCC Main Campus 32nd Street & Union Hills Rd in Phoenix in Rm LS-205. Lecture begins promptly at 7pm. See article in this issue for more details about this event.

Dec 12: PAS at DBG Luminaria

Dec 13: PAS at DBG Luminaria

Dec 17: CTCA Private Star Party - PASimes Star Tour Members Only

Dec 18: PVCC FREE Telescope Workshop at PVCC Main campus 32nd Street and Union Hills Rd 7pm to 10pm with Public Star Party.. RSVP is required with Terri Events@pasaz.org. When you RSVP, please leave your first name, and the

make and model of your telescope. Bring your telescope and accessories to this event. We meet in G-147 and by the Telescope Dome on campus.

Dec 19: PAS at DBG Luminaria

Dec 20: PAS at DBG Luminaria

Dec 21: PAS at DBG Luminaria

Dec 22: PAS at DBG Luminaria

Dec 23: PAS at DBG Luminaria

Dec 24: CTCA Back up Date for Dec 17.

Dec 26: PAS at DBG Luminaria

Dec 27: PAS at DBG Luminaria

Dec 28: PAS at DBG Luminaria

Dec 29: PAS at DBG Luminaria

Dec 30: PAS at DBG Luminaria §

Astronomy Lecture: Dec 11

Lecture is in Room LS-205 and begins at 7pm

By Terri, Event Coordinator, description paragraphs provided by Mike Marron.

Everyone welcome! Mike Marron will be doing an astronomy Lecture at PVCC Main Campus, 18401 N 32nd Street Phoenix AZ 85032 in Room LS-205. Set up will be at 6:40pm; lecture begins after a few short announcements at 7pm. This Lecture is being recorded, so please hold your questions until the end of the presentation. We expect this talk to run to 9:45, at which time

we will open it up for Q&A. Bring a snack to share - bottled water will be provided by President Bruce. If you wish to have a different drink, BYO.

On Dec 11, 2014: Tails of Plasma covers the lives of Population I and II stars and their jets. The surprising origins of various galactic types such as dwarf, spiral and

elliptical galaxies can be read in the jets they made. Malin-type dark galaxies reveal the hidden secrets of an older universe that has much more mass than can be accounted for by the bright galaxies. This lecture has the most detailed explanations you will ever encounter for how stars and galaxies are born and evolve.

Your Vote is Needed

By Terri, Event Coordinator

PAS Members... We are calling together those members who wish to vote on an issue at the December 4th PAS meeting. Here is the topic to vote on: As most of you know, Joe Collins has had a stroke. Since his recovery is taking quite a while and we

know that his family can not afford to pay for PAS Membership, we'd like to vote Joe in as an Honorary Member of PAS with the stipulation that as long as PAS is doing the CTCA events, Joe's Membership Dues are waived. Attend the meeting for more de-

tails and to put your vote in to help Joe become an Honorary Member of PAS. If you can't attend the meeting, you can vote by email anytime before 9am Thursday, Dec 4th. You can designate a proxy to carry your vote to the meeting. §

When things go Boom!

(Continued from page 1)

figure out how to put some of them back together again. Eric has a BA in Biology/Premed from Rutgers College and an MS in Computer Science from Polytechnic Institute of New York. Especially interested in astronomy, he found the light pollution and heavy tree cover of New York to be frustrating enough to stick to “textbook” observing, but one day on an early Arizona winter morning jog, he

(Continued from page 1)

have guessed he was going to leave us this soon.

Sam Insana writes: I have known Jerry for over 28 years, as long as I have been a member of PAS. I last saw him 10 days ago at our PAS meeting. He was the gentle-mAn who was going to order the Astronomical Calendars for our section. He had a great sense of humor, and I will miss him greatly.

(Continued from page 1)

PAS got the award.

We had several new folk join us for this meeting. Greg Spradlin and Ethan Sadaacca who saw PAS on Facebook, Greg and Elise Schwimer (Welcome to PAS, Greg), Steve Seilaff who came to us from Mesa and Joe who attended the meeting to learn what telescope to buy.

David started his talk by letting us know that he had new Mars posters at the front of the room that we could take home. David always does a wonderful presentation. He is quick, to the point and entertaining with a lot of information to share. He talked about the Rosetta Mission which will land on a Comet Nov 12 (a few days after

looked up at the sky and had the sudden powerful feeling of being among long-lost friends – and that it was time to start some real observing. These days, Eric can be seen regularly at star parties or in the deep desert with his automated 22” Dobsonian scope. He lives in North Phoenix with his wife and two cats.

Terri writes: This is the exciting topic

In Memoriam

Kevin Witts writes: That's very sad. I'd never met him before but sat next to him at the November 2014 meeting and had a nice, brief conversation with him. He seemed to have a great sense of humor. Prayers go out to his family and friends. RIP Jerry.

Leah Sapir writes: I was acquainted with Jerry since the time I joined PAS in 1999. At that time he was president of

of the Dec 4 PAS Meeting. Our Guest Speaker for this month is Eric Steinberg. This Meeting is also the annual PAS Swap Meet. Please see the article about this topic in this issue. Bring a snack to share or if you don't have time to pick up a snack, donate \$1+ to the snack fund to help get future snacks for the meetings. And always BRING A FRIEND to the meetings! See you there! §

PAS. He would introduce the meetings, and sometimes tell us about his adventures with high-speed rocket launches, or other trips he had taken. I remember him as a nice, friendly guy, and it's so sad to hear that he's gone.

Paul Facuna writes: I met Jerry only a few times about the calendars. He seemed like a nice person. I give his family my condolences. §

PAS Meeting Nov 6

this meeting happened). He then shared what he does for the NASA missions and talked about the rovers on Mars and their status, including Curiosity and its sampling systems. David also went over all the upcoming missions to Mars and more. At the end of his talk, he told us he'd return in the future with a talk about Dwarf Planets and Pluto. He is scheduled for the Nov 2015 PAS Meeting. You won't want to miss that one.

When David finished his presentation, the posters were grabbed by everyone there. David must have brought a 100 or more, as he had plenty left to take to his next presentation the next night. Many thanks to David for a splendid pre-

sensation. I can't wait till Nov 2015 for his next one. Thank you David!

As the meeting came to a close, there was a quick announcement and discussion about a card that was passed around among the meeting attendees to be given to Joe Collins, who is recovering from a stroke. Darlene Ahlefeld also had a stroke recently. Both are recovering.

I'd like to thank everyone who attended the meeting. It was great seeing those who haven't been to many meetings lately, be there, such as Kevin Harcey, & Ofelia Waters. We look forward to seeing you all at our next PAS meeting on Dec 4 for the PAS Annual Swap Meet!§

Sell Your Astronomical Equipment

By Terri, Event Coordinator

The PAStimes Newsletter is your means to selling your old, unwanted, but loved and used astronomical equipment. Write an ad with description & photos, get it in the next issue of the PAStimes News-

letter. Also, the ad will be posted in the For Sale PAS Forums & sent out to the 450 Astronomy Loving Arizona Residents who are on the Public Email Notification List Serv that I post Upcoming Free/Public

Events to once a month. PAS Members may post items for sale, in the newsletter, for free. Send them to Events@PASaz.org.

Sci-Fi Movie Trivia: Armageddon (1998) - This was the first movie in which the cast was allowed to use genuine NASA spacesuits. The cast are the only civilians to ever wear NASA spacesuits, which cost over \$3 million each.

Sci-Fi Movie Trivia: Armageddon (1998) - After Rockhound gets space dementia, the shuttle crew wraps him in duct tape, which is, in fact, NASA protocol for immobilizing a crazed crew member.

PAS Swap Meet in December in Room LS-205

By Terri, Event Coordinator

PAS Members & Guests: PAS holds a yearly Astronomy Swap Meet which is coming up at the December 4th Meeting. This Swap Meet is open to everyone, PAS Member or not. Bring cash.

Here's how it works: Bring your items for sale. When you walk into the room, the right side will be for the Swap Meet, and the left side will be the Garage Sale.

The Swap Meet items will have a silent bidding system in which the owner of the item puts a piece of paper next to the item with the description, a list of everything that comes with it and a starting bid. Let's say you'd like to get at least \$50 for that eyepiece, so your starting bid is \$50. Then,

through the night, before the meeting and even after the meeting, attendees can go and bid on the items by putting their bidding price (higher than the starting bid) and their name or initials next to their bid.

At the end of the meeting, all sales take place. Hopefully everyone leaves with a lack of items they brought with them, but also some great new items for their collection.

For the Garage Sale side of the room, put your items on the tables with a tag that has the price you want for that item. So, if you really want \$50 for that eyepiece, and you don't care to get any more for it, put \$50 on a tag, attach it to your item, make

sure your initials are on the tag so we can identify who owns the item, and sell it off. For the Garage Sale items, feel free to purchase right then. No need to wait for the end of the auction.

This is a fun time for all, and a great way to get some awesome items at decent pricing.

Now, if your item doesn't sell, please feel free to write up an ad, include a photo or two, and send it my way by email Events@pasaz.org. We'll get it advertised in the January issue of our newsletter, in the forums and out to our email list of 475 astronomy loving people. Good luck with your sales!§

Year in Space Calendar Order Update

By Terri, Event Coordinator

Did you order a Year in Space Calendar through Terri, this year? If so, come pick up your calendar at the December PAS meeting. I put the order in on Nov 14, so the calendars should be in my hands by that

time. If you can't make it to any event where we'll see each other, please let me know so we can make other arrangements to get it to you before the start of the new year. Thank you so much for your order,

and for everyone who took the order over 10 calendars so we could get them at the better price. §

Astronomy Day in Carefree Oct 4

By Terri, Event Coordinator

Astronomy Day in Carefree had no public RSVP's, so for a while the discussion in the PASMembres listserv was whether to have the event or cancel it. In the end, the weather promised to be nice, so we decided that even if there was no public in attendance, we'd still hold it.

Much to our surprise, we had a great viewing session. Rodney Fong and Don Boyd brought their scopes. Don didn't set up, but was very helpful at this event. Rodney set up his scope and though the Moon was overly large and Rodney had only a 6" dob, we saw quite a few objects. We started with the Moon. It was too bright, so Don grabbed his Moon Filter, and Mike brought out some eyepieces and Filters, too. We never knew Mike had eyepieces and Filters - thanks Mike! Rodney, Don and I worked out a good view of the Moon, which we shared around, followed by other objects viewed through a 32mm eyepiece.

Attendance was 6 PAS members - Mike Marron hosting, Don, Rodney, Bob Senzer, William and Terri Finch. The food was great - Don brought a delicious Italian pasta dish, Bob had pierogies of many kinds and William brought Pizza. We ate, then chatted while some clouds, who were visiting, finally got bored with us hanging out indoors and left. That was around 10pm, so we went outdoors and viewed.

We saw the Perseus Double Cluster, Andromeda (with a bunch of effort to find it), E.T. Cluster, Alberio, the Moon in different colored filters, the Ring Nebula (just barely). I tried but couldn't find, the Crab Nebula - I think the Moon was too bright, and the scope a tad too small. About the time we decided to pack up Rodney's scope, I noticed that the Orion Nebula would be coming up shortly. We (Don, Rodney and I) waited it out, while the rest of the group went inside to chat and load up the movie they had planned for the night.

They held for us to start, which was very nice of them. As Orion snuck up, I found the Trapezium, but no nebulosity. About the time we were going to pack it in the 2nd time, I found I could finally see the Nebula. I'm sure the Moon was getting in the way, but it was interesting, if disappointing to see the Trapezium without the Nebula around it. Nevertheless, finding so many wonderful objects with such a bright Moon out was quite satisfying.

I wish to thank Mike for hosting this smaller event at his home. Many thanks also to Rodney for taking out his scope and allowing the Members present to search for objects. It was a great event. The movie wasn't anything special, but the people at this event, make it all worth while. I totally enjoyed our discussion around the table - it must have gone on for 2 hours and was both fun and very interesting. Looking forward to the next observing session at Mike's home, hopefully with No Moon that night. §

Project Astro at Kitt Peak Sept 26

By Kevin Witts

I was fortunate to be selected to participate in Project ASTRO for the 2014/15 school year. Project ASTRO was developed by the Astronomical Society of The Pacific and coordinated in Tucson by NOAO, the National Optical Astronomy Observatory. It is held at the Kitt Peak National Observatory.

This unique and free educational program offers teachers instruction in conducting hands-on inquiry-based science activities in their classrooms. But, the biggest benefit is that each teacher gets an astronomer partner to work with them for the entire academic year. The astronomer helps conduct activities, and classroom demonstrations, schedule field trips, speakers, and even assists in setting up class or school star parties.

During the day-long ASTRO workshop, a partnership is forged that blends the teacher's knowledge of methods and classroom discipline with the astronomer's knowledge of and passion for astronomy. Together the team brings the science of astronomy alive in the classroom when the astronomer makes four school visits during the academic year.

Astronomy activities in turn may serve as springboards to other explorations into math, physics, chemistry and even writing. The ASTRO activities are even designed to help meet various state and national educational standards.

All workshop attendees received the "Universe at Your Fingertips" guide, a resource that contains more than fifty lesson plans. This invaluable resource is organized to present studies and activities that progressively include subjects from the solar system to galaxies.

The day began with a brief meeting on the campus of the University of Arizona, where I met my teacher-partner, Tom Larson of the Cesar Chavez High School in Laveen, Az. Tom teaches Grades 10-12 and planned to use the partnership for his accelerated Sr. Science Class. The group then boarded a bus for the 90 minute ride to Kitt Peak, located 56 miles southwest of Tucson, AZ, in the Schuk Toak District on the Tohono O'odham Nation.

A full-day workshop included training on activities that can be used in the classroom to teach basic and advanced Astronomical concepts. Some of the activities

included creating mock-ups of the Solar System, presentations about each planet, an exercise to build a "comet" and brainstorming sessions around the teacher/astronomer partnership.

The event also included a tour of the Kitt Peak facility. The Kitt Peak National Observatory (KPNO), part of the National Optical Astronomy Observatory (NOAO), supports the most diverse collection of astronomical observatories on Earth for nighttime optical and infrared astronomy and daytime study of the Sun. Sharing the mountaintop site with the National Solar Observatory, KPNO, founded in 1958, operates three major nighttime telescopes and hosts the facilities of consortia which operate 22 optical telescopes and two radio telescopes. Other tenants who use the mountain include The MDM Observatory, owned and operated by a consortium of five universities: the University of Michigan, Dartmouth College, the Ohio State University, Columbia University, and Ohio University. Also located on Kitt Peak is the The WIYN Observatory, a ground-breaking facility with a 3.5-meter telescope owned and operated by the WIYN Consortium, which consists of the University of Wisconsin, Indiana University, National Optical Astronomy Observatory (NOAO) and the University of Missouri.

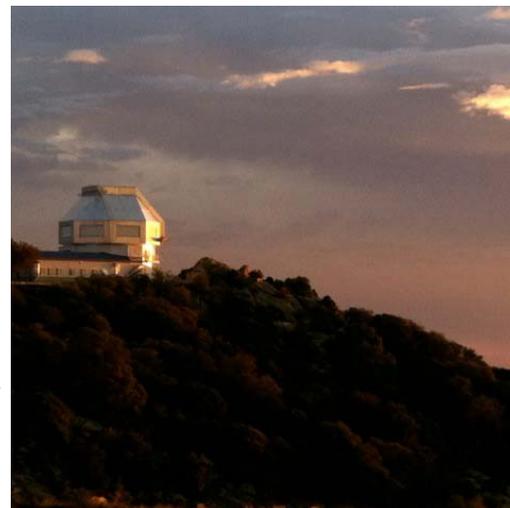
The big Kahuna on Kitt Peak is the the 4-meter (158 inch) Nicholas U. Mayall Telescope, one of the largest optical telescopes in the world. The eighteen story Mayall Telescope, located just below the summit of Kitt Peak at 6875 feet, can be seen from over fifty miles away. Construction of the Mayall was completed in late 1970. The dome weighs 500 tons and has a double shell structure, permitting it to withstand hurricane force winds of 120 miles per hour. The building upon which the dome revolves is constructed of ten hexahedrons and has a height of 187 feet. The structure houses a viewing gallery that is open to the public, which includes a 360 degree view of the surrounding Sonoran Desert. The tele-



*The enormous 4-meter Mayall telescope.
Photo by Kevin Witts.*



Kitt Peak – Photo provided by Kevin Witts



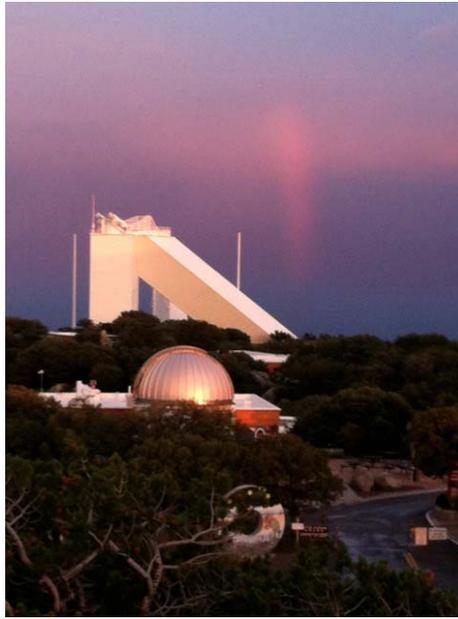
*The WIYN Observatory at sunset on Kitt Peak.
Photo by Kevin Witts.*

Project Astro at Kitt Peak Sept 26

scope's 15 ton primary mirror is polished to one millionth of an inch and has a reflective aluminum coating one thousandth the thickness of a human hair. A blue "horse-shoe" equatorial mounting positions and moves the 92 foot long telescope. The telescope is mounted on a cement pier that is completely separate from both the building and the dome, although the telescope and dome move in unison. The Mayall Telescope is equipped with a wide field imager camera, the CCD Mosaic. This camera has 8192 x 8192 pixels and produces color pictures of astronomical objects such as M 101, the Pinwheel Galaxy. The Mayall Telescope is used primarily for infrared and faint visible light observations and has played an important role in many fields of research. The rotation curves of distant galaxies have been observed in order to determine the role of dark matter in the universe. Also, the 4-meter has helped to establish the dynamical structure of elliptical galaxies such as M87 and M49.

The group was able to get up-close and personal with the Mayall and I can confirm that the views from the top are spectacular. Unfortunately, the group experienced a massive, very violent thunderstorm mid-day. If you've never experienced a thunder and lightning deluge at 6857 ft elevation, it's a breathtaking experience. Due to the weather, the group was unable to access the The McMath-Pierce Solar Telescope.

The McMath is the largest solar instrument in the world. This is also the world's largest unobstructed aperture optical telescope, with a diameter of 1.6 meters. The structure includes a tower nearly 100 feet in height from which a shaft slants two hundred feet to the ground. The shaft continues into the mountain, forming an underground tunnel where the sun is viewed at the prime focus. A 3-mirror heliostat collects light and directs it down the tunnel. Unlike other



The gigantic McMath Solar Telescope. The largest solar instrument on Earth...and a rainbow behind. Note that the huge "Disc" in the foreground is a cement "stand in" for the mirror of the Mayall scope. The dome in between is the Kitt Peak visitor Center.

Photo by Kevin Witts.

solar telescopes, the McMath-Pierce is sensitive enough to observe bright stars in the night. Permanent instruments include a dual grating spectrograph capable of extended wavelength coverage (0.3-12 microns), a 1-meter Fourier Transform Spectrometer for both solar and laboratory analysis, and a high-dispersion stellar spectrometer. The scope is used to study the structure of sunspots, as well as sunspot spectra. Important discoveries revealed with this telescope include: a detection of water and isotopic helium in the sun; solar emission lines at 12 microns; first measurement of Kilogauss magnetic fields outside sunspots and the very weak intra-network fields; first high resolution images at 1.6 and 10 microns;



Some of the various observatories that call Kitt Peak home... the large one in the foreground is owned and operated by the University of Arizona. Photo by Kevin Witts.

detection of a natural maser in the Martian atmosphere.

Also washed/clouded out was the planned star party for that evening.

I was able to Partner with teacher Tom Larsen and visit his class on Wednesday, October 14th. I took along my 8" Celestron SCT and my Solar filter. Many in the class had never seen the Sun through a telescope, so all got a look. We spent about 30 minutes discussing the attributes of the Sun and also it's impact on life on Earth. I was very pleased with how engaged the class was and what a fine teacher Tom Larsen is. I'll be returning in a few weeks and the class and I will be making comets! I'm thrilled to be a part of Project Astro and feel that I've made a great partnership with a Science Teacher in the community. §

CTCA Star Party of Oct 8

By Don Boyd

When Mike Marron, Terry Dancer and I got to CTCA at 6 pm, it looked very promising with mostly clear skies, but

when we went back up to the Rooftop Garden at about 7:15 after eating dinner, it was Michigan clear and got worse from that

point. The only object we could see was the moon - so Mike, of course stole the show. We had four customers. §

Bookmans Telescope Workshop Oct 5

By Terri, Event Coordinator

We had no RSVP's and no walk-ins this time, but we did have a great discussion among the PAS Members present. Attending this event were: William and Terri Finch, Don Boyd, Rodney Fong, Bob Senzer and Howard Moneta. Many thanks to the Team.

We discussed many things at this event, some related to Mike's Astronomy Day event the night before and the problems we had with the very bright Moon. We talked about Moon filters, which led to discussions on telescopes, binoculars, upcoming events, contacting companies for



their current catalogs and several other topics. It was a nice meeting. Thank you, Tele-

At this Telescope Workshop, great minds met to have a super discussion about various topics. Attending in this photo are: William, Don, Rodney, & Howard. Bob is present but only his knee is showing. Photo by Terri Finch.

scope Team for attending, even though we had no one outside the club to share with, this time.

We (William, Terri, Rodney and Bob) went to Carlos O'Briens for dinner and had a super meal. We look forward to the next Bookmans Telescope Workshop, hopefully with some public attendance. §

PVCC Telescope Workshop & Star party Oct 16

By Terri, Event Coordinator

This event began outside the room about 6:45 - Jenny got stuck in traffic so didn't get there until about 7:10 to open the room for us. Attending from PAS were: Rodney Fong, Bob Senzer, Mike Marron with his meteorites, William and Terri Finch, Eric Steinberg and Howard Moneta.

Attending this event for assistance with his Meade LX200 GPS 12" scope was Dave Krause. Dave was helped by Eric most of the evening and became a Member the same night! Welcome to PAS, Dave. Also attending and visiting Phoenix from Tennessee were Dan and Marla Merrick.

Rodney took the time to take out one of the 6" scopes and set it up so this wonderful visiting couple could enjoy a few views of the night sky.

The temperature was great but the humidity was a bit thick and we had clouds take over the sky, now and then. We closed up the event at 10:10pm. Many thanks to my wonderful Telescope Team for this evening's event, and thanks to Jenny Weitz for being there to unlock the room, give us computer access and unlock the telescope storage closet.



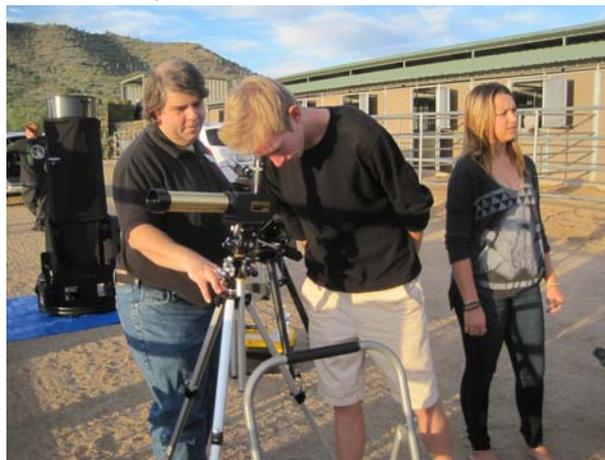
Dave brings his scope to the workshop. Mike has meteorites. It was a great event. Photo by Terri.

Star Party in North Scottsdale Oct 18

By Terri, Event Coordinator

The weather on the day of this event was questionable, starting out 100% overcast, however Mary, our host, wanted to do the event anyway because the caterer was already scheduled and could not be canceled. So, the PAS Telescope Team went to the location and set up around 4 pm. In attendance were William and Terri Finch with Terri's scope and the PST, Eric with his 22", Bruce Wurst with his 20", Howard Moneta with his 14" dob, Mike with his Meteorites and Kevin Witts with his solar filter and his 8". Kevin also set up some really awesome displays with many globes, the Moon, Mars and two others.

Mary had a nice crowd joining the star party with probably 60 friends in atten-



William showing the Sun through the PST. Photo by Terri.

dance. The chef's food, which we were treated to from 6:15 to 7pm, was delicious. After eating we did viewing from 7pm to

10pm with a good crowd that stayed right up until it was time to close up.

Now, as to those clouds... They were not invited to this event. Thankfully we had many holes where we saw quite a few really good objects, some of which I observed for the first time. It was pretty dark at Mary's location, which helped it turn out to be a great event with really nice people. Some of the objects we saw were Alberio, Andromeda Galaxy, Ring Nebula, Hercules Globular Cluster and many more. Many thanks to Mary for inviting us to her awesome party with a super great meal - even with working around the clouds, we totally enjoyed the night and look forward to a future event at Mary's home.



Where the Heavenliest of Showers Come From

By Dr. Ethan Siegel

You might think that, so long as Earth can successfully dodge the paths of rogue asteroids and comets that hurtle our way, it's going to be smooth, unimpeded sailing in our annual orbit around the sun. But the meteor showers that illuminate the night sky periodically throughout the year not only put on spectacular shows for us, they're direct evidence that interplanetary space isn't so empty after all!

When comets (or even asteroids) enter the inner solar system, they heat up, develop tails, and experience much larger tidal forces than they usually experience. Small pieces of the original object—often multiple kilometers in diameter—break off with each pass near the sun, continuing in an *almost* identical orbit, either slightly ahead-or-behind the object's main nucleus. While both the dust and ion tails are blown well off of the main orbit, the small pieces that break off are stretched, over time, into a diffuse ellipse following the same orbit as the comet or asteroid it arose from. And

each time the Earth crosses the path of that orbit, the potential for a meteor shower is there, *even after* the parent comet or asteroid is completely gone!

This relationship was first uncovered by the British astronomer John Couch Adams, who found that the Leonid dust trail must have an orbital period of 33.25 years, and that the contemporaneously discovered comet Tempel-Tuttle shared its orbit. The most famous meteor showers in the night sky all have parent bodies identified with them, including the Lyrids (comet Thatcher), the Perseids (comet Swift-Tuttle), and what promises to be the best meteor shower of 2014: the Geminids (asteroid 3200 Phaethon). With an orbit of *only* 1.4 years, the Geminids have increased in strength since they first appeared in the mid-1800s, from only 10-to-20 meteors per hour up to *more than 100* per hour at their peak today! Your best bet to catch the most is the night of December 13th, when they ought to be at

maximum, before the Moon rises at about midnight.

The cometary (or asteroidal) dust density is always greatest around the parent body itself, so whenever it enters the inner solar system and the Earth passes near to it, there's a chance for a **meteor storm**, where observers at dark sky sites might see *thousands* of meteors an hour! The Leonids are well known for this, having presented spectacular shows in 1833, 1866, 1966 and a longer-period storm in the years 1998-2002. No meteor storms are anticipated for the immediate future, but the heavenliest of showers will continue to delight skywatchers for all the foreseeable years to come!

What's the best way to see a meteor shower? Check out this article to find out:

<http://www.nasa.gov/jpl/asteroids/best-meteor-showers>.

Kids can learn all about meteor showers at NASA's Space Place:

<http://spaceplace.nasa.gov/meteor-shower>.

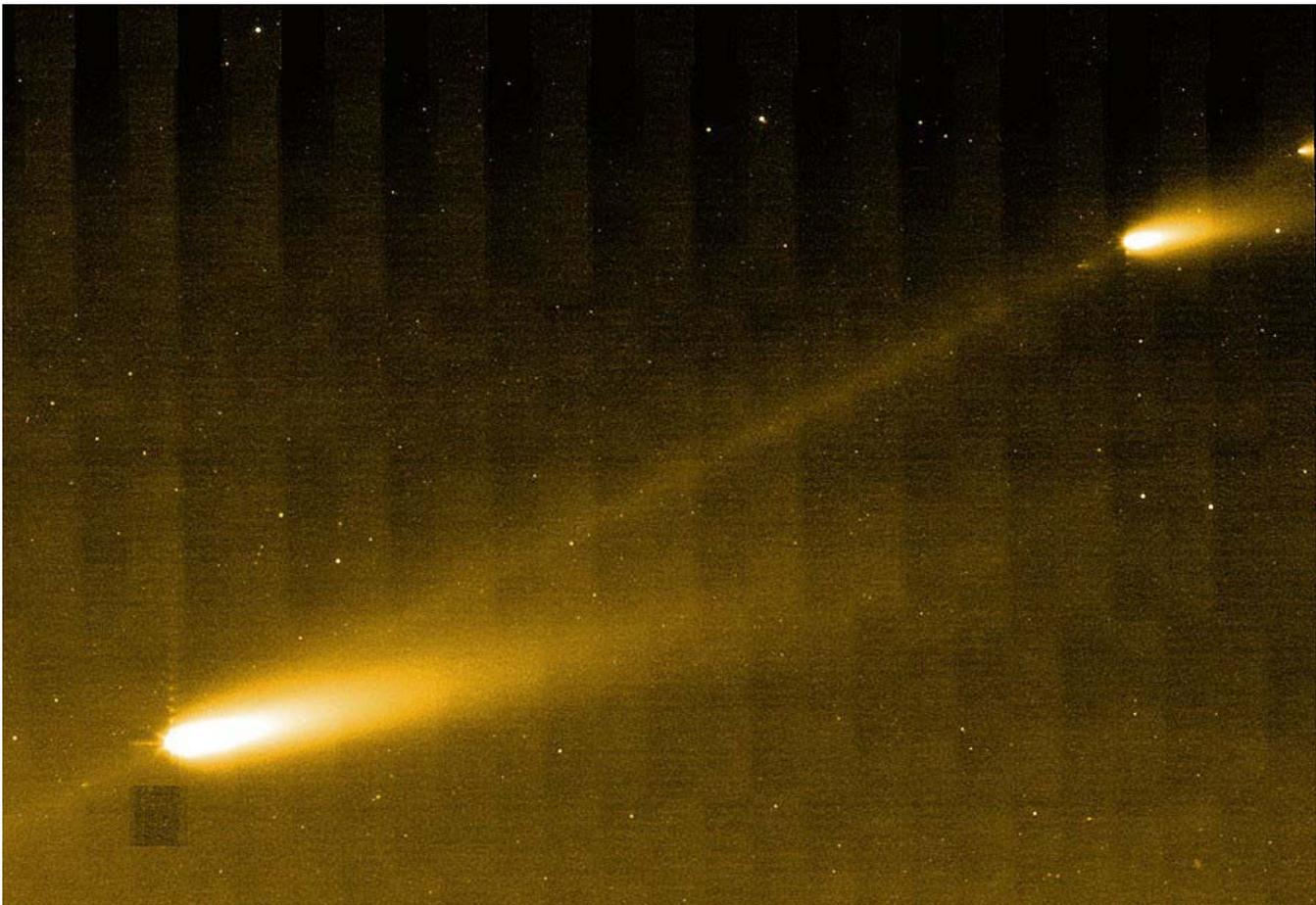


Image credit: NASA / JPL-Caltech / W. Reach (SSC/Caltech), of Comet 73P/Schwassman-Wachmann 3, via NASA's Spitzer Space Telescope, 2006.

The Planets This Month

By Leah Sapir

Mercury and Venus move into our western sky this month, but are still hiding in the sunset. Mercury will be lost in the sun's glare for most of December, and starts to be visible in evening twilight only in the last few days of the month. It will be a little more visible – but still only in twilight – in January. Venus will start to be visible in evening twilight after around December 20. In January it will begin staying up after dark as well.

Mars is still a fixture in the evening sky; getting farther away and shining only at around first magnitude, but still visible in the southwest till around 8:30 pm throughout the month.

Neptune and Uranus are high in the

south at sunset, and almost overhead at the beginning of December. Their position at sunset gradually moves into the western sky during the month. Neptune sets around 11:30 pm at the beginning of December, and around 9:30 pm towards the end of the month. Uranus sets about three hours later.

Jupiter finally moves into our evening sky this month. It rises around 10:30 pm at the beginning of December, and 8:30 pm towards the end of the month.

Saturn is back in our sky, too, but as a morning star. At the beginning of December it rises around 6:15 and is still lost in the dawn twilight, but by midmonth it will be rising around 5:30 am, and towards the end of the month it will rise at 4:30. Certainly

a good reason to wake up early (or stay up late) on those cold December mornings, to get a glimpse of our favorite ringed planet!

December is the month of the Geminid meteor shower, which reaches its peak on the night of December 13-14. It's a good idea to watch for meteors on the night before and after that, too. The third-quarter moon will rise around midnight, lighting up the sky a little, but the Geminid meteors tend to be bright and should still be visible. Also, since Gemini rises early, some of the meteors might be visible before midnight as well.

The moon will be full on December 6, and the new moon will be on December 22.

Solar Eclipse Viewing at Bookmans Oct 23

By Terri Finch

Many thanks to Katy at Bookmans Entertainment Exchange at 19th Ave and Northern. She and I set up a solar eclipse viewing event for which we had great public attendance. The Partial Solar Eclipse of Oct 23 was scheduled to make an appearance across the Sun's surface from about 2:20pm to 4:45pm, so the telescope team arrived about 1:30pm and set up. Mike did his meteorites at the PAS table at the front of the store and kept a crowd the whole time. Don set up his telescope across the parking lot (as seen in the photos), while Rodney and Pete were runners for the event. About 4pm, the Sun went behind the Bookmans building, ending the eclipse "early", so we packed up.

Pete had left earlier, right after helping us set up (especially the canopy - thanks Pete); Rodney left after the pack up was done and William Finch joined the group about 3:30pm. Don, William, Mike and I

(Terri Finch) then all went to Sprouts to find dinner. The initial idea was to have a sub sandwich, but the Sandwich Shop inside Sprouts looked tastier. After having a good meal we all drove up to Black Mountain Campus for the evening viewing session. I estimate we had about 60 people visit the telescope and PAS Table. The temperature was a humid 90 degrees or so, but in the shade, it wasn't too bad. It was a wonderful event for which I especially wish to thank my Telescope Team: Mike Marron, Don Boyd, Rodney Fong and Pete Turner.



Mike shares his meteorites at Bookmans store front during the Partial Solar Eclipse of Oct 23. Photo by Terri.



Pete, Rodney & Don share the solar experience at Bookmans for the Solar Eclipse of Oct 23. Photo by Terri.

Solar Eclipse Viewing at Black Mountain Campus Oct 23

By Sam Insana

On October 23, 2014, from 2 to 4:30 pm, PAS had a solar eclipse event at the Black Mountain Campus of Paradise Valley Community College. Barbara Hartman (a blast from the past) and her husband Scotty came up from Black Canyon City to participate; Paul Facuna, and Sam Insana also attended for PAS. About 75 people enjoyed the partial solar eclipse, most of them being college students. Bob Ewing, the astronomy professor, had his students attend after performing several experiments

trying to determine if the ambient light and temperature changed during the eclipse. PAS used my PST scope which showed 3 good solar flares, a long filament, and a huge sunspot. We also had Barbara's solar binoculars which seemed to show a 3 D view of the eclipse and many sunspots. My 8 inch newtonian reflector showed a huge sunspot and dozens of smaller sunspots along with the eclipsing moon, whose edge revealed a few bumps which were probably mountains or rims of craters on the moon.

Paul had the public and students start out looking through solar glasses to get a wow effect of the moon taking a bite out of the sun. Then Barbara would have them look through the bins, then through the PST and finally the 8 inch newtonian reflector. Several people came back repeatedly for further looks at the developing eclipse. The moon, at maximum around 3:30 pm seemed to cover about 30% of the sun. It was a warm day, around 90 degrees, but the PAS canopy helped us a lot.

Black Mountain Campus Oct 23

By George Muncaster

It was an interesting and fun event at BMC. Surprising weather: Several Milky Way(s) visible: the real one and some persistent pesky clouds. Nevertheless, dark skies allowed viewing many objects with little real difficulty. Several (I counted 8) of my SCC astronomy lab students attended and appreciated the ability to see different objects quickly and to learn about diverse types of telescopes from different scope operators. Thanks for putting on a great event! Thanks also to PVCC for their support including a DARK parking lot!!

Terri Finch writes: In attendance at this event from PAS without scopes were: William and Terri Finch with handouts and Q&A, Paul Facuna, Pete Turner and Mike Marron with his meteorites. PAS Members who brought their scopes were: Rodney Fong, Howard Moneta, Sam Insana, Kevin Witts, Eric Steinberg, Don Boyd and Bob Ewing.

The weather was cooperative as far as temperature. After a hot 90 degree day, it

cooled nicely, requiring only a light jacket. We had a clear sky night for about an hour from 7 to 8 PM before some nasty thin but too-thick-to-see-well-through clouds, came to visit and stayed until the 9:45, pack up time. I would say we had about 200 people in attendance though most of the RSVP's I had, did not check in with me.

I wish to thank my awesome telescope team along with Loretta Mondragon and Mike (PVCC Security) for getting the traffic cones set up to protect our observing location and turning off the lights. This is the last event at this location until construction is done sometime in 2015. We are hoping, when construction is done, we will still have a great observing spot at BMC. It was a very successful event!

Eva Marie writes: It was so wonderful to meet you all on Friday! What a special group of people you are. Friday night I felt like I was at "home". You guys felt like family from the start. Looking forward to being part of your club!



Mike & Eva Marie at Black Mountain Campus Star Party Oct 23. Photo taken by unknown.

A Frustrating Night at Antennas Oct 19

By Eric Steinberg

On October 19th, PAS members Eric Steinberg and Howard Moneta observed at the Antennas site. We arrived around 5pm to surprisingly warm and humid conditions, though thankfully with no wind or bugs. We set up, ate and watched the amazing sunset and twilight over the western ridges but unfortunately, things went downhill from there. First, a large bank of clouds off to the east began to retrograde and move back over the site. They eventually dissipated, but skies remained pretty murky, if clear. We observed for about two hours, but began noticing lightning off in the dis-

tant south and smelling dampness. A little after 9 pm the wind picked up moderately at first, but then quite suddenly became very strong in a classic outflow pattern. Skies went black while scopes were hurriedly covered and pointed at the horizon just in time for visibility to drop to a mile or two in heavy blowing dust. Perfect for astronomy! At that point, Howard quickly packed and left, while I decided to wait it out based on the time it would take to pack up and the length of the drive back. I nevertheless took the scope down to protect it. Of course about that time the sky cleared

and the wind began to die down, though transparency remained poor - even worse than before the dust storm. I spent some time in the recliner appreciating the stars and now windless night, but by 11pm found I was exhausted and so went to sleep. Got up a little after 6 and headed back to town. All in all, I observed seven Herschel II NGC objects in Pegasus, along with M31 and Mars. This was the first time in the three years I've been going there that I was forced to abort. Looking forward to better conditions next time!

Bookmans Telescope Workshop Nov 9

By Terri, Event Coordinator

We set up at 3pm and the event opened up at 3:30 for the 2 expected RSVP's. Attending from PAS were: Ed and Bette Wurst, Bruce Wurst, Rodney Fong, Don Boyd, Bob Senzer and William and Terri Finch.

Our first RSVP, Joe MacEwan, arrived about 4pm looking for help with purchasing a telescope, so, we gathered around him and shared info. Bruce, William & Rodney did a great job advising him. 20 minutes

later, Joe was ready to leave, seeming very pleased with the help we offered.

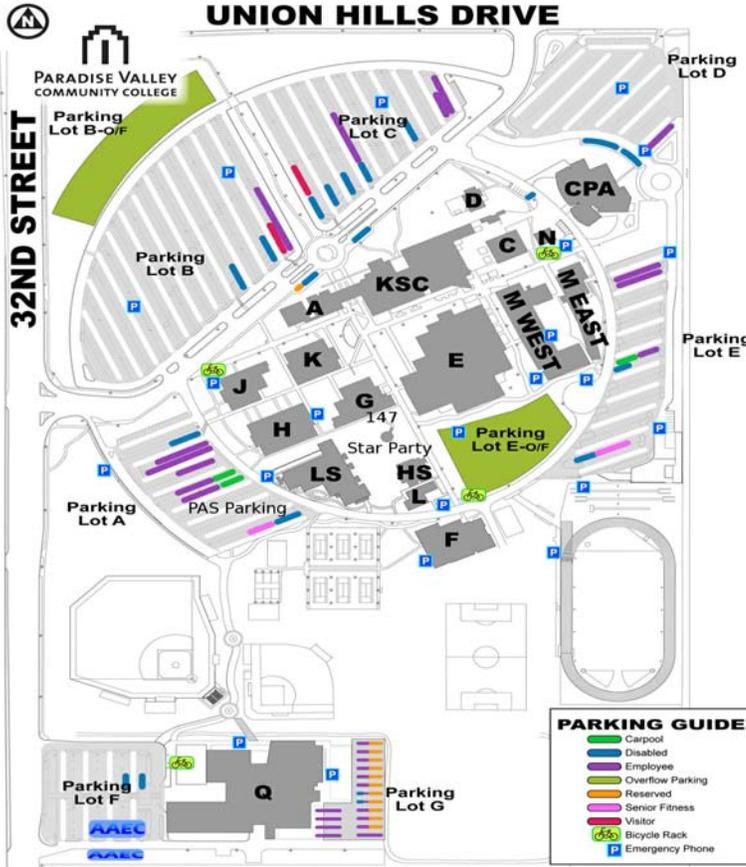
After Joe left, Dawn Gallagher arrived about 4:30pm. We assisted her with her scope, a Meade F1200, for about an hour, particularly appreciating Bruce's presence, as he knew what Dawn needed and how to do it. Many photos were taken too. By then, it was time to depart to dinner at Carlos O'Briens where Bob, Rodney, William and I enjoyed a delicious meal!



The Telescope Team gathers around the PAS Table of handouts. Photo taken by Bruce Wurst with Terri's camera.

Map of PVCC Main Location

18401 N. 32nd Street | Phoenix, AZ 85032



Map of PVCC Black Mountain

34250 N. 60th Street | Scottsdale, AZ 85266



December 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4 PAS Meeting	5 DBG Luminaria	6 DBG Luminaria
7 Telescope Workshop	8	9 School Star Party (Private)	10	11 Public Astronomy Lecture	12 DBG Luminaria	13 DBG Luminaria
14	15	16 Hanukkah (sunset)	17 CTCA (Private)	18 Telescope Workshop	19 DBG Luminaria	20 DBG Luminaria
21 DBG Luminaria	22 DBG Luminaria	23 DBG Luminaria	24 CTCA Back up/ Christmas Eve	25 Christmas	26 DBG Luminaria	27 DBG Luminaria
28 DBG Luminaria	29 DBG Luminaria	30 DBG Luminaria	31 New Year's Eve			

Don Boyd
PAStimes Editor
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To:

2014/2015 PAS GUEST SPEAKER LINE-UP

By Terri, Event Coordinator, Events@pasaz.org

Do you have an idea for a Guest Speaker? Email me the details.

Here's the scheduled Guest Speakers at PAS:

:<http://www.pasaz.org/index.php?pageid=meetings>

Jan 15: Roger Anzini: "Astro System Dobsonian "TeleKit"

Feb 5: Jeff Stillman: "Art of Astrophotography"

Mar 5: Alex Vrenios "You're So Far Away"

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Meetup.com - <http://www.meetup.com/Phoenix-Astronomical-Society/>

What's Up For December?

By Rod Sutter, PAS Past President

Planets

Name	Date	Rise	Set
Mercury	12-15-14	07:50	17:31
Venus	12-15-14	08:25	18:12
Mars	12-15-14	10:26	20:43
Jupiter	12-15-14	21:47	11:14
Saturn	12-15-14	05:28	15:53
Uranus	12-15-14	13:23	01:54
Neptune	12-15-14	11:44	22:53
Pluto	12-15-14	08:42	18:50

All Times Arizona Time

December 15 2014

Sunrise: 07:24

Sunset: 17:22



Q1: November 29



Full: December 6



Q3: December 14



New: December 21

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