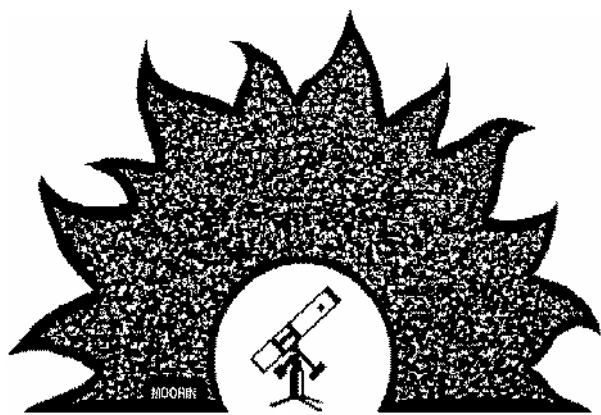




PAStimes

Phoenix Astronomical Society

www.pasaz.org

October 2015

Volume 67 Issue 2

PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Richard “Rik” Hill to Speak at October Meeting

“The Latest with CSS and Near Earth Asteroid Surveying”

I was born June 10, 1949, only a few hours after Antares was occulted by a nearly full moon.

My first observation was the May 15th, 1957 transit of Mercury as a schoolboy in a two room schoolhouse in rural Oakland County, Michigan, when a substitute teacher brought a 1.6” to school and projected the sun. I observed through the 1960s, first with the ubiquitous standard 2.4” refractor (Tasco) and later with an RV-6 I bought with money earned mowing lawns and washing cars. I occasionally at-

tended evening astronomy classes at Cranbrook Institute of Science though I did not have good grades in school because I spent all my study time with Sky & Telescope or girls. These poor grades led to my being drafted very quickly after graduation but I instead joined the Navy. In the Navy I served as a radar tech, but was frequently called up by the navigators to help identify stars for sextant fixes. (A very early form of GPS!)

After the Navy I became engaged to a woman who had little appreciation for astronomy. To accommodate her growing distaste for my telescope and the time I spent with it, I sold (Continued on [page 4](#))



Photo courtesy of Rik

PAS Meeting Sept 3

By Terri, Event Manager

The September Meeting was a great success with some excellent guest speakers who are PAS Members. We had Bruce Wurst, outgoing President of PAS, open the meeting. He then turned it over to the new President, Sam Insana after welcoming him in. Sam thanked Bruce for his many years of serving as President of PAS and gave him a gift certificate with a card signed by the attendees of this meeting and a “Past President” position badge. Bruce’s duties as Past President will include helping Sam adjust to being the new President.

Sam then congratulated Terri Finch for continuing to be the Event Coordinator and upgraded her status to Event Manager. Terri was Vice President for the 4 years that Bruce was President and so was also given a gift certificate with a card signed by the attendees of the meeting. Sam then introduced and congratulated the new Vice Pres-

ident, Howard Moneta.

With the new year, a new Secretary position was and formed and filled by Kevin Witts - congratulations, Kevin.

Sam further announced Mike Marron as previous Treasurer and finally, introduced and congratulated the new PAS Treasurer, Eric Steinberg..

Following the announcements, Alex Vrenios and Sam Insana did a half-hour presentation on the solar eclipse of 2017. They went over some great details and gave the best locations from which to see this event. Thank you both. We then had Peter Turner present “Black Holes - Everything you thought you knew about them is wrong (well, almost everything!)” Pete’s interesting and funny talk was about 45 minutes long, ending around 9pm. Many thanks, Pete! After a short break, Sam Insana told us about the upcoming free events during



Pete Turner did a fantastic presentation on “Black Holes,” at the Sept 3 PAS Meeting. We were all on the edge of our seats as he presented “Everything you thought you knew about Black Holes, is wrong.” Photo by Don.

the week-long Flagstaff Festival of Science. The events Sam mentioned sounded

See Sept 3 Meeting on page 5

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October 2015 Upcoming Events

By Terri, Event Manager

More events may be added to the list, so check the website for updates at <http://www.pasaz.org/forums/calendar.php>.

Oct 1: Dinner prior to the PAS Meeting. We will be meeting at Deer Valley Airport Restaurant from 4:30 to 5pm for dinner with the Guest Speaker. You MUST RSVP your attendance by Sunday Sept 27 to attend and sit at the PAS Table. Please sign up on the site <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=1629&day=2015-10-1&c=1> or RSVP via Events@pasaz.org. The initial RSVP will be called in Wednesday Sept 23, and confirmed again with DV Airport Restaurant on Monday Sept 29. So, get your RSVP in today. Everyone Welcome.

Oct 1: PAS Meeting in LS-204. Come enjoy a wonderful presentation by a returning guest speaker. Bring a snack to share. Bottled water provided by Past President Bruce. Everyone welcome.

Taking orders for Year in Space Calendar order. \$14/calendar. See Terri about your order.

Oct 8: ASU West public star party from 7pm to 9pm. Please see site for details and RSVP is with Paul for the public, and with me for PAS Members attending with Telescopes. ASU West is at 47th Ave and Thunderbird Road in Glendale; there is a \$3 parking fee. More details at: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=1789&day=2015-10-8&c=1>

Oct 9: School Star Party (Private).

PAStimes Star Tour Members only.

Oct 9: 5am Planet Line-up. View from a dark location. Enjoy!

Oct 11: Uranus is at Opposition

Oct 15: Huge public star party at Black Mountain Campus of PVCC, 60th Street and Carefree Hwy from 7pm to 10pm. Set up is 6pm for telescopes. Everyone welcome. RSVP is requested with Terri Events@pasaz.org. This event is weather permitting. When you RSVP by email, please include the number in your party. We usually provide 10-14 scopes for your viewing pleasure. Please do not touch the telescopes. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=1395&day=2015-10-15&c=1>

Oct 17: Private Star Party in N. Scottsdale. PAStimes Star Tour Members only.

Oct 18: Free Telescope Workshop at Bookmans, 19th Ave and Northern in Phoenix - 3:30pm to 5:30pm. RSVP is required with Terri Events@pasaz.org. 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 to match your needs. We have no telescopes for sale at this event. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=1387&day=2015-10-18&c=1>

Oct 21: Orionids Meteor Shower Peak. A meteor shower can be seen from 5 days prior to 5 days after the peak date. Find a dark location, like your back yard and enjoy

the show.

Oct 22: 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. Seating is limited. 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. We have no telescopes for sale at this event. This event is weather permitting. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=1407&day=2015-10-22&c=1>

Oct 24: Halloween Party (Private)

Oct 26: Conjunction of Venus and Jupiter. View this naked eye occurrence from a dark location, like your back yard.

Oct 28: Conjunction of Venus, Mars and Jupiter. View from a dark location.

Oct 29: Possible Special (private) Meeting for Star Tours Members only.

Oct 30 & 31 & Nov 1: Rock-a-Rama Solar Viewing event. Everyone welcome. Come view the Sun through safely filtered telescopes in Black Canyon City. See calendar for more info on this event: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=1757&day=2015-10-30&c=1>

Wow! This is a super busy month for PAS. We hope to see you at many of these fun events!!! Please remember to RSVP where requested. ***

Change in Day of Week for PAS Meetings

By Terri, Event Manager

To better accommodate our guest speaker in November and the Luminaria Events at DBG in December, our November and December PAS meetings will be held on the first Wednesday of those

months. Please make a note of this so you do not miss a super meeting! President Sam has been working very hard to schedule new guest speakers into the PAS Meeting Line-up - more details about these meetings

will be in the associated month's newsletter. All other meetings of the 2015/2016 PAS year will be on the first Thursday of the month unless otherwise noted. See you there!

President's Corner

By Sam Insana PAS President

Scientific research in astronomy is exciting and is something we can all do as members of PAS. The data we collect helps support busy professional astronomers who spend much of their time trying to obtain grants, analyzing theories, writing papers and doing public speaking.

The site at <http://www.skyandtelescope.com/online-resources/list-citizen-science-projects/> has a list of 24 citizen science projects in a Sky and Telescope article. The Great World Wide Star Count is coming up Oct 2-16, 2015 and is something every one of us can do. It can help determine the sky quality in areas all over the world, which it affected by air pollution, light pollution and other factors.

[http://www.skyandtelescope.com/get-](http://www.skyandtelescope.com/get-involved/pro-am-collaboration/list-amateur-research-projects/)

[involved/pro-am-collaboration/list-amateur-research-projects/](http://www.skyandtelescope.com/get-involved/pro-am-collaboration/list-amateur-research-projects/) lists 13 amateur research organizations that have more advanced projects. The International Meteor Organization link is something Alex told me about before the last Perseids meteor shower. Together we figured out the procedures and documentations needed and I then used the form Alex had available for us at Mike's house to enter my data. I sent it in to the IMO and they published it along with hundreds of other observers' data from around the world.

<https://www.astroleague.org/al/obsclubs/AlphabeticObservingClubs.html> lists about 50 observing programs. Some of these involve getting an award for being able to observe certain numbers of deep sky objects and doing a detailed description.

Alex and Eric and others in our club have received such awards. They should be very proud of their Achievements. Other programs listed, such as Variable Star Observing Programs, Occultation Observing Programs, and Sunspotters Observing Programs involve actual scientific data collection. These links show the equipment needed and have tutorials to help us.

I invite all PAS members to look at the above resources and choose one or more projects. We can work as a team, with two or more PAS members doing a project, or individually. Feel free to use pasmembers@freelists.org to communicate with one another and to keep all our members informed of your research and any requests for help. Have fun doing astronomical research and data collection.

Antenna's Mar 15

By Howard Moneta

Good weather comes and goes, so I've learned to be somewhat spontaneous in planning an observing night. This month, Sunday looked like THE night to go to the Antennas. The forecast was primed in every possible way. Nice temperatures, no clouds, and the winds predicted to be calm. The feeling that comes over me on such weekends is not unlike what is felt by a child on Christmas Eve.

It takes over an hour to pack the car for a one night trip. I have 51 useful items that I check off of a printed list as I load them in the car. Believe it or not, there are approximately 40 "can't live without" items that go on every overnight observing trip. The telescope and all of its accessories, sleeping gear (inflatable mattress, sleeping bag, pillow), food and water, a folding table, recliner chair, and most importantly for me, a good pair of binoculars.

From my front door to the Antennas site is exactly 100 miles. The trip takes about an hour and a half. Not bad at all. It

feels so good to get out of the city so of course I was feeling great until a thick layer of clouds to the west over California came into view at about the halfway point of the drive. It was definitely concerning but knowing the weather around here, it was possible that the clouds would either pass us by, dissipate, or curve back around the way they came. I'm not sure which of those things happened but the sky did clear up about an hour after dark leaving a beautiful clear star filled evening

There were too many great memories of the night to pick just one favorite so I'll list a few.

Viewing Messier open clusters in the telescope and then finding the same star field in the binoculars was great fun and educational. M41 in Canis Major and M37 In Auriga were most remarkable

Then came the galaxies. Seeing Markarian's Chain was humbling. There are so many galaxies packed into the space between Leo and Virgo. At one point I

could see six galaxies in the same field of view. That big group of visible galaxies was something I'd heard about but hadn't experienced until last night.

Toward the end of the evening, M3, the breathtaking globular cluster in Canes Venatici was high in the sky. Finally, just before going to bed, I had an incredibly clear and detailed view of Jupiter's Great Red Spot. It was quite a trip.



Are you preparing for the PAS Halloween Party / Costume Contest at Mike's house this year? Photo is Mike & Ofelia at the Halloween Party of 2013, taken by Terri Finch.

Richard "Rik" Hill to Speak at October Meeting

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the RV-6 to a high school girl who was the only one in the whole Detroit area (then 2 million people) that answered the ad. I was surprised to find she lived in my neighborhood and went to school with my sisters. I bought a smaller telescope for myself. The young girl and her friend called on me to help them start an astronomy club at their school, the same high school I attended. Eventually the engagement was broken off and a year and a half later I married the girl that bought my old 'scope. That was 35 years ago. We're still married and I am committed to a lifetime maintenance contract on the RV-6!

I joined the ALPO and AAVSO in 1975 and have been active, to some degree, in both organizations since. That same year my wife and I founded (along with another

person) The Sunset Astronomical Society in Midland, Michigan. It is still going strong today.

In 1979, I was hired by Warner & Swasey Obs. (Case Western Reserve Univ.) to operate their Burrell Schmidt telescope being moved from Cleveland, Ohio to Kitt Peak. I worked there for 12 years until the grant was terminated. Two years after moving to Tucson, my wife landed a position at Lunar & Planetary Lab. (Univ. of Arizona) as a meteoriticist: a life-long dream come true. During that time Walter Haas (Director and founder of the ALPO) asked me to found the Solar Section, which I did. (See history of ALPOSS on the Solar Section main page of the ALPO website.)

In 1992, when Warner & Swasey's

National Science Foundation grant failed to get renewed, I began work with the Planetary Atmospheres and Planetary Occultations groups at the Lunar & Planetary Lab of University of Arizona. That job lost its funding in Dec. 1999 at which time (20 min. after losing that job) I was picked up by Steve Larson for work with the Catalina Sky Survey (CSS), a near Earth asteroid search project, where I am still working today.

With CSS I have been enjoying some of my greatest observing challenges, but the rewards are high. So far I've found many asteroids that have passed closer than the moon, 23 comets and named a bunch of asteroids. The future looks good with new projects being planned and I look forward to finishing my career with CSS.

2016 Year in Space Calendar orders

By Terri, Event Coordinator

Take a look at these great calendars - I love both of the styles. Last year, I ordered the large wall calendar and it is amazing. Previous years, I had the desk calendar. Both are great for keeping track of your upcoming events and life and are full of information about astronomy and just great photos to enjoy. If you plan on ordering a Year in Space Calendar this year, put your order in with Terri. Be sure to let me know which style calendar you would like. I will be collecting the monies for the 2016 calendars at the October and November PAS meetings and will put the order in shortly

after that, so that we can receive our calendars by the December PAS meeting and the holidays. Here's the link to have a preview of what's in the 2016 calendars: <http://yearinspace.com/>. 1 copy of the calendar is \$14. 2-9 copies are \$13 and 10+ copies are \$12 each. My goal is to get 10+ calendars ordered as a group so that we can save some money on the order. We could get them for \$11 if we can get 36+ copies ordered, but we haven't been able to reach that goal at all in past years. So, if you want one or more, in cash, bring me \$14/calendar. If we get 10 copies ordered, I

will refund you \$1. See me at the October and November PAS meetings to order your calendars and be sure to check out the web page to see how wonderful these calendars are. Thanks for your order.

If you haven't picked up your calendar from last year, please drop me an email and let me know what to do with it or let me know if you are picking it up at a meeting (by the day before the meeting via email or phone text) so I can bring it with me to give to you. Thanks.

Astronomy Day 2015 activities at the Arizona Science Center

By Howard Moneta

On April 25th, 2015 I attended the Astronomy Day activities at the Arizona Science Center. There was a lot to see and do. Outside the building, the East Valley Astronomy club had solar telescopes set up to look at the Sun in both hydrogen alpha and filtered visible light. There was a beautiful solar prominence visible on the Sun and multiple sunspots could be seen in the visible spectrum. Inside the building there were booths with information and exhibits presented by the ASU School of Earth and Space Exploration.

At 1:30pm I had the privilege of listen-

ing to a lecture by Dr. Jeff Hester in the planetarium on the 25th anniversary of the Hubble Space Telescope which was launched 25 years ago yesterday. Dr. Hester was a member of the science team responsible for the Wide Field and Planetary Camera 2 on the Hubble. "The Pillars of Creation" in the Eagle Nebula is just one of Dr. Hester's amazing photographs. He told us about the history of Hubble and the challenges that they faced in getting it into space and then fixing some major design issues that initially made it unusable. Thankfully the problems were resolved and

the resulting images have given us an unparalleled look into the Universe. Seeing the most iconic Hubble images projected onto the 60 foot across planetarium ceiling was breathtaking and a truly memorable learning experience.

The 3:30pm lecture by Lowell Observatory astronomer and New Horizons team member Dr. Will Grundy, covered our initial exploration of the Pluto system in 2015. Our understanding of Kuiper Belt Objects continues to grow as the New Horizons mission gets closer to its Pluto flyby in July 2015.

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PAS Meeting Sept 3

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like great fun - and the best part is that they are designed for families.

Alex Venios took over again, and did a great presentation called "Beyond Hubble" which lasted about 20 minutes. Thanks, Alex. At that time we dismissed non PAS members and opened a Meeting of the Minds. The topics covered at this MoM's were:

"The Martian" movie of Oct 3 and PAS going as a group.

A dark sky outing around the 12th of September, mentioned by Howard

A gift presented by Kevin to Sam for winning the "Where's Alex" contest using the Reflector Magazine. Sam won a NASA tote bag which he in turn donated to the raffle, which was won by Bruce Wurst.

I'd like to thank Sam and Bruce for providing snacks and water at this meeting along with everyone else who brought something to share.

I'd also like to thank Kevin for doing a great job with the meeting agenda. With the help of President Sam and Event Manager Terri, we should have an agenda available at each general meeting and Meeting of the Minds. Pencils will be at the back of the room for you to borrow and take notes with if you want. Please return the pencils when you are done for the night so we can provide the at the next meeting.



Sam Insana accepts his new PAS Position Badge as PAS President from Past President Bruce Wurst at Sept 3 PAS Meeting. Photo by Terri Finch.



Sam wins the "Where's Alex" contest hosted by Kevin, and is given the NASA bag seen here, as a prize. He then donates it back to the club for this evening's raffle. Bruce wins the bag in the raffle. Photo by Terri.

Thanks to Bill Powell, Kathleen Hartnett, Nicole, Rick Lemler, Jerry Searcey and all the members who attended this meeting. We had a super turnout this



Bruce Wurst accepts his new PAS Position Badge as PAS Past President from Sam Insana at the PAS Meeting of Sept 3. Photo by Terri.



Kevin Witts accepts his new PAS Position Badge as PAS Secretary at the PAS Meeting of Sept 3. Photo by Terri.

month. Looking forward to the October Meeting with a terrific returning guest speaker!

Many thanks to Bruce Wurst

By Terri, Event Manager

As the 2015/2016 year at PAS begins, we have a new slate of officers, an exciting change. Bruce was PAS's President for 4 years. He helped with many events and attended all that his schedule would allow him to. He also found many fine guest speakers for the club meetings. I wish to thank him for his support and also for his

offer to continue this year during his Past President term of office. Each President of PAS takes over for a 2 year term, and then when they have completed it, they are given the title of Past PAS President in order to help facilitate the transition for the new President. During 2015/2016 Past President Bruce has offered to continue to provide a

case of bottled water to every PAS meeting and PAS Meeting of the Minds. This is a generous offer. He may also provide some of the snacks seen at these events. Thank you so much, Bruce, for your continued support of PAS. We hope to see a lot of you this year!!!

Congrats to PAS's First Lifetime Member

By Terri, Event Manager

Congratulations to Alex and Diane Vrenios. Alex renewed his PAS Membership for not one year, but as a Lifetime Member! We will have many fun times

with Alex in the years to come.

How do you join PAS as a Lifetime Member? It's really easy - you just select it

on the membership form and based on your age, pay the amount listed. Then voila! You're a lifetime member with PAS.

Way Out There - Moons Behaving Badly, Part 2

By Kevin Witts, PAS Secretary

In the September Issue of PAS-times (page 7), we looked at some moons that have very unusual features or behave in ways that most moons don't. In a Solar System that features hundreds of moons, there are bound to be more strange behaviors exhibited from these orbiting bodies. Here is another bunch of Moons Behaving Badly.

Ganymede is one big sucker. Of course, it orbits our biggest planet, Jupiter and it's the biggest moon in our solar system. Ganymede is 8% bigger than the planet Mercury! In fact, if it wasn't captured in Jupiter's powerful gravimetric field, it would likely be considered a planet. It's almost as big as Mars. And, it moves fast, completing an orbit of immense Jupiter in only 7 days (remember that our Moon takes a little over 28 days to complete an orbit around a planet that is 11 times smaller than Jupiter). Ganymede is the 9th largest object in the Solar System and the biggest object without any substantial atmosphere. It has an internal ocean under its surface that may contain more water than all of Earth's oceans combined. It's also so big that it qualifies as the only Moon we know of that has its own magnetic field, often exhibiting auroras around its north and south poles. Ganymede is indeed the big Kahuna of our solar system's moons.

Last time, we discussed Io and the very active volcanic life on that moon. Another moon that exhibits a lot of volcanic activity is Neptune's largest satellite, **Triton**. However, if you visit Triton, don't plan on seeing any burning hot lava flowing across its surface, because Triton has ICE VOLCANOES. That's right...instead of spewing molten rock and iron, Triton's volcanoes spit out a mixture of liquid water, nitrogen and ammonia, which freezes instantly once it hits the surface of the planet, resulting in massive icy non-lava fields. And, if spouting ice volcanoes isn't enough, Triton also holds the distinction of being the ONLY large-scale moon in the solar system that orbits in retrograde to its parent planet. While Neptune spins clockwise on its northern pole, Triton orbits it in a counter-

clockwise motion, and in a near perfect circle, rather than in an ellipse. Because of this strange orbital pattern, it is believed that Triton is actually a captured object. Perhaps it was once a dwarf planet from the Kuiper Belt that got caught in Neptune's strong gravitational pull.

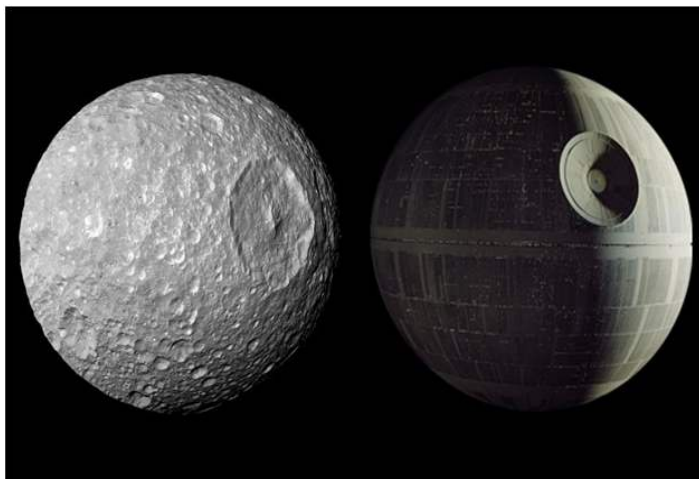
Miranda is UGLY! Like all of Uranus' moons, Miranda is named after a character from the works of William Shakespeare. But unlike the innocent child from the "Tempest", Miranda the moon is craggy and gorgy and rocky and gashed. In fact, Miranda may just be the ugliest moon in the solar system. The surface is covered with cliffs and canyons, some of which 12 times deeper than Earth's Grand Canyon. The moon also features some incredible mountains. In fact, if one were to drop a stone off of Verona Rupes, the highest cliff on Miranda, it would take almost 10 minutes for the stone to hit the ground. Truly, the surface is a jigsaw puzzle of curious features. In many places, it appears that the moon has split apart and then randomly joined back together with some kind of "cosmic epoxy".

Next, it would seem that **Epimetheus** and **Janus** had a horrible break-up. Sometime in the distant past while circling Saturn, a single moon split apart, creating these two separate moons that orbit that planet today. Epimetheus and Janus occupy the exact same orbit, travelling together so closely that scientists originally believed them to be a single object. It wasn't until 1978 that astronomers determined that there were two distinct bodies. This belief was confirmed during Voyager 2's flyby of the ringed planet. The two moons travel only 50 km apart in radius from Saturn, although the two maintain a distance from each other of 40,000 km. Every 4 years or so, the moon in the lead will slow sufficiently that the trailing moon will catch it and the two come within a 10,000 kilometers of colliding! The moons then trade

orbits and the cycle begins again.

Then there's the little sad orphan moon of the solar system, **Dactyl**. As large as Ganymede is, Dactyl is that small. The teeny moon measures only 4600 ft. in diameter, making it only about a mile across. And little Dactyl wasn't able to find any parent planet to take it in, Dactyl is the only moon in our solar system that orbits an asteroid! Yep, out there in the asteroid belt between Mars and Jupiter sits the asteroid Ida, and her little companion moon Dactyl. Discovered by the Galileo spacecraft in 1993, Ida and Dactyl are the only known joined pair of asteroid and satellite. Dactyl features huge craters, which indicate a very violent past.

And finally, the moon that's the favorite of Star Wars fans everywhere...meet **Mimas**. Discovered by William Herschel in 1789, Mimas has roughly the same land area as Spain. It's composed mostly of water ice and rock and features craters over most of its surface. Mimas is primarily responsible for creating the Cassini Division in Saturn's ring system. However, Mimas' greatest feature is the enormous 130 km impact crater on its northern hemisphere. It's here that almost 2 million troops of the Galactic Empire, along with 400,000 droids and a superlaser capable of decimating a planet, call home. Don't believe it? Then, have a look at Mimas...



Incidentally, the first Star Wars movie was created 3 years before photos of Mimas were resolved well enough to see its surface

Meeting of the Minds Sept 10

By Terri, Event Manager

Meeting of the Minds (MOM's) is the name we give to our business meeting. Generally, the MOM's is just set up to discuss society business, but at this meeting we decided to be open to the public for some mini presentations done by PAS Members, leaving time at the end for the business portion.

The meeting began at 7pm with Sam Insana, our new President, introducing the rest of the new PAS officers. Kevin Witts then did a 50 minute presentation called "Visiting the Rocket Garden." This was fantastic - a photo is in this issue so you can see Kevin's wonderful collection/display of rockets used as his examples during the talk. Many thanks to Kevin. I'd like to see a repeat of this presentation at a future MOM's for those who had to miss it this time.

After Kevin, Sam Insana did a short presentation called "Amateur Astronomy Research Projects." Sam took about 20 minutes to go over these items and had a very nice power point presentation to go along with it. He talked about the Citizen Science Projects listed in Sky & Telescope (Aug 20, 2012 edition), amateur research organizations and the Astronomical League Observing Program. Many attendees expressed interest in participating in these programs.

After a short break we convened the Meeting of the Minds portion of the evening.

Sam gave Eric Steinberg, the new



Kevin Witts. Photo by Don.



Eric Steinberg accepting his PAS Position Badge as the new Secretary of PAS from Presidnet Sam at the PAS Meeting of the Minds of Sept 10. Photo by Don.



Kevin put together this awesome Rocket Display for his presentation "Visiting the Rocket Garden." Those who attended the Sept 10 Meeting of the Minds, enjoyed this wonderful presentation. Photo by Terri Finch.

Treasurer of PAS, his PAS position badge. Eric did a short acceptance speech and told us how he is computerizing the club's records. He also talked about the PASTimes Star Tours Team and how they will be compensated via QuickPay or Bill Pay through the PAS Chase account.

Kevin Witts spoke next about the press releases for the Black Mountain Campus star party on Sept 17 and the Lunar Eclipse Party for Sept 27.

To close out the meeting, we had a discussion about the newsletter. We discussed that the reviews of events should be made shorter and that everyone can and should be encouraged to write reviews. The newsletter team would like to maintain everyone's articles, but maybe do combo review articles with everyone's input, rather than individual reviews.

Many thanks to Past President Bruce for the bottled water, to everyone who donated to the snack fund and to Sam for the other snacks that were provided. The next several Meetings of the Minds will be: October 29, 2015 for a private, Star Tours members-only meeting (Room TBA), January 28, 2016 for a PAS members-only meeting (Room TBA), February 25, 2016 for a public mini presentation meeting (like this one) in LS-205, and Mar 24, 2016 for a meeting to be determined as public or private. We hope to have everyone attend, where appropriate.

Scope for sale

For Sale: Meade LX200 8" SCT with original instruction book, diagonal prism & 7 super plossl eyepieces, super wide angle: 40mm, 32mm, 26mm, 12mm, 4mm, 6.4mm & 15mm with the best tripod available, super heavy and scope is in original boxes.. Asking \$1300 OBO Contact Roger at Schollra@aol.com or 480 991 0133.

Scope for Sale:

Celestron C-6 R, f/8, 6" refractor. Includes: dewcap, 20 mm Plossl, 2X Barlow, 9X50 finder, Celestron advanced GT tripod/mount, NexStar computer controller, accessory tray, AC line cord, cigarette lighter cord, collimating eyepiece, Allen wrench set, 2 counterweights, and a couple miscellaneous items. Very nice condition. Only used a few times. The optics are wonderful and the mount is pretty steady. Available for you viewing/testing at BMC star parties....or by appointment! All yours for \$550. Bob Ewing 503 349 8734 rrewing9@gmail.com (I'm in Arizona, not Oregon).

Sell Your Astronomical Equipment

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 Newsletter. 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.

Astro Tech - Observing Meteors by VHF Radio Signal Reflections

By Alex Vrenios

A meteor can be quite a sight, especially if it's a really bright one, and spending a night with friends at a dark sight counting the meteors you see during a "shower" can be fun. Some organizations, the International Meteor Organization for one, take observational counts seriously, collecting data from thousands of observers worldwide, and entering them into an online database to be studied by professionals.

Wouldn't it be nice to have a more complete meteor count, including day as well as nighttime totals, and without regard for cloud cover? You may ask "How can we observe meteors during the daytime?" Well, that's exactly what this article is about. First, let's take a look at an important part of the radio spectrum.

VHF, for Very High Frequency, lies between 30 and 300 MHz. Near the low end of this band is where TV channels 2 through 6 are assigned. The broadcast FM radio band follows, and TV channels 7 through 13 come after that. Government and ham radio bands fill in the rest of the VHF spectrum. Below VHF is HF, for High Frequency. Above VHF is UHF, for Ultra High Frequency.

The VHF band is of most interest here because of its special properties. By nature it's line-of-sight, which is perfect for local communications like broadcast TV or FM radio, where reception is limited by design to a particular metropolitan area. VHF signals do not follow the Earth's curvature, but eventually pass right through the atmosphere and continue out into space.

Given the right conditions however, sometimes a VHF signal can reflect off the atmosphere just like an HF signal. One day back when I lived in the Chicago area, I was flipping around the TV channels and happened upon a TV weather report for La Fayette on channel 3, not assigned in Chi-

cago. Assuming it was from Indiana I watched for a while. It wasn't too long before I realized this weather report was being broadcast from La Fayette, Louisiana, almost a thousand miles away! This was at a time when the solar cycle was at its peak, causing ionizing radiation that was strong enough to excite our ionosphere to a level that reflects radio frequency signals in the VHF range. It's a rare event, but it happens.

When the physics behind these events became known, the meteor counters of the world asked, "Wouldn't the ionization trail left behind by a meteor reflect VHF radio signals too?" Answer: "Of course they would" replied the experts, so they devised a plan by which anyone can gather meteor counts, day or night, cloudy or not, by a technique called radio meteor scatter.

When a meteoroid enters the Earth's atmosphere it becomes a meteor, by definition. And it gets really hot, sometimes hot enough to be seen in daylight, and usually hot enough to ionize the air through which it travels. It leaves an ionized "trail" behind it, for a short while anyway. The level of ionization can be enough to reflect a distant FM broadcast signal for as long as the ionization trail lasts.

Assuming the special conditions described above are not in effect, check broadcast listings for FM stations in cities that are too far away to heard directly. (But be sure that that same frequency isn't assigned to a local station!) Tune an FM receiver to that frequency and you may hear a syllable or more of that station's broadcast each time a meteor passes through the atmosphere. Enthusiasts often build an antenna for that particular frequency and point it at a place in the sky where the reflections are most likely to occur.

A powerful enough FM transmitter's

reflection might be heard even without special hardware. NOAA Weather Radio broadcasts a recorded "loop" of current weather forecast information. To avoid overlapping reception, NOAA has several frequencies allocated to them and assigns one of them to each metropolitan area so as not to cause interference.

I happened to notice that the weather service's choice of frequency for both Tucson (Mt. Lemmon) and Flagstaff (Mt. Elden) are the same, at 162.400 MHz. And both of these transmitters are at about the same distance of almost 200 miles, which is too far away from my house to be heard directly. That means, there are twice as many meteors that may cause a reflected signal to be heard on 162.400 MHz in Phoenix. I tuned my weather radio to that frequency, turned the squelch up to reject the background noise, and waited.

Pretty soon there was a pop, and later, another. Then, for just a second or two, I heard a garbled voice! I was doing all this toward the Astronomical League's new Radio Astronomy Observing Program awards. I split my receiver's audio output from the remote speaker jack to an actual speaker, and also to a data acquisition unit that was being monitored by oscilloscope software on an older PC. I sat at my iMac, catching up with my email correspondence, surfing the Web and following whatever caught my interest. Whenever I heard a pop, I turned around and captured the oscilloscope screen's image. Ten of these events, time and date stamped, along with my earlier acquired solar radio data, served as documentation for the Astronomical League's silver level radio astronomy observing program award. The Gold level requirements are a bit more complex, but that's a topic for another article.

Planetarium Shows at the Star Barn

By Sam Insana

June 21st, the Summer Solstice, Mike, Joe and I attended Ron's Planetarium show in Cave Creek. About 30 people were there and it was quite comfortable inside. The air conditioner was working well and there were plenty of seats. Ron discussed the Summer Solstice and showed the route of the sun on the planetarium dome. He then

showed the night sky and the upcoming conjunction of Venus and Jupiter. We then were shown the 1956 Bell Labs movie "Mr. Sun", starring Eddie Albert, Lionel Barrymore and others. It was a lot of fun and brought back memories of science class when I was in elementary and middle school. I have attended 2 other planetarium

shows at Ron's place over the last year - Ron has a sense of humor and is a delightful host. Shows are free, although he has a donation jar and some books and other items for purchase. I would recommended his shows to PAS members and their family and friends.

CTCA June 24

By Terri, Event Coordinator

Amanda "Storm" Sallas and Terri Finch headed over to CTCA, met by Don Boyd around 5:30. We made our way to dinner at the CTCA cafeteria, during which Kevin Witts and Mike Marron also arrived. I was looking forward to rotisserie chicken, but they didn't have any this time - nevertheless, we had a great conversation and good dinner with friends.

After eating, we headed for the roof, leaving Mike behind in the cafeteria showing his meteorites to a family that was there.

Kevin got set up first and found Venus while Don and I worked on our own set up; we both put our scopes on the Moon to start, as the sky was still too bright to align on the North Star. While Don and I set up, Storm went back downstairs to give out handouts and invite people to come upstairs to look at Jupiter, Venus, Saturn and the Moon.

Also during that time, Storm and I took some photos of the rooftop without any CTCA people there to show the setup for future events.

The night was cloudy and breezy - we tried to view the ISS fly over at 8:07pm, but too many clouds were in the direction of the fly over. By that time, Don and I were set up. I took the Moon for a long time and let Kevin go between Venus, Jupiter and Saturn. The clouds finally cleared around 9pm, but the wind continued throughout the evening.

I estimate about 15 people were on the roof, from CTCA. Among them, Julia wanted a photo of the Moon to send to her friend, so Kevin took a few of the Moon with his cell phone while Don offered his scope to let Julia try to photograph through it. John also was there taking photos through of the Moon through my scope and Don's. Eventually, Julia and John, who stayed with us most of the event, got some nice shots of the Moon through my scope, either on my phone or hers. Kevin also took a photo of Saturn for her. Near the end of the event, we tried a few other objects including the Ring Nebula, but viewing was not very good.

The event was scheduled from 9-11pm, but around 10pm, Kevin decided to pack up. Don was OK with this because we had started at 8pm. Only Julia and another gentleman were present when Kevin left; Don and I stayed set up for them until they said good night about 10:15. Once they left, Don and I called it a night. As luck would have it, the strong winds that had plagued us all evening disappeared just as we packed up!

I wish to thank Storm for being our scope runner. We had great attendance, mostly due to Storm's repeated trips downstairs to invite people up. I'm thinking a scope runner for this event would be a good idea in the future. The gentleman I mentioned, a patient at CTCA whose name I didn't catch, was very helpful at the end of the event. He helped Storm and I load the equipment on the luggage carts and he even ran downstairs 2 times to fetch the carts for us. He also had his cell phone on KSLX for a while, so we could enjoy some music



Don & Kevin setting up their telescopes on the 5th story roof of CTCA for the Star Party. It was a blustery day/night. Photo by Terri.



Terri setting up her scope at CTCA. It sure was windy and her hair shows that. Photo by Storm.

while packing up.

This night had a great telescope team. We all worked together to make it happen. Thank you Don, Mike, Kevin and Storm for attending this event! And thanks to CTCA for hosting us.

Astronomy Day 2015 activities at the Arizona Science Center

From page 4

New Horizons set some records: Nine hours to lunar distance, thirteen months to pass Jupiter and taking the highest resolution photos of Io ever. The Sun lit side of Io was too bright due to the cameras being calibrated for Pluto but the Jupiter shine side of Io was clear with visible volcanic activity and plumes shooting into space. New Horizon survived its nearly ten year

trip due to redundant systems, hardly any moving parts and hibernation with annual checkups.

New photos of Pluto just came in and will be released in a few days. What will we see when we get to Pluto? We don't know yet but Neptune's moon Triton is a template for what we expect Pluto to look like because it is of similar size and temperature.

There will be good images of the moon Nix due to its orbital location but the moon Hydra will be far away due to the pass-by timing.

New Horizons will survive for a couple of decades beyond its pass of Pluto, possibly engaging a few more targets beyond Pluto if they can get the funding from NASA.

Tropper Star Party May 16

By Terri, Event Coordinator

Terri writes: It was a fine day in N. Scottsdale where Scott Tropper invited the PAS Telescope Team to do a star party at his home. He had a band and a chef at this event who provided interesting and tasty food. The band was good too, though I appreciate that Scott kept them indoors. The noise level was minimal outdoors and we could talk about the objects we were showing without having compete with the music. It made the event more enjoyable for everyone involved.

I'd estimate that there were about 60 people in attendance of all ages, from infants to "young at heart." The sky stayed clear up until about 9pm, when it was correctly predicted the clouds would take over. By 9:30pm or so, we started losing the sky.

Attending this event were William Finch with his 10" Dob, Don Boyd with his 8" scope and solar filter, Howard Moneta

had his 14" Dob, Bruce Wurst with his 20" Dob, and Roger Anzini with his 16" Dob. Helping me out also, using Bruce's 12" GPS scope was Amanda "Storm" Sallas, and Mike Marron of course had his Meteorites. It was a nice collection of scopes arrayed around Scott's circular driveway.

Set up started at 5pm and was completed promptly so we could close the gate and prevent cars from coming up the driveway towards the scopes. We did Solar viewing until about 7pm and then stopped briefly to eat; from about 7:20 to 11pm we did evening viewing. Highlights were Venus, [Orion Nebula], Jupiter, Saturn and [Mars]. The Ring Nebula was also visible, along with a few other objects including M13 which Bruce had set up the 12" GPS on for the whole night. I was really busy with Q&A and kids who kept asking me to ask them questions so they could win prizes. I really didn't get a break with them, but Storm

helped me with the Q&A and became a scope runner, which is where we got the idea to hire scope runners for future events, such as the Luminaria at DBG. Storm did an impressive job running between scopes, fetching water, snacks, etc for everyone - it was a blessing having her at this event.

The whole night was super busy and great fun for all. I'm so glad Scott invited us to do this event and look forward to the next event he wants to host at his home in North Scottsdale. Thank you Scott! I hope your son, Blake enjoyed it too, as he was one of the kids wanting to win the prizes from me!

Don writes: My setup ended up behind a large tree which blocked my view of Polaris so I could not get a good polar alignment. It was far enough off that my gotos were not very good. I was only able to see Venus and then the Beehive Cluster.

Bookmans Telescope Workshop June 28

By Terri, Event Coordinator

It was a fine, hot, muggy summer day at Bookmans Telescope Workshop. We had a great turnout, though even more folks who RSVP'd never made it. The Telescope Team consisted of: Howard Moneta, William and Terri Finch, Storm Sallas, Don Boyd, Rodney Fong, Alex Vrenios and Eric Steinberg. Many thanks to my telescope team for coming to the rescue since we had an initial 10 RSVP's for the day.

From the public, we had: Kathleen Hartnett who came to find out what telescope to purchase. She sat with William

and me along with a walk-in named Diana Gruber. I wish to welcome both of them, as new Members to PAS!!! We had James Robertson who brought his Celestron Nexstar 6SE, Nikul Suthar who brought his Celestron Nexstar SLT base with an OTA 5" SCT on it and James Bloom who brought his Orion Observer 60AZ. The telescope teachers assisted where they could and it went smoothly. About 4:45, everyone had left and the group decided where to go to dinner.

Attending dinner were the team above

with the exception of Alex who went home to eat. Ora Kurland joined us at Thai Lotus which is at 19th Ave just north of Glendale. We had a great dinner and then saw out the window that there was a storm brewing, so we all left to go home. The storm didn't hit right away, but came about an hour later with winds blowing tremendously and the rain whipping around. It then stopped and just dripped rain for another hour. It was a nice end to a wonderful day / event. We look forward to the next Telescope Workshop at Bookmans on July 26th. See you there!

Bookmans Telescope Workshop July 26

By Terri, Event Manager

A hot summer afternoon... what could be better for an indoor Telescope Workshop? We met at Bookmans where we had some great RSVP's attend the event. From PAS, we had William and Terri Finch, Storm Sallas, Sam Insana, Don Boyd, Rodney Fong, Dewell Howell, Kevin Witts, Mike Marron and Joe Acquavella. From the public, the attending RSVP's were: Laura Gieselman and her 2 daughters, Sundee Thotey and Madlar Reddy. They all came to find out what telescope to purchase. Sundee (who goes by "Sunny") also wanted to know about astrophotography. We had walk-ins Victor Szeto and Kate who have a 4" telescope and wanted

to know how to work it, though they didn't bring it. We opened the class with William and I talking about telescopes, after which I turned it over to Kevin who had made a great handout describing the differences between the various type of scopes. He took about 15 minutes to talk about what he had on the page and did a fantastic job! We then had Rodney talk about his experience and what he recommends to do when looking to purchase a new telescope: research it, attend our star parties and ask questions to discover the type of scope that best fits your needs for viewing the night sky. Next we had Sam talk about binoculars and he gave some great advice. As we closed up the

class portion of the event, another walk in (David) stopped by who has a 12" reflector and wants repairs; I referred him to President Bruce Wurst.

Mike also stole the show when he took out his meteorites near the end of our class. Sunny and Madlar enjoyed learning about meteorites, assisted by Joe.

After the workshop we decided to go to dinner at Thai Lotus, which is a place we went to recently and liked. At dinner were William, Terri, Amanda, Alex, Sam, Kevin, Don, Rodney, Dewell and Wendy (Dewell's wife), Mike, and Joe; we talked about some upcoming events and planned for them.

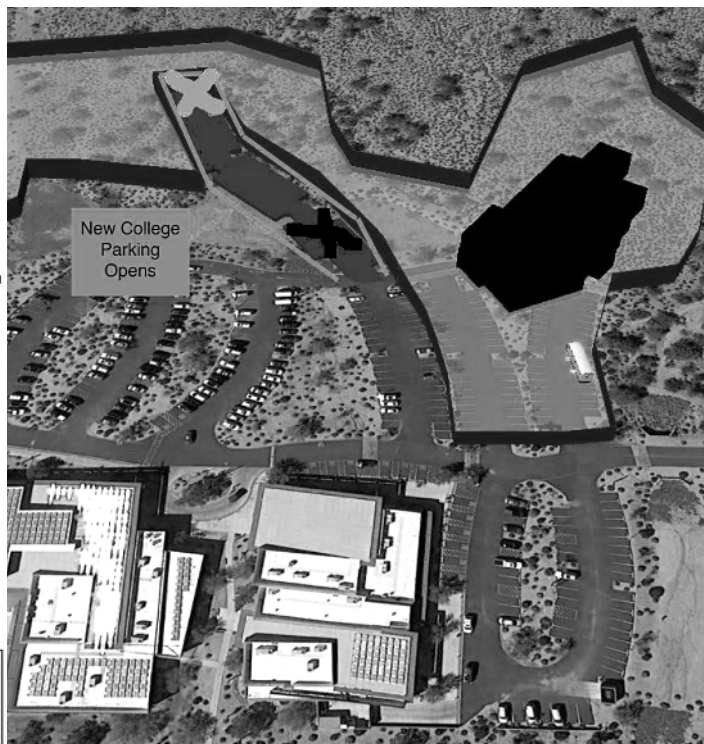
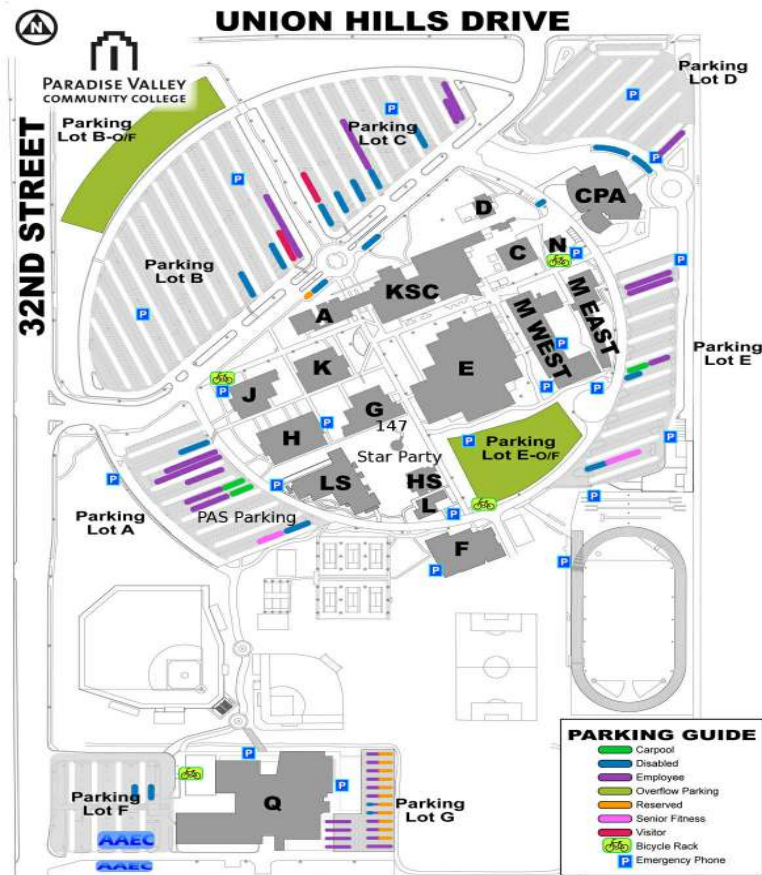
Map of PVCC Main Location

18401 N. 32nd Street | Phoenix, AZ 85032

Black Mountain Campus of PVCC

60th Street and Carefree Hwy

34250 North 60th Street, Scottsdale, AZ 85266



The white X is Scope set up. The dark X is PAS Parking.

October 2015

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1 PAS Meeting Rm LS-204	2	3
4	5	6	7	8 ASU West Public Star Party	9 5am Planet Line-up and School (Private) Star Party	10
11 Uranus at Opposition	12	13	14	15 BMC Public Star Party	16	17 Private Star Party in Scottsdale
18 Free Telescope Workshop	19	20	21 Orionids Meteor Shower Peak	22 Free Telescope Workshop	23	24 Halloween Party (Pri- vate)
25	26 Conjunction of Ve- nus and Jupiter	27	28 Conjunction of Ve- nus, Mars, and Jupi- ter	29 Private Star Tours Only Meeting	30 Solar Viewing Event in Black Canyon City	31 Solar Viewing Event in Black Canyon City

Don Boyd
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To:

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>

Nov 5 (Wednesday): Dennis Young: "Astro-Imaging in Arizona" plus
"Building/Designing New Telescopes"

Dec 2 (Wednesday): Astronomy Equipment Swap Meet: Bob Ewing "The
Cosmological Distance Scale"

Jan 14: Alex Vrenios: "Radio Astronomy"

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What's Up For October?

By Rod Sutter, PAS Past President

Planets

Name	Date	Rise	Set
Mercury	10-15-15	05:08	17:11
Venus	10-15-15	02:59	15:36
Mars	10-15-15	03:28	16:14
Jupiter	10-15-15	03:33	16:15
Saturn	10-15-15	09:44	20:04
Uranus	10-15-15	17:40	06:22
Neptune	10-15-15	15:51	03:08
Pluto	10-15-15	12:44	20:51

All Times Arizona Time

October 15 2015

Sunrise: 06:32

Sunset: 17:54

Q3: October 4



New: October 12



Q1: October 20



Full: October 7



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