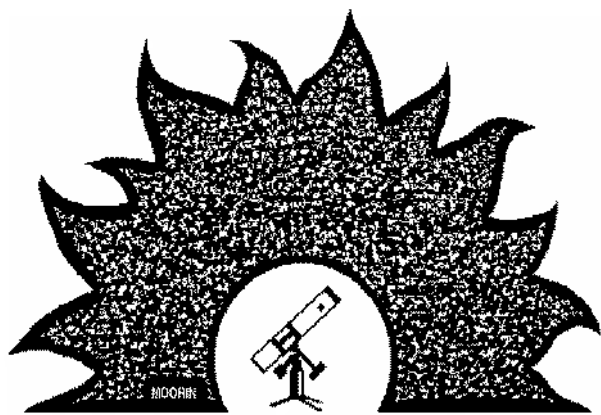




PAStimes

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David Williams to Speak at Nov 3 PAS Meeting

Asteroids, Ion Propulsion, and NASA's Dawn Mission to Vesta and Ceres

By Terri, Event Manager

We have a fantastic return visit one of our favorite Guest Speakers and a Friend to PAS, Dr. David Williams. David has provided the below details about his upcoming presentation to PAS and about himself.

David writes: "Asteroids are the rocky remnants left over from the formation of the Solar System, and have become increasingly of interest because of what they can tell us about the origins of the Solar System, and because they are easy to visit with low-cost spacecraft because of their lower gravities. Previously Dr. Williams spoke to PAS about the results from NASA's Dawn mission at asteroid (4) Vesta — since March 2015 Dawn has been

orbiting the dwarf planet (1) Ceres, the most massive object in the Main Belt. What has it found? Join us on Nov 3 when Dr. Williams will tell us about the interesting results that Dawn has discovered in its exploration of Ceres.

Dr. David A. Williams is an Associate Research Professor in the School of Earth and Space Exploration at Arizona State University, Tempe, Arizona. Dr. Williams is the Director of the Ronald Greeley Center for Planetary Studies, the NASA Regional Planetary Information Facility at ASU. He is also the Director of the NASA Planetary Aeolian Laboratory, which administers wind tunnels at ASU and the

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Dr. David Williams

PAS Meeting Sept 30

By President Sam Insana

The October General Meeting of PAS took place Sept 30th to accommodate our speaker, Dr. Rogier Windhorst. He is Dutch, and graduated from Leiden University with a PhD in astronomy and physics. He now teaches at ASU and presides over the School of Earth and Space Exploration. He gave a presentation about the James Webb Space Telescope that will be launched in 2 years. NASA started out the mission, but later on the European Space Agency and the Canadian Space Agency joined onto the project. Dr. Windhorst is one of 6 scientists heading up the mission. His Powerpoint presentation really excited the crowd. There were many good questions, and he ended up speaking for almost

2 hours. His good sense of humor made for a delightful evening. The JWST will reside at L2, about 1 million miles from Earth. It should be able to see, in the infrared, back to the first light after the Big Bang. It also should be able to see planets around other stars. Vera and Sam brought Dutch snacks in honor of our speaker. We had Dutch chocolates, cheeses, cookies, crackers, cakes, breads, spreads, candies, and cocoa to drink. Dr. Windhorst was very thrilled about it, and had several platefuls and even took some home with him.

We had about 40 people in attendance, over 10 of which were first time meeting attendees. There were announcements near

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Dr. Rogier Windhorst was at the Sept 30 PAS Meeting. Photo by Don.

Phoenix Astronomical Society Contact Info

President	Sam Insana	602-315-4750	President@pasaz.org
Vice President	Alex Vrenios	602 789-6556	VicePresident@pasaz.org
Secretary	Kevin Witts		Secretary@pasaz.org
Event Manager	Terri Finch	602-561-5398	Events@pasaz.org
Treasurer	Eric Steinberg		Treasurer@pasaz.org
Newsletter Editor	Don K. Boyd		Editor@pasaz.org
PAS Host	Rodney Fong		
Librarian	Rod Sutter		Librarian@pasaz.org
Member at Large	Jenny Weitz	602-787-6818	jennifer.weitz@paradisevalley.edu
Member at Large/Equipment Manager	Bruce Wurst	602-971-3555	PastPresident@pasaz.org
Webmaster	Chris Johnson		Webmaster@pasaz.org
Phoenix Astronomical Society	3039 W Peoria Ave	#102-188	Phoenix AZ 85029

November 2016 Upcoming PAS Events

By Terri Finch, Event Manager

Check out these and other events on the PAS Calendar: <http://www.pasaz.org/forums/calendar.php>

Nov 3: PAS Meeting at PVCC in Room LS 205. Come enjoy a wonderful presentation by Dr. David Williams. Bring a snack to share. Bottled water provided by PAS snack fund. Everyone welcome. Doors open 7pm. Meeting begins 7:30pm. Here's the link for more details about this event:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2004&day=2016-11-3&c=1>

Nov 3: Dinner before the Meeting 4:30-5pm. See bottom of page 16 for more details.

Nov 4, 5, 6: Rock A Rama in Black Canyon City. This event is free to everyone. PAS is providing safe views of the Sun at this event. Volunteers needed. Rock a Rama is from 9am to 5pm on all three days, and PAS will be sharing views of the Sun & showing Meteorites (not for sale) Friday 10am to 3pm to Saturday 10am to 3pm. <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=1988&day=2016-11-4&c=1>, Saturday 10am to 3pm <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=1991&day=2016-11-5&c=1>, and Sunday 10am to 2pm <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2184&day=2016-11-6>

Nov 10: Free Telescope Workshop at PVCC main campus, 32nd Street and Union Hills Rd - 7pm to 10pm. 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=2012&day=2016-11-10&c=1>

Nov 13: 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=2183&day=2016-11-20&c=1>

Nov 17: Huge public star party at PVCC Black Mountain Campus, 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=2087&day=2016-11-17&c=1>

Nov 25 & 26: PAS will be at the Desert Botanical Gardens Luminaria events. We have a different set up for this year. Up on Space Mountain, there could be 2 or 3

telescopes, and / or a presenter. Along the Plants & People Trail, we will also have a presenter and 1 or 2 telescopes each night of the Luminaria, which are: Nov 25, 26, Dec 2, 3, 4, 9, 10, 11, 16, 17, 18, 20, 21, 22, 23, 26, 27, 28, 29, 30, and 31. General admission will get you into DBG. There is no additional charge to look through our telescopes. We do ask that you do not touch the telescopes. Come enjoy a view through our high powered telescopes of the Great Orion Nebula (after mid December), Albe-rio & Gamma Andromeda Double Stars, the Moon (when available), the Andromeda Galaxy, Perseus Double Cluster, the Pleiades, possibly Venus and more. The weather and time of the year will dictate what objects will be available for viewing. Come enjoy an evening under the stars with PAS at DBG!

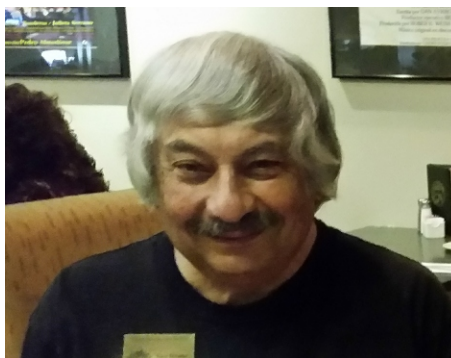
For Sale

Meade LX90 ACF 8" with tripod: \$850, Meade series 4000 1.25" Plossl eyepiece and filter set: \$80. Location for pick up & to see these items for sale is in Ah-watukee with nearest cross streets of S. 46th Pl and Ray road. The items are all being sold individually. - Contact Michael at mjohns21@cox.net

Like new! Questar 3.5" Standard telescope with Pyrex mirror, broadband and low reflection coatings. Model #10214. \$3,850.00 Contact seller at: cancourt77@gmail.com More details about this scope can be seen at this link: <https://www.dropbox.com/s/0d7s3c72vhk71st/Scope%20for%20Sale%20Questar%2010214.pdf?dl=0>

President's Corner

By Sam Insana, PAS President



PAS President Sam Insana. Photo by Terri

Enjoying a night of stargazing away from the city lights is primarily the numerous objects you see through telescopes or binoculars. However, do not forget to enjoy the beauty of the night and nature itself. Take time between target objects to sit in a lounge chair and gaze up at the night sky and see the thousands of stars. If you are in a very dark spot, outside the city lights, you can even see some galaxies, nebulae, globular clusters and an occasional shooting star

with the naked eye. Also listen to the sounds of nature such as owls, coyotes, frogs, toads, crickets, javelina, and other night animals. Take in deep breaths of clean, clear air, something hard to do in the big city. Smell the blossoms on wild flowers and cactus in the spring. Astronomy in the wide open outdoors can be more pleasurable than in an observatory dome setting if you take advantage of the beauties of nature.

2017 Year in Space Calendar

By Terri, Event Manager

So far, we have 6 calendars on order. I'd like to make it to 10 and save some money with the order. The November PAS meeting is a great place to meet up with me and get that calendar paid for. I collect the \$\$ first, then deliver. Nov 13 is the deadline to put in your order, so see me at the meeting or any other event before then to order

(and pay cash) for your calendar. I will put the order in shortly after the deadline so that we can receive our calendars by the December PAS meeting and in time for the holidays. Here's the link preview what's in the this years 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. I look forward to purchasing the calendar for you so you can enjoy this fantastic calendar through all of 2017!

From page 1

November PAS Meeting

Ames Research Center in California. David is currently performing research in volcanology and planetary geology, with a focus on planetary mapping, geochemical, and remote sensing studies. His research has included computer modeling of seismic wave propagation through planetary interiors, visible and near-infrared spectroscopy of the lunar surface, planetary geologic mapping of the satellites of Jupiter, the planet Mars, and the asteroid Vesta, computer modeling of the physical and geochemical evolution of lava flows in a

variety of planetary environments, and petrologic study of lava samples from Mount St Helens. He was involved with NASA's Magellan Mission to Venus and Galileo Mission to Jupiter. He is a Co-Investigator on the European Space Agency's Mars Express orbiter mission, and he is a Science Team Member on NASA's Dawn Mission to asteroid Vesta and dwarf planet Ceres. In 2014 David was elected a Fellow of the Geological Society of America, and asteroid 10,461 DAWILLIAMS was named in his honor."

Terri adds: At this PAS Meeting, We are in LS-205 at PVCC Main Campus. Doors open at 7pm for set up and at 7:30 the presentation will begin with a few short announcements and then we turn the floor over to David. Invite everyone you know to this meeting! Bring snacks to share and PAS will provide, from the PAS Snack Fund, a case of bottled water. Please donate to the Snack Fund for next month's meeting water. Hope to see you there!

From page 1

the end of the meeting about the upcoming Occultation Timing Project, the ASU space museum field trip, the Flagstaff Festival of Science, a donated telescope, and upcoming new PAS tee shirts and other apparel that club members can order. Alex, our Vice President, told everyone about the upcoming PAS events for October.

George Sabo writes: Outstanding meeting and an amazing speaker!!!!

Sept 30 PAS Meeting



At the meeting, Dutch snacks were provided for the attendees. Here we have Vera Stiesmeyer (Sam's wife) and Diane Vrenios (Alex's wife) setting up the snack table. Photo provided by Sam.



Dr. Windhorst was a fantastic guest speaker at the Sept 30 PAS Meeting. In this photo we have (L to R) Ron Walker, Mike Marron, Dr. Rogier Windhorst, President Sam Insana & PAS Newsletter Editor Don Boyd.

Photo provided by Sam.

Desert Botanical Gardens Luminaria 2015

By Terri, Event Manager

The 2015 DBG Luminaria event this year was very good. 14 PAS Members (who belong to the PAStimes Star Tours SIG) attended the 24 nights of this event. The attendees were: Don Boyd with his 8" scope, Sam Insana with his 8" scope, William Finch as a Scope Runner, Terri Finch with her 8" scope, Storm Sallas with an 8" scope, Kevin Witts who brought his 11" scope most of the event, Bruce Wurst with his 12" scope, Howard Moneta with his 8" scope, Pete Turner who brought his 9.25" scope, Rick Cunningham had his 8" scope, Roger Anzini had his 16" scope, Dewell Howell brought his 12" scope. We also had Kevin Witts and Mike Marron for several events as Presenters when the clouds were too thick for the scopes to see through. We had Vera Stiesmeyer as a Scope Runner and we added Christine Mintzmyer as Bee Keeper for some events, especially the last three events of 2015.

The November events were very cold, low 50's. This year, PAS was set up, not up on Space Mountain, but instead, in the Wildflower Loop Trail. We had chosen 5 locations to have telescopes set up within the Wildflower area. It was dark, nice, and more level than being on Space Mountain. It was also easier to get to. The 5 locations were: Location 1: Sonoran Desert Garden which had a nice view of the sky and any size scope could fit there. Location 2: Pollinator Garden Sign for which only N and E were visible and only a small scope could fit there. Sam liked this location. Location 3: Bee Garden in which any size scope could fit and we could see N, NE and S. Location 4 was good for 2 scopes. We called this the Water Tower Overlook and we could see SE, E, N, W and NW. Terri took this location for all nights she attended, which was all but 1 night.

When December began, there were many nights we did not have 4 scopes but instead 3 scopes and a presenter, or 2 scopes and 2 presenters depending on how thick the cloud forecast was for that evening.

Some evenings I, Terri, was a 7 Layer Dip. Storm named me that after I put on, not counting jackets, 7 tops and 7 bottoms. Then, there were 3 nights (not in a row) where I was a 9 Layer Dip because it was just so cold out and with a breeze and a wind chill of freezing or below.

A few Star Tours Members were

Scope Runners, which is a new position that was created to help out those who are the main scopes of this event. A Scope Runner assists by giving the Scope Operator a break from their scope to use the bathroom, grab a snack, do whatever needs to be done to make the event run smoothly. I have to thank everyone who participated as Scope Runners, as they were very much needed. We hope to have the option to have Scope Runners again at next year's event. The Scope Runner also could fetch hot drinks, bottled water, and cookies for the Team, if they decided to, and before the evening ended, they were in charge of taking the trash bag around to each Team member and collecting the trash from that evening so we leave the garden as it is meant to be, trash free.

The first 2 events, Nov 27 & 28, were very interesting. **Nov 27**, William Finch was main Scope Runner with Storm Sallas attending as assistant to Terri Finch & helper to William. The night went well. Then on **Nov 28**, there was a very confusing evening. 4 Scopes were set up with William as Scope Runner. Pete Turner had forgotten to pack his star diagonal & visual back, and so he had to run home to get the needed items to be able to complete the evening. Since his scope was already set up, except for these 2 items, William scope sat, while Pete ran home. When Pete got back, William ran to his car to get an additional battery he had brought, because Storm's battery died right at the beginning of the event. Once all of these weird things were taken care of, the rest of the evening was awesome and super cold.

We also added, this year, Bee Keepers. The Bee Keeper would stand at the entrance to the Bee Garden and direct traffic back to where a scope was set up, at the back end of the Bee Garden where most people could not see anyone, if just walking by. Christine Mintzmyer did a few nights of Bee Keeping.

For the **Nov 28th** event, **Terri** writes a review of: One lady had her son looking through my scope. While the boy was trying to see the object, it was obvious he was leaning on the eyepiece. The eyepiece was tipping down. As I noticed this, I said to the mom and son, "Please do not touch the telescope." As they walked away, I mentioned that her son was touching the telescope and may have lost the item we were viewing, and she comes back with "He only



On Nov 27, Kevin Witts provided this photo of himself and his scope setting up for the Desert Botanical Gardens Luminaria Event that evening.



Kevin Witts took this photo of Sam Insana setting up at the Lumi Event on Nov 27. The view of the background mountains of Papago Park is really awesome to see and enhances the sunset views from DBG.

touched it with his eye."

On **Dec 3**: Pete had his telescope motor quit working for him. The lucky thing is that we were so clouded out that night, it didn't really matter, but it did frustrate Pete as he tried so hard to get his scope to cooperate.

Terri writes: I had one lady come up to the scope and as she got there, I could see her hand heading for my eyepiece. I said to her 3 times "Please do not touch the telescope." And she continued, so on the third time I flicked her fingers with my finger until she got the idea to quit touching my scope. Luckily she was in a great mood, her friends were teasing her for touching the scope, we all laughed about it and I congratulated her for NOT losing the object in the scope and told her that most of the time, touching the scope just a little will lose the object. The group of gals left in a good mood.

Roger writes: On this night the sunset was greeted by thin clouds settling over much of the sky. Many stars lingered

behind the scenes playing hide and seek behind a gray, streaky curtain that William described as "pea soup". I chose to aim my telescope at the Pleiades cluster. It seemed to me that a star cluster that could usually be seen with the naked eye would be very interesting shown in much closer detail using the depth of the telescope. I was rewarded in my choice. Many guests were fascinated not only by the sheer number of tiny stars that added new wonder to the Seven Sisters Cluster but also stunned to view a grouping of stars that could hardly be seen through the thickening clouds but available in the eyepiece.

As the Pleiades rose ever higher in the streaky gray sky, Orion began to rise in the now clearing East. Terri began showing the Great Nebula M42 in her scope, I began to help some of her guests by pointing out some of the mystery and wonders of Orion. Toward the evening's end I pointed my scope directly at the sizzling golden point of Betelgeuse noting that Orion's left shoulder is 800 times the diameter of our lovely, yellow Sun.

On **Dec 4** the clouds were so thick, Rick and Don were set up at the Water Tower Overlook as the 2 scopes in attendance, and they couldn't find anything in the sky, so Rick had a great idea. Train the scopes on the awesome Bruce Munro Light Display on the mountain. The image looked like a lit up synapse. It was very pretty, so Don did the same thing. They also talked about their scopes to the attendees.

Rick writes: Friday, December 4th was completely overcast from arrival until well after we broke down. Instead of viewing the sky, Don and I pointed our telescopes at the lights on the mountain for viewing, which most patrons enjoyed. The brass quintet next to the double site (#4) was excellent and delightful entertainment. Terri and Storm were excellent runners with relief, cookies and hot chocolate liberally supplied.

For the **Dec 5** event, **Bruce** writes a review: I had beautiful views of M57 in my 12" scope until about 8pm. Then I switched to M103 and Wow'd people for the rest of the evening.

Terri writes: Dec 5 was clear skies until about 9pm when the clouds were getting in the way. I showed Alberio most of the night until 8:30 and then moved to the Orion Nebula. I discovered Kevin also was on the Orion Nebula once the clouds took over, however, I had a filtered view.

Dewell writes: Lumi on Saturday the 5th was a great success. At first I was concerned that the Sonora Desert location would not have enough sky to show people cool objects but I was able to see quite a bit once I got there. Once we hit full dark I spent the first hour of the evening showing M103 in Cassiopeia and the rest of the evening I showed the Pleiades. I have a pretty wide field of view eyepiece that shows the Pleiades well and a lot of the attendees really seemed to enjoy it. The clouds rolled in at about 8:30 but my object was so bright I was able to show all the way to 9:00pm. Overall the evening a lot of fun and I got to chat with many friendly people.

Dec 6, Sunday, had clouds again. We went with 2 presenters and 2 scopes. Mike & Kevin did Meteorite displays.

We were informed that this year, through December, El Nino would be visiting and causing many cloudy, moist evenings for this Holiday Season. And the weather people were right. Due to the constant and mostly cloud cover, Don stayed on the lights on the mountain all night and I found Vega (because nothing else was visible), Alberio 2 different times during the night (had it, lost it in the clouds, had it again), and the Orion Nebula the last 20 minutes of the night. At least we had an object or two, and we did impress the public by providing views of some stars through some very thick cloud cover. But, if I didn't have tracking on my scope, I

Continued on next page

Metal Cactus made of Old Tools

Provided to PAS by Susan Rubin, DBG Special Events Coordinator
Emailed to Susan by Laura Houghton, DBG Exhibitions Manager

This description is given next to this sculpture at the Desert Botanical Garden in the Harriet K. Maxwell Desert Wildflower Loop Trail.

This 20' tall Saguaro sculpture was created by Jeff Hebets in honor of his cousin, Phil Hebets. The sculpture is made from pick heads that were used to salvage native plants.

In 1980, Phil Hebets originated a tree boxing methodology that enabled over one million native plants to be salvaged rather than bulldozed. The salvage process allowed municipalities to pass ordinances requiring native plants to be saved and replanted in developments. These events, together with revisions to Native Plant Laws, championed by Phil, completely changed the face of landscapes in the desert southwest.



This photo, taken by Don Boyd, shows William Finch photographing Terri Finch and Storm Sallas at the DBG Lumi Event of Dec 6 2015.



During the evening of Dec 11, the sky was threatening rain but never produced any, Kevin Witts set up his Meteorite display to Wow the Patrons of DBG. Photo by Terri Finch.



This photo was sent to me by Dewell Howell. It is one of the set up locations in the Wildflower Loop Trail for which we had a telescope set up. This photo was taken on Dec 5 2015. See "Metal Cactus" article to the left.

would have lost it many times during the night and had a rough time getting it back. At one point, it was such thick cloud cover, I moved to some lights on the mountain, but from my spot within Location 4, I discovered I have branches in my view, so Don had a super clear view of the lights on the mountain, and my view was not as crystal clear. I also put my scope on some far away lights, on another mountain. Not sure if it was part of DBG or not, but it was cool looking. And it was really cold Sunday for the last half of the event. Cloud cover usually means it will be warmer, but it wasn't.

The following weekend, for **Dec 10**, we were covered in clouds and a cold front.

Saturday, Dec 12: Terri Writes: We had Dew! Boy, did we ever have Dew! The evening started with a rain storm that had just passed through Phoenix. It was raining most of the afternoon, light rain, but still rain, enough that the ground where we were set up at DBG was Soggy, not puddles, but damp, which caused very cold feet in our shoes. So, the rain left, and the sky cleared. It was a beautiful, damp view. Then, about halfway through the event, around 7pm, we had Dew. I had my dew shield and so I kept my scope free from Dew for part of the evening. I was on Alberio to start, and lost it in the clouds. Then, the clouds took over, and I amazed people with the fact that you couldn't see any stars, yet I had Alberio in my scope, even though it was faint, fuzzy and blurry due to the Dew and clouds. So, about 8:30, my scope was dripping with dew. It wasn't until about 9pm that I totally lost everything I was showing. When we packed up for the evening, everything was soggy, the bags, the jackets, the scopes. We took it all home, and laid it out, opened the cases and let it dry out for 2.5 hours. I had never experienced this drastic occurrence of Dew previously.

Storm said, on this night, "It was foggy, the optics were completely covered in a Foggy view, so I switched from the ET Cluster over to the mountain where the Bruce Munro lights were."

Terri writes: After the end of the scope was covered in Dew, one of the first people (DBG Patrons) to look at the Light Display on the mountain, looked in the scope, looked at me, looked back into the scope, and said "I hate to tell you this... I think your lens is cracked." It didn't look cracked when there was no fog in the view. But with the fog, it was ominous looking and appeared as if the lens was cracked. As the evening progressed, the dew became a drip-

ping mess all over the scope, and the eyepiece was then covered over by dew, which made it difficult to see any part of the Mountain's beautiful light display.

Storm writes, "The next night, **Dec 13**, someone walked up to my scope and called the lights on the mountain a "Bioluminescent Jellyfish.""

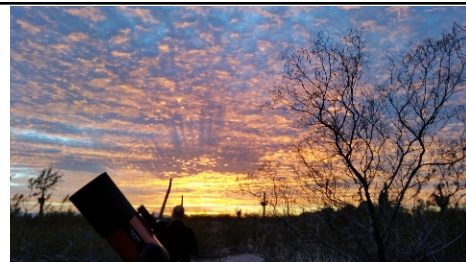
Terri writes: Saturday **Dec 19**, we were rather clouded out, but it was really cool. We showed the Moon in between holes in the clouds in which, while viewing the Moon, the clouds were moving across the face of the Moon so fast, they were a great sight to see through the scope. So, we had a little game we were playing. We would have a line of people waiting to look through the scope, and as the Moon became visible, we'd have the first person come up to the scope, and view, and they'd be quick, and let the next person look, etc, until we lost the Moon again. It was a fun time. We made a game of it.

On **Dec 20**, the public mentioned, a few different times, that the lights looked like a Bioluminescent Jelly Fish.

Also on the **20th**, we had total cloud cover. Roger was set up next to me in Location 4, and he took the Moon most of the night. I had the Moon for a while, but the clouds took it away for about 1.5 hours in which I took the Lights on the Mountain. Since this was interesting to the attending patrons of DBG, we decided to name the lights on the mountain as "Neuron Galaxy and it is 15,840 inches away."

Also, while showing the Moon in a red filter, people ask why I have the filter and I would explain to them that I use the red filter to retain their dark adapted eyes so that when they are done looking through my scope, they can leave the area without brushing against "Teddy," which is the Cholla Jumping Cactus that is near my scope.

For the **19th & 20th**, we had the assistance of Christine Mintzmyer as Bee Keeper. Christine made herself very useful. The first night she was at Lumi, Dec 12, she stood at the entrance to the Bee Garden and helped direct traffic in to see Rick. She said she had a great time doing that, so she returned. A few days later, Susan (our boss at DBG) created a hanging sign that gets attention to the fact that there is a telescope in the Bee Garden. So, When Christine was at Lumi on the 19th, she was thinking of ways of making the sign more visible. Sam was in the Bee Garden on the 19th, so she and Sam changed it up a bit. Sam moved



Quite a few evenings at the DBG Lumi events, the PAS Telescope Team was treated to some awesome sunsets. This one was on Dec 19. Howard Moneta and his scope are seen in this photo. Photo by Terri.



On Dec 23, Sam Insana and Vera Striesmeyer were seen at the Lumi event in which Sam had his scope, and Vera was a Runner / Bee Keeper for this night. Aren't they a cute couple in this photo? This photo was provided by Sam.



This photo, taken on Dec 31 by Christine, is of Bruce Wurst and his telescope, seen at Lumi Events. Bruce was set up in various locations around the DBG Wildflower Loop Trail. The mountains in the background add a nice view to this photo.

more to the curve at the Bee Garden rather than at the back of it, which made his white scope with red lights a bit more visible from the main path, and Christine moved the sign so that it could be seen better from the path. On the 20th, Don was in the Bee Garden. Christine figured out how to liven up the sign with a few more red lights on it, and so instead of being Bee Keeper, she walked around among the Telescope Team and helped, assisted, became a second Runner. That night we had Storm and Christine as Runners and they did a splendid job. I totally appreciate my Runners!

On **Dec 21**, while showing the Bruce Munro Light Display on the DBG Mountainside, Roger, Terri & Storm came up with this data to share with the public: The Neuron Galaxy (Lights on the mountain)

are 123 Trillionth of a light year or 15,840 inches away from us. On this night, Terri took the Whole Moon with a Red Filter until Orion Nebula was visible. Pete took a crater. Sam too Andromeda Galaxy, but then clouds came in so he took Gamma Andromeda. The forecast for that night's low temperatures was 41 degrees. We dressed in layers.

On Tuesday **Dec 22**, We had to cancel the scopes and went with just 2 presenters. It was totally cloud cover. Kevin and Mike did the event without any Runners or additional help. They were amazing!

Wednesday **Dec 23**, we again did only 2 presenters due to the cloud cover and threat of rain. Mike was there again, and Terri did a display of a scope on the mountain and some Moon demos.

On Monday **Dec 28**, Sam & Vera were Runners, and William was my assistant. William took over my scope while Sam and I took a long walk down towards Yellow Bird to check out other locations to set up telescopes for next year's event. It was a fun, quick walk, but still took us about an hour to do. Sam also took readings on the light levels at each possible scopes set up station.

Roger writes: **December 27 and 29.** Starting about 4:20 PM..... I set up my 16" DOB with 81mm finder scope at location 4b next to Terri in 4a. Once set up was complete it was time to relax until 5:30 when the brass horns welcome the first guests of the evening. With darkness still nearly an hour distant we welcome the first guests to look over our scopes and converse about anything astronomical. As darkness fell the first star of the evening was Capella, so I swing the DOB to the north east and centered on that first light in Auriga. When darkness finally allowed I found the Seven Sisters and began showing a fine view of the entire cluster using my 81mm. After the Pleiades rose too high in the heavens I gave our guests a birdseye view of Orion's right shoulder, the red giant Betelgeuse along with a small tutorial on the wonders of the Hunter.

On Tuesday **Dec 29**, we had a wonderful Lumi Team. Terri & Roger had their scopes, as well as Pete and Bruce. We had William as Runner and Christine and Howard were helpers. Where there is a lot of assistants, the events go so much smoother. The air was very chilly this night, as if it was damp out, but no dew was on the scopes.

For **Dec 30**, **Roger** writes: **December**

30....After set up was complete and the wait for darkness to fall upon us Capella was our target until the Pleiades at 435 light years distant began to appear. Many guests were amused to learn that the seven sisters were also known as Subaru in Japan. Then, it was on to Betelgeuse with the younger crowd giggling at me referring to the red giant as BeetleJuice. Finally during the final hour Terri and I had great fun teaming up on showing the crowd M42 and it's next door neighbor M43 in the sword of Orion, both of us pointing our green beams on the highlights of the ancient hunter.

My last visitors on my final evening for LUMI 2015 was crowned by a lovely older married couple. They strolled arm in arm in the 45 degree evening chill with beaming smiles as they approached the scope. They blessed us with praise for bringing our telescopes and knowledge out in the cold to share with the public. Their appreciation and well wishes were a perfect end to the one thing I enjoy most.....sharing my telescope with everyone.

Bruce texted Terri on Dec 31 with: "I have a fantastic view of Andromeda. I can make out the outer lying stars."

Terri writes: It was a rough night. Not because of weather and being about 45 degrees, but because we had to say goodbye to our friends we had made at DBG through all the Lumi events. We made friends with the Brass Quintet, the Electric Cart Drivers, the Volunteers for the Lumi Events, and more.

The skies were clear this night, and the crowd was never ending until about 9pm, everything stopped. The people stopped coming to the scopes, the bands were winding down as if they didn't have anyone listening any more. And the drivers of the carts, who were super appreciated, were later picking us up from our set up location, than any other night. We said goodbye to them, and it was sad. But, most of the cart drivers will be there through the year, and so we will get their assistance again, for other events. Many thanks to Cart Drivers: Rocko, Michael, Zachary, Paloma, Jeff, and Chris. It was a great way to spend the last evening of 2015! With lots of fun people from the public and a few friends we had made at DBG. I look forward to next year's Lumi event, when/if DBG hires PAS again. I can't wait. This was exhausting, fun, messed up my daily routine, but well worth it. I wanna do it again! Happy 2016 to all, and I wish you a most astronomical year ahead!!! ***



Don Boyd was seen with his scope in the Bee Garden during the 2015 Lumi Events. This photo was taken by Christine Mintzmyer on Dec 31.



Howard Moneta and his telescope attended the 2015 Lumi Event at DBG. This photo was taken by Christine on Dec 31.



A Sun Dog was caught hovering over the DBG Lumi event of Dec 31, while we were setting up our telescopes. Photo by Terri Finch.



Terri & William Finch with Terri's scope, were setting up at the DBG Luminaria Event of 2015. This photo was taken by Christine Mintzmyer on Dec 31.



Mike Marron set up as a Presenter at DBG Lumi events, as needed, when the skies were too cloudy to have enough scopes at the event. This photo was taken on Dec 11 by Terri

Desert Botanical Gardens Luminaria 2016

LAS NOCHES DE LAS LUMINARIAS

By Terri, PAS Event Manager

Are you looking for something really different to fill your holidays with wonder and fun? Bring the whole family to the Desert Botanical Gardens Luminaria event. Here's the link for additional information: <http://www.dbg.org/events/las-noches-de-las-luminarias-2016>. This is where you want to be this year, for the Holidays! From the day after Thanksgiving to the end of the year, this event is full of fun, music, food, and celestial views of the heavens.

Dress warmly. Come listen to several awesome bands including a return visit

from Simply Three (they were awesome last year!), enjoy a snack, bring the entire family, and wander through the gardens where you will find several telescopes set up by the Phoenix Astronomical Society for your viewing pleasure. Come view through our high powered telescopes (please do not touch the telescopes), the wonders of the night sky such as Venus (will be seen best from the Plants & People Trail), or the Moon (when available), the Great Orion Nebula (half way through December), Alberio and Gamma Andromeda

Double Stars, the Andromeda Galaxy, Perseus Double Cluster, the Pleiades and more. The weather and time of the year will dictate what objects will be available for viewing. The dates of this year's event will be November 25 & 26, December 2, 3, 4, 9, 10, 11, 16, 17, 18, 20, 21, 22, 23, 26, 27, 28, 29, 30, and 31. We will be set up in 2 locations with several scopes and a couple displays - Plants and People of the Sonoran Desert Trail and top of Sonoran Desert Nature Trail. Come enjoy an evening under the stars with PAS at DBG!

Dinner with Bob Ewing

By Paul Facuna

Paul Facuna organized a dinner for September 22, 2016 at Sesame Inn with Bob Ewing and invited PAS members to attend and visit with Bob since he was in Phoenix for a short time and was not able to attend the ASU astronomy museum tour. The PAS members that attended were Peter Turner, Sam Insana, Paul Facuna, and Mike Marron. The attendees ordered many different items for dinner from the restaurant's extensive menu offering. The conversation before, during and after dinner was free-wheeling covering many topics such as a telescope eyepiece that Pete saw on the internet, detailed telescope equipment repair that Pete found on the Cloudy Night's

website that he needed, taxes on retirement payments, Mike's health which was so much better to the point he did not have to wear the support boot for his foot (but he was a little concerned that his condition might change and he would need to use the support boot again which doctors would term a "reboot"), Bob's plans, because of the weather smart phone weather apps., etc. As dinner progressed the storm moved out of the Phoenix area as the weather apps. were showing. When we left the restaurant to attend the star party at BMC the sky was clearing which was a good indicator for successful evening viewing. Bob and everyone had a good time and visit at dinner.



Bob was in town visiting and got together with a few PAS Members for dinner prior to this Black Mountain Campus Star Party. Photo provided by Bob Ewing

Desert Ridge Community Star Party Sept 30

By Terri, Event Manager

I would estimate 200+ in attendance at this event. It wasn't as huge in attendance as I had hoped for but it was busy, fun, and the time flew by. The Telescope Team for this event was Bruce Wurst with his 14" scope, William Finch with his 10" scope, I brought my 8" scope, and Kevin Witts had a fantastic display of Rockets. Many thanks to my telescope team for their attendance at this event.

The highlights of the night would be Venus, Saturn, and Mars. The gentleman in charge, my contact, was Terrance Smith. Terrance and Sherry set up a canopy near the Telescope set up to greet the Community residents as well as the three attending invited schools.

I ran across my friend Allison and her

mom Stephanie. Allison always seems to find me at this event. And I had additional attendance by Vera, a student of Bruce's, and Brennan, a student of mine.

The evening began with set up in a very buggy field. Wow, the bugs were very thick, but as soon as the sun went down, and I brought out some Avon Bug Guard, the bugs quit bothering me and the night was pleasant. It was a bit hot & muggy still, for being the end of September, but the event was a big success.

The three telescopes had lines all night long. Kevin was kept busy with the kids who were very intrigued with his rocket display. The event was from 7pm to 9:30pm and we had attendees there right up to 9:45.

It was a very fun event, with lots to show. I was able to find Alberio, Ring Nebula, the available planets, including Venus. Venus set within a half out of the start of the event, but I was able to keep it in view until it set for the night. I saw Bruce was on Andromeda, and I believe William had ET Open Cluster, as did I, for part of the night. This was a very good date to have an event like this with so many planets (Venus, Saturn, Mars) available in one night of viewing. Some of the later arrivals missed Venus, but we did a great job of Wowing them with other fun objects in the night sky.

Many thanks to Desert Ridge for having us at this fun event. We hope to do this event again, soon. Thank you to Mallory

See Desert Ridge Sept 30 on Page 15

Mercury Transit at PVCC May 9

By Paul Facuna, PAS Member

The weather was excellent for observing the Mercury Transit at the Main Campus of PVCC. Under a cloudless sky, I helped Sam Insana and Earl DeLong move their equipment to and from the viewing platform, where during the viewing session PAS members Kevin Witts, Howard Moneta and Alex Vrenios stopped by to view the transition, visit, and take photos. Jenny Weitz came while Sam and Earl were setting up and brought PVCC's SunSpotter. The SunSpotter is a device with mirrors and lenses, which when aligned with the sun captures sunlight and projects a magnified, low intensity image of the sun onto a flat white surface. The projected image is easy to view, showing large sun spots and in this case Mercury as it transitioned the sun. Paul from ASU West came to view the transition bringing ASU West's SunSpotter to compare with PVCC's. Overall PVCC's SunSpotter produced a better image. During the transition I kept adjusting the SunSpotter to keep the sun's image visible showing Mercury. As people came to view the transition I gave them a 2-3 second SunSpotter view of the transition pointing out Mercury and the sunspot and then directed them to the telescopes to view the transition. Some people also took cellphone photos of the transition through the telescopes.

Terri Finch, Event Manager writes: The morning wasn't very busy and overall we had about 25 people stop by and visit us while Mike kept some people busy with his vast collection of meteorites. Don decided to photograph the transit happening so he put his camera on his scope and then took it off to let the public look through it, several different times during the event. We stayed for the event from 7am set up to the 11:42am end of the Transit and then about 20 minutes more chatting with people there.

About 11am, Don decided to video through his camera which was hooked up to his scope, the transit to try to catch the tear drop effect. Pete pointed it out and everyone in attendance ran to Pete's scope. That was really awesome to see!

Many thanks to Tom for helping out and to Anna for the canopy and help with access and parking. Thanks too for the ice water in blue bottles that were left over from the dedication of the Aquila building.

I wish to thank the telescope team who did a great job keeping Mercury and the

Sun visible for the attendees. We also gave out lots of materials. I hope to see Don's photos and possibly share them, too. Hoping everyone was able to view this fantastic celestial event!

Many thanks to President Sam, who managed the telescope team at PVCC Main Campus.

Peter writes: The transit, which was first visible on the East Coast, was in progress when we arrived at the campus. There were two scopes provided by Don Boyd and Pete Turner. Mercury was clearly visible, along with a number of sunspots. Don was able to take photographs on the hour and half hour. Pete's camera had focus issues, however he was able to demonstrate a technique of displaying objects from the telescope to a 10" tablet computer by networking with his iPhone attached to the eyepiece.

As Mercury progressed across the face of the Sun, about 20 to 25 people viewed its progress. Several came back for second and third looks. Of interest were a group of sunspots in the center of the Sun that had an irregular outline surrounding the group. As the transit progressed the interior of the outline began to darken, seeming to form a much larger sunspot around the group.

As the transit ended we were able to observe the "teardrop effect" where the dot of Mercury seems to stretch out towards the edge of the Sun.

Mark Johnston, PAS Member, writes: I did a solar event for the City of Scottsdale at Pinnacle Peak Park. I used my Lunt 80mm double stacked HA solar scope. From about 6:30 to 10AM when I had to pack up, I showed the Sun/Mercury to about 200 visitors.

I have been doing star parties and public astronomy outreach for the City of Scottsdale for about 12 years, normally at Pinnacle Peak Park or the McDowell Mountain Preserve. By 6:30 that morning, there was a line waiting of people keen to see the transit before they had to go to work. We also had quite a few normal hikers who had to walk right past where I was set up in order to get to/from the trailhead - whenever I could catch their eye I'd ask in a friendly voice if they'd like to safely view the Sun and a rare opportunity to see Mercury crossing in front of it. 100% of the people I asked were interested



Peter with a solar filter on his 9.25" scope. Due to the heat, Peter was having difficulties with the tracking motor shutting off. Photo by Terri.



Don brought his 6" scope with a solar filter to this event. His set up was steady enough he did photography through his scope. Photo by Terri.



Photo of the Mercury Transit taken by Bob Ewing using a Nikon 200 mm lens on a Nikon D60 camera with a Thousand Oaks optical solar filter 1/1000 sec exposure.

and participated (a few had their earbuds in and were intensely focused on what was straight ahead, not looking my way even though I was only 15-25 feet away!).

As a result I estimate I showed the transit to about 40-50 people who came specifically to see it, and another 150+ who were hikers - many of whom were keen to look again after their hike to notice the distance Mercury had moved since their earlier peek. Lots of "ooo's" and "aaah's" when I explained what they were looking at, distances, sizes, etc. A couple of people had owned telescopes in the past and really appreciated the opportunity and were reasonably knowledgeable about what they were seeing.

As usual, none had ever had a 'hydrogen alpha' experience before and were astounded and fascinated by the detail visible on the Sun's surface. Most people were amazed to see how small Mercury was compared to the solar disk. The best way I found to describe how to find Mercury was to ask them to imagine the Sun was a 'smiley face' icon, in which case Mercury would be the 'left eye'. That worked well. A couple of people asked if the solar filaments were 'mountain ranges' and a one asked if the seething faculae were 'craters'. More solar outreach is definitely needed!

Bob Ewing in Oregon - see photographs.

Sam Insana writes: At 7:30 am on Monday May 9th, Paul Facuna, Earl DeLong, Jenny Weitz, Sam (me) and Paul Schmidtke (from ASU West) put on a Mercury transit viewing at PVCC Main campus. Over 60 students, faculty, and others showed up to view the event that last took place 10 years earlier. We set up at the observatory domes east of the Life Sciences building and the customers were delighted to see Mercury, sunspots and even a solar flare. Kevin had sent out press releases and a few people said they heard about it on the radio, TV or newspapers. We also had some MeetUp people attend, thanks to the efforts of our Vice President Howard. Kevin Witts and Howard Moneta each stopped by on their way to work to check out the Mercury transit. Alex Vrenios also came for about 30 minutes to view the transit and take some photos of it and of the people there. It was a beautiful day with no clouds or wind. Set up temperature was 70 degrees and when we packed up at 11:45 am it was 80 degrees. Jenny and Paul Schmidtke had small safety viewing wooden scopes with white paper to show the reflection of the Sun and Mercury. Sam brought his 8 inch newtonian reflector with glass filter for Mercury and the sunspots, Earl brought his 10 inch dob with glass filter to show the sunspots and Mercury, and Sam had his

PST to show a solar flare. Paul Facuna helped hauling our equipment and was our carnival barker hauling in students and faculty who were walking by on their way to and from final exams. Everyone seemed to have a great time. They were given literature and cards about PAS and several said they would attend either the May 12th evening event at BMC or the International Astronomy Day event at Roadrunner Park Saturday night to see the Moon, Jupiter, Mars and Saturn. Dave Hellman from PVCC also dropped by to view the Mercury transit.

Ted Blank writes: I know it is well before sunrise for you but Mercury is now on the face of the sun for us on the East Coast. Tiny tiny compared to Venus in 2012. Glad you had good views! It was clear in NJ for about 2/3 of the transit, which is amazing since they've had 12 straight days of clouds and rain.



Another view of the BMC set up. Tom, who is sitting at the table with Mike, was there when we were setting up and didn't leave until helped us put our stuff in our vehicles and drive away.

Photo by Terri.



Mike Marron, PAS's Meteorite Man, with 2 gentlemen who hung around a long time to hear what Mike had to say. Photo by Terri.



The PAS Mercury Transit viewing event at Black Mountain Campus of PVCC had this set up. PVCC lent PAS the canopy and table. In the photo, Don is set up on the left with his black scope, center of photo is the PAS table with handouts on the left and Mike with his meteorites on the right on the table. We shifted the canopy every time the Sun was on us. And in the back of the canopy to the right, is Peter set up with his black scope. Photo taken by Terri Finch.



Mike having the time of his life talking about meteorites, cosmology, astronomy and more. It was a very warm day outside. I was very thankful PVCC Provided the canopy for us to stay out of the Sun. The blue bottles on the table were given to each of us for attending the event. Photo by Terri.



Paul Facuna (L) and Paul Schmidtke at PVCC Main Campus. Dr. Schmidtke (R) is wondering when Terri will be showing up at the main campus. Terri was at BMC for this event. Photo taken by Sam.



Mark Johnston did a Mercury viewing event for the City of Scottsdale at Pinnacle Peak Park. Photo provided by Mark.



Earl was at the Main Campus of PVCC showing the Mercury Transit. Photo taken by Alex Vrenios.



Mercury Transit photo taken by Sam Insana. He took this photo at PVCC with his Samsung Galaxy S 5 cell phone. If you enlarge the picture, Mercury is on the left and sunspots on the right. Sam writes: I used my smartphone camera at 100 ISO. It shows a sunspot on the right center and Mercury on the left. I used my 8 inch Newtonian reflector with a glass solar filter at 40 power.

Sci-Fi Movie Trivia

Mission To Mars (2000) - After Mars Recovery is given the OK to enter orbit around Mars, Woody Blake says "Let's light this candle". This is exactly what Alan Shepard, the first American in space, said just before lift-off on his inaugural Mercury flight.



Paul, Earl and Sam at the Mercury Transit viewing event at PVCC Main Campus on May 9. Photo provided by Sam Insana.



Mercury Transit photo taken by Don Boyd using LXD 75 mount and tripod. Camera was a Pentax K3, Thru an Orion 8in Astrograph.



Bob Ewing tried to view the Mercury Transit through the Oregon skies. Photo by Bob.



Ted Blank emailed the group about the Mercury Transit as it was happening on the East Coast and sent this photo.



President Sam Insana, at the Mercury Transit May 9 event, presented Jenny Weitz, PAS Member at Large and PAS/PVCC Liaison with some of the prizes he had won at the Awards Ceremony, as a way to thank Jenny for all she does for PAS. He also gave her a PAS Member-signed card. The items he gave her was a Celestron First Scope (box) and a cardboard Celestron Binoculars. Thank you Jenny, for all you do for PAS!!! Photo provided by Sam.



Sam set up on the Observing Deck at PVCC Main Campus, sharing a view of the Mercury Transit on May 9. Photo was taken by Alex.



Paul and Sam check out the Sunspotter that Jenny brought with her to use for the Mercury Transit event. Photo by Alex.

Star Barn Presentation “The Story of Bob”

By Paul Facuna, PAS Member

On June 25, 2016, I attended Ron Walker’s program on his planetarium projector that he has named Bob. I thought it was a very interesting and excellent program. He gave a brief history of planetariums and ancient ways of depicting the motion of the planets and stars. He then presented information on “Bob”, his projector. He explained how he bought and transported it, built the dome and installed it. He described the various projectors for the planets and their motions, stars, the sun and moon, the Milky Way, the projection of the meridian and celestial equator, the earth’s continents, and the constellations

(many of these he built and added himself). The projector can show time spans from minutes to 26,000 years. It projects about 6,000 stars down to magnitude 6. He explained there are two plates (gears) for each planet. One plate (gear) is for the motion of the earth and one for the planet itself. These are geared in such a way that the motion of the planet is the same as seen from the earth. The moon is also geared in a way that accurately shows the phases of the moon and its position in the sky as seen from the earth. The show was primarily a slide show but he pointed out the various projectors, wheels, gears, etc. on the projector. He also

showed the night sky at the south and north poles and at the equator. After the show he let us come to the projector and look at the various projectors, gears and ask questions.

In telling about the various ways the night sky was projected, he mentioned the Atwood Sphere. When we were in Chicago in 2012 we went to the Adler Planetarium which has the Atwood Sphere on display and presents shows inside of it. I attended one of the shows. The Atwood Sphere was designed and built in 1913 and shows the Chicago night sky. Beginning in 1940 until the late 1940s it was used in teaching celestial navigation to naval reservists.

Annular Solar Eclipse In Tanzania September 1st

by Paul D. Maley

There are few sights as awesome as that of a solar eclipse; however, many people think that unless an eclipse is a total solar eclipse where the Sun completely disappears from view that it is not some worth seeing or traveling to. That is a completely erroneous thought. An annular solar eclipse occurs when the Moon’s diameter due to its distance from Earth is slightly smaller than that of the Sun resulting in a ring of light or annulus at central eclipse. Don’t be confused by the word annular as it does not mean annual—that is, there is not a solar eclipse every year. The sky does not get completely dark and you likely will not see any planets or stars. But there is a lot of things you can see. First, the sky does lower in brightness by some fractional percentage. You can noticeably see a drop of background skylight light as annularity approaches. As in the partial phases of a total solar eclipse the Sun’s image is projected through certain types of trees onto various surfaces. Tiny crescent images will appear depending on how much of the Sun has been obscured. Local weather can be altered by the cooling. Clouds can either form or dissipate and it is tricky to try to predict such weather modification. The temperature will drop somewhat with the lowest temperature typically a few degrees from the ambient.

As the Moon’s disc makes contact with both inner solar limbs you can watch Baily’s Beads** form for a few seconds; but if

you are not located on the center of the eclipse path, and position yourself at either the north or south edge of the path, Baily’s Beads can be prolonged for over a minute. Baily’s Beads are incredibly fascinating to watch and are created by the passing of sunlight through mountains and valleys at either the north or south poles of the Moon. They can also be used to help measure the diameter of the Sun at either a total or annular eclipse. If the annulus is large enough such that a very thin ring of light surrounds the Moon at central eclipse, this can turn into a hybrid eclipse which is both annular and total. Then you can see bright planets. At hybrid central eclipse a complete ring of Baily’s Beads can be seen for a few seconds making this truly a remarkable visual sight. However, even if the ring is complete and unbroken by these beads it is sometimes possible to actually see and even photograph the outer atmosphere of the Sun (the corona) or even bright flames of hydrogen suspended at the edge of the Sun (prominences).

I have been organizing and leading tours to annular solar eclipses for decades and I never fail to be amazed by the apprehension, anticipation and concern that everyone has regarding whether clouds will obscure the Sun. This is the same sort of fear that pervades for a total eclipse. If you spend enough money getting to a remote destination like Tanzania you would not want to miss the main attraction. And we did not. I was able to find a house in a

village outside the town of Waging’ombe where the main attraction is the auctioning of cattle. We obtained permission from the owners to set up our cameras in their backyard and obtained some great shots. See: <http://www.eclipsetours.com/completed-tours/2017-tanzania-results/>

There are other sites worth seeing in addition to the solar eclipse and you can view photos showing things like the southern Milky Way, Iridium flares, the Zodiacal Light (time of year dependent), the Gegenschein, and exotic animals. Most of these were spotted during our trip and there was not one person who felt that this expenditure of money was not worth it. Being with a small group is something I like and try to maintain. With the exception of the August 2017 total eclipse upcoming in the USA (and that of the 7 minute long total eclipse in Mexico in 1991), most of the groups I organize have 10 to 30 people in them. If you have an interest to travel to see what the universe has to offer, feel free to contact me offline at the pdmaley@yahoo. I continue to organize these adventures as an outreach for the NASA Johnson Space Center Astronomical Society and hope to do so for the PAS.

Annular eclipses are more pervasive than total eclipses but the challenge still remains to get to one rather than waiting until it arrives at your doorstep. There are places in the USA where the time frame from one eclipse to another is measured in hundreds of years, sometimes thousands.

As I tell people, you cannot just sit at home and wait for a solar eclipse to pass over your house. It is likely that in your lifetime this will never happen! The projected paths of annular or total solar eclipses are narrow compared to that of a lunar eclipse where everyone located in an entire hemisphere might witness the latter! My next annular

adventure will be in late February 2017 to the annular solar eclipse in southern Chile and I will send in a report afterwards.

**** Baily's Beads** (provided by Matt Kohl) are an arc of bright spots seen during total and annular eclipses of the Sun. They are named for Francis Baily, an English astronomer, who called attention to them

after seeing them during an annular eclipse on May 15, 1836. Just before the Moon's disk covers the Sun, the narrow crescent of sunlight may be broken in several places by irregularities (mountains and valleys) on the edge of the Moon's disk; the resulting array of spots roughly resembles a string of beads.

Bookmans Telescope Workshop Sept 18

By Terri, Event Manager

We had a great turnout from PAS Members for this event. Alex Vrenios, Sam Insana, Don Boyd, William & Terri Finch, & Bruce Wurst attended. We also had Ed & Bette Wurst attend.

From the public we had 3 RSVP's which got all switched around prior to the start of the event. Cynthia owns a Nextar 8SE and showed up at 2pm to find out PAS wasn't at Bookmans yet, so she left. Later after we arrived and set up, I saw she had emailed that she was on her way. Chris had RSVP'd with a 4" Orion Starblaster. Then he had something come up and he canceled his attendance. Right after his email came in and I confirmed I got it, I then got an RSVP from Beth and her husband who didn't tell me what scope they needed help with. Then, I got an email from Beth Genender that they were canceling their attendance. Welcome new PAS member Allen Hullenaar. Cynthia joined us about 4pm. She drove back from Gilbert to chat with us. Welcome new member Cynthia Jones. Allen walked in with his 5" Nexstar telescope. It was a very successful event. Thanks so much to the Telescope Team for attending and assisting at this event.



(Center) Allen was assisted in the discussion by Alex to the left and Sam to the right in this photo. Photo by Bruce



The Telescope Workshop had New PAS Member Cynthia attend. (L to R) William & Don are on the far left in this photo, Alex, Allen, Sam and Cynthia are around the table. Photo by Terri.



For my birthday, my favorite Waiter at Carlos O'Briens, Daniel, made me this awesome carrot cake. Thank you Daniel! Photo by Bruce.



(L to R) Rodney, Terri, William, Don are seen behind the PAS Table at the Bookmans Telescope Workshop on Sept 18. Photo taken by Bruce



It was a great discussion about telescopes between (clockwise – starting at the yellow shirt) Alex, Allen with his back to the camera, Sam, Ed, Bette, Rodney, Terri and then William on the right, just out of the photo. Bruce Wurst took the photo.



Frank & Sam Insana were seen at dinner at Carlos O'Briens for Terri's Birthday party. Photo by Bruce.

Black Mountain Campus Star Party Sept 22

By President Sam Insana

Prior to the Star Party at PVCC BMC, Mike Marron, myself, Paul Facuna, and Pete Turner had dinner with Bob Ewing at the Sesame Inn in Carefree. We then went to PVCC BMC and set up our telescopes. Joining us at BMC, were Mark Johnston, Mike Cawley, Ron Walker, Chet Schuler, Roger Anzini with his daughter Sonya, and George Zukauckas. Mike Marron was also there with his meteorites. Four other PAS members had rsvp'd but did not show up. Jenny was there with her honor Astronomy

Students. They provided us with sandwiches, chips, cookies and cold water. During the evening about 50 students and about 10 other visitors enjoyed viewing through PAS telescopes. We showed the Andromeda Galaxy, Saturn, Hercules Globular Cluster, Uranus, Neptune, Ring Nebula, Albireo double star, and many other interesting objects. There was also a tour of the new observatory dome which was empty but soon to house a 14 inch Celestron telescope.

It had been raining hard, with overcast skies and a lot of wind as late as 4 pm. However, at 6 pm, just as my weather reports predicted, the rain stopped, the clouds began disappearing and the wind died down. The temperature was perfect and it was a good night for observing. I wish to thank Jenny and her honor students for hosting such a fine astronomical event. I am proud of all the PAS members who showed up despite enduring heavy rains getting out to the star party.

Flagstaff Festival of Science September 2016

By President Sam Insana

Eight PAS members attended this year's Flagstaff Festival of Science: Don Boyd, Hugh and Terri Clark, Sam and Frank Insana, Howard Moneta, Rick Cunningham, and Mark Johnston.

The opening night had an address on climate change, showing global warming effects over the last 27 years in the polar regions. The next morning was the Science in the Park event with about 50 exhibits from all fields: Astronomy, Biology, National Parks, Medicine, Weather, Robotics, Birding, etc..... There were also solar telescopes showing sunspots and solar flares.

That afternoon, for PAS members and others who brought telescopes, there was a free all you can eat barbeque buffet at a Downtown Brew Pub, with all you could drink. Following the feast, Deidre Hunter an astronomer from Lowell Observatory did a presentation on several citizen science projects that Lowell has available for members of the public. One of them is LO-NEOS, the Lowell Observatory Near Earth Object Search, another concerns Spectroscopy, and another is Dwarf Galaxies a project where amateur astronomers can take wide field photographs and can show interactions of the galaxies. That evening all 8 of our PAS members went to Buffalo Park for the star party. We had our telescopes out from 6 to 10 pm showing several fun objects to over 1000 members of the public. There were 31 telescopes in all, from all over Arizona, and a few from out of state. The weather was clear, no clouds or rain, but the cold temperature and wind made my Russian fur hat and ski gloves a necessity. The next morning Don, Mark, Frank and I went hiking at a Lava Cave northwest of Flagstaff on a guided tour. It was difficult with lots of boulders, loose rocks, sharp lava formations, and a mile of total darkness. That evening the U.S. Naval Observatory opened up for those of us who had taken part in the Buffalo Park Star Party. We were allowed in from 7 to 11 pm to view 5 deep sky objects through the eyepiece of the 61 inch reflector. Normally, the public is not allowed into the facility, guarded by Homeland Security.

Most PAS members left that night, but I stayed one more day. I met with Dr. Lauren Edgar at the USGS. She agreed to speak to PAS at our January 2017 meeting, about the Mars Curiosity Rover. She grad-

uated from Caltech in 2013 with a PhD in geology and now works in planetary geology. I then attended 3 more seminars at Lowell Observatory on 1. SW Monarch butterfly studies 2. Use of Radio astronomy to measure moving earth surfaces and 3. Updates on the various Mars rovers and a preview of future rovers. The festival lasted 10 days with over 90 free programs, hikes, open houses, etc.... I would encourage PAS members to attend the Science Festival next year.



Sam in cave during the Flagstaff Festival of Science. Photo provided by Sam.



Sam and Frank in Wheeler Park. Photo provided by Sam.



Many people were wanting to go into the Lava River Cave in Flagstaff during the Flagstaff Festival of Science. Photo by Don.



Rick, Frank and Sam at 61 inch scope. Photo provided by Sam Insana.



(L to R) Hugh, Frank, Rick, Don, Howard, Mark and Sam were seen at the Flagstaff Star Party. Photo provided by Sam.

Desert Ridge Sept 30

Continued from page 8

for setting up this event and being patient as we moved it several times before settling

on Sept 30 for the date. I also want to thank Bruce and Kevin for accommodating the

many changes in getting this event to happen successfully.

The Star Barn & Movie Night Oct 15

By Terri, Event Manager

Many many thanks to Ron for a splendid full afternoon of fun! It all started at 3pm. William and I attended the Star Barn presentation of "Rambling through the October Skies" presented by Ron Walker in his awesome planetarium. Side note: These Planetarium shows are open to all PAS Members and their immediate families with proper RSVP to Ron, and they are Free to attend. Donations are accepted, and in my opinion, should be given. Ron puts on a fantastic tour of the October Skies in this presentation that was just over 1 hour in length. Some of his presentations are over an hour, but most are about 1 hour long. This one was just long enough to get comfortable learning about some stories of how the constellations were put up in the night sky, who did it, what they look like - asterisms - and other fun facts about nearby bright stars. Ron has a very awesome presentation to share with everyone. In attendance from PAS for this afternoon's planetarium show was Paul Facuna, and William & Terri Finch.

After the planetarium show, Ron had the three of us head to his home and we met in the dining room area for some snacks while we waited for Sam Insana and Mike Marron to attend for Ron's Movie Night.

Julie, Ron's wife, was the hostess and provided cheese, crackers and salami. When Sam came he brought a bag of Doritos and some Reese's Pieces. Some of the attendees got to partake in Ron's Ale. While having snacks, we voted on what movie to see. It was a choice between the prequel to "The Thing" and "Aliens." "The Thing" won. Then we went into Ron's awesome, huge screen movie theater room.

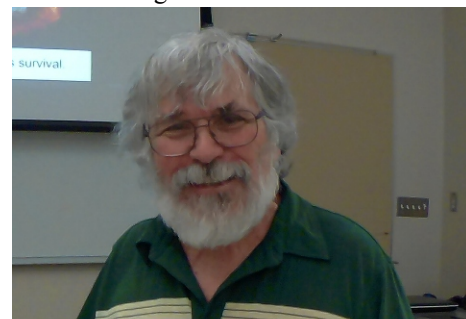
Inside this room, which to me looked like it was a garage at one time, but was actually built as a movie theater room, there was plenty of seating for 10 people besides Ron. The seating was couches and single chairs, all cushioned and pillowed. The Screen was 10 feet by 20 feet in size. This was huge. The sound system was fantastic!

We watched an introduction to the Theater, a Disney short of about 10 minutes in which the sound system provided adequate volume and clear sound and the screen was crisp and clear. There were snacks and drinks available all through the movies.

We watched the Prequel to "The Thing" and then took a short break and watched the Newer version of "The Thing," the one that the prequel was designed for.

Sam and Mike left after the 2nd movie, and Paul and the Finches stayed for the original "The Thing." The movies concluded about 10:45. Paul left at 11pm while the Finches and Ron stood outside until about 12:30am talking. Then it got rather chilly outdoors and we were all looking for a jacket, and so we decided to head home and let Ron get to bed.

Many thanks to Ron for hosting a super event. He is considering doing a movie night, for PAS Members only, once a month. He has a ton of movies to choose from, so if you want to attend his 'Movie Night,' you could ask him if he has a certain movie and he may schedule it into a future evening.



This photo of Ron Walker was taken at the Oct 6 PAS Lecture at PVCC Main Campus by Terri Finch.

What's Up For November?

By Rod Sutter,
Planets

Name	Date	Rise	Set
Mercury	11-15-16	07:35	17:56
Venus	11-15-16	10:17	19:54
Mars	11-15-16	12:12	22:21
Jupiter	11-15-16	03:51	15:31
Saturn	11-15-16	08:44	18:48
Uranus	11-15-15	15:43	04:31
Neptune	11-15-16	13:52	01:12
Pluto	11-15-16	10:51	20:56

All Times Arizona Time

Bolded dates and times are nighttime objects

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November 15 2015

Sunrise: 07:00

Sunset: 17:25

New: October 30



Q1: November 7



Full: November 14



Q3: November 29





Is Proxima Centauri's 'Earth-like' planet actually like Earth at all?

By Ethan Siegel

Just 25 years ago, scientists didn't know if any stars—other than our own sun, of course—had planets orbiting around them. Yet they knew with certainty that gravity from massive planets caused the sun to move around our solar system's center of mass. Therefore, they reasoned that other stars would have periodic changes to their motions if they, too, had planets.

This change in motion first led to the detection of planets around pulsars in 1991, thanks to the change in pulsar timing it caused. Then, finally, in 1995 the first exoplanet around a normal star, 51 Pegasi b, was discovered via the “stellar wobble” of its parent star. Since that time, over 3000 exoplanets have been confirmed, most of which were first discovered by NASA's Kepler mission using the transit method. These transits only work if a solar system is fortuitously aligned to our perspective; nevertheless, we now know that planets—even rocky planets at the right distance for

liquid water on their surface—are quite common in the Milky Way.

On August 24, 2016, scientists announced that the stellar wobble of Proxima Centauri, the closest star to our sun, indicated the existence of an exoplanet. At just 4.24 light years away, this planet orbits its red dwarf star in just 11 days, with a lower limit to its mass of just 1.3 Earths. If verified, this would bring the number of Earth-like planets found in their star's habitable zones up to 22, with 'Proxima b' being the closest one. Just based on what we've seen so far, if this planet is real and has 130 percent the mass of Earth, we can already infer the following:

It receives 70 percent of the sunlight incident on Earth, giving it the right temperature for liquid water on its surface, assuming an Earth-like atmosphere.

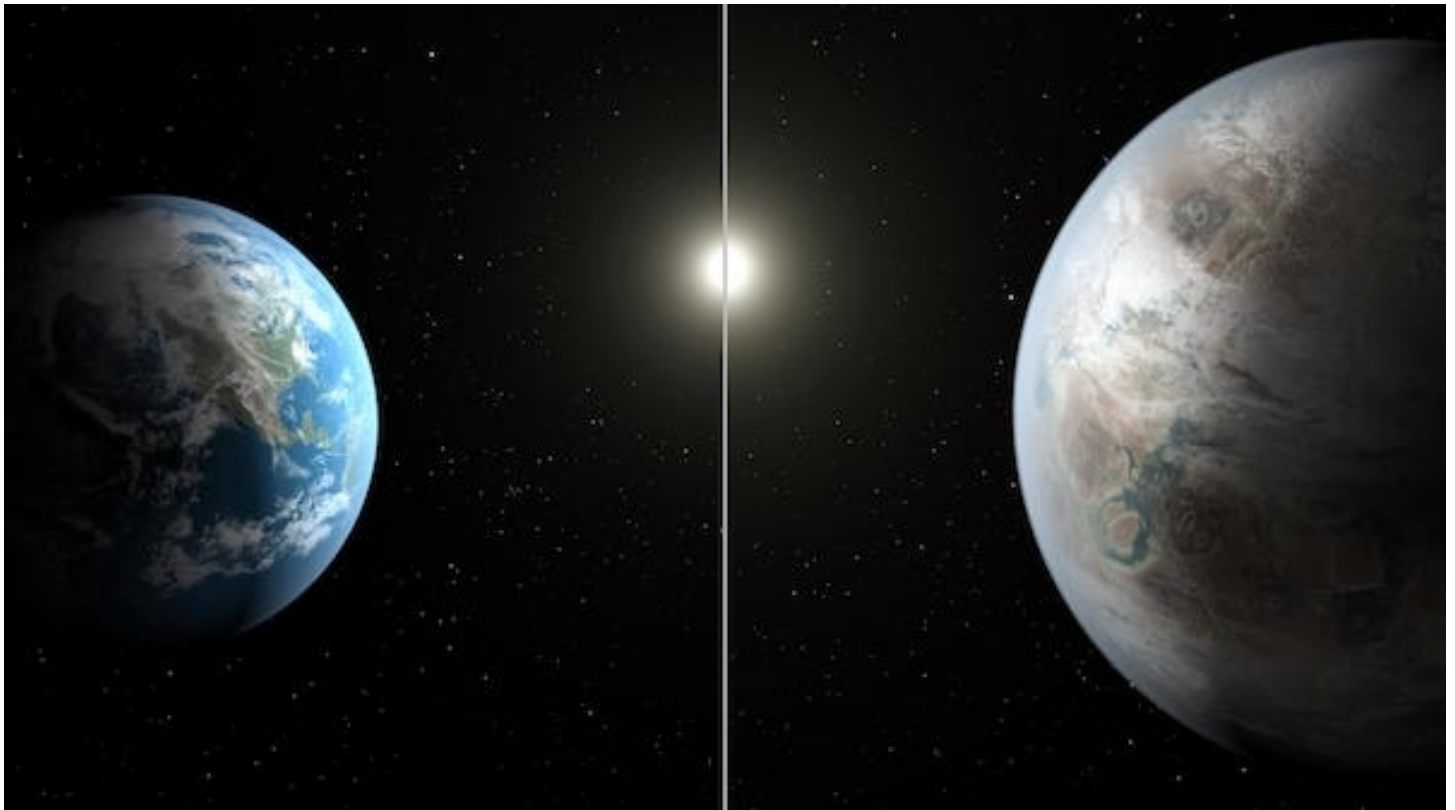
It should have a radius approximately 10 percent larger than our own planet's, assuming it is made of similar elements.

It is plausible that the planet would be tidally locked to its star, implying a permanent 'light side' and a permanent 'dark side'.

And if so, then seasons on this world are determined by the orbit's ellipticity, not by axial tilt.

Yet the unknowns are tremendous. Proxima Centauri emits considerably less ultraviolet light than a star like the sun; can life begin without that? Solar flares and winds are much greater around this world; have they stripped away the atmosphere entirely? Is the far side permanently frozen, or do winds allow possible life there? Is the near side baked and barren, leaving only the 'ring' at the edge potentially habitable?

Proxima b is a vastly different world from Earth, and could range anywhere from actually inhabited to completely unsuitable for any form of life. As 30m-class telescopes and the next generation of space observatories come online, we just may find out!



An artist's conception of the exoplanet Kepler-452b (R), a possible candidate for Earth 2.0, as compared with Earth (L).

Image credit: NASA/Ames/JPL-Caltech/T. Pyle.

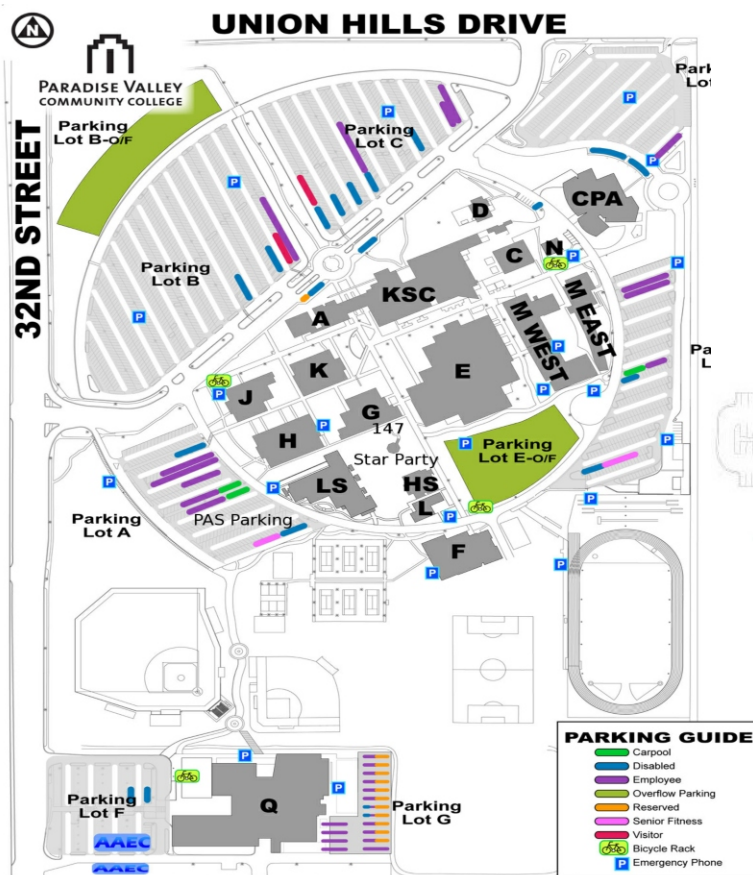
Dinner prior to PAS Meeting Nov 3

By Terri, Event Manager

PAS Members & Guests are invited to Chili's at 7th Street and Bell Rd in Phoenix 4:30 to 5pm to have Dinner prior to the PAS Meeting with our Guest Speaker Dr. David Williams. RSVP is required. More Details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2187&day=2016-11-3&c=1>.

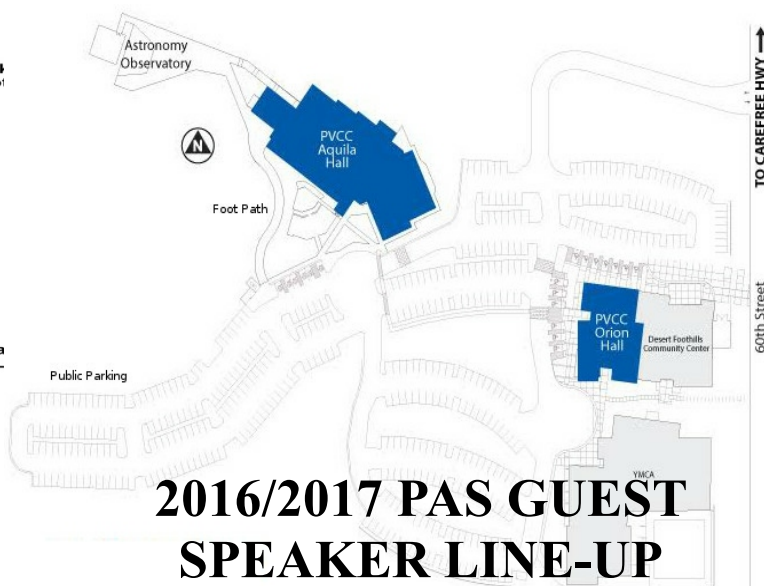
Map of PVCC Main Location

18401 N. 32nd Street | Phoenix, AZ 85032



Map of PVCC Black Mountain

34250 N. 60th Street | Scottsdale, AZ 85266



2016/2017 PAS GUEST SPEAKER LINE-UP

By Terri, Event Manager, Events@pasaz.org

PAS Meetings are held on Thursdays in Room LS-205 unless otherwise noted. Do you have an idea for a guest speaker? Email Terri the details. Here are the scheduled guest speakers at PAS:

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

Dec 1: Suzanne Morrison "It's Raining Rocks!"

Jan 19: Lauren Edgar PhD "Recent Results from the Mars Science Laboratory Curiosity Rover Mission"

Feb 2: Alex Vrenios "Radio Astronomy"

November 2016

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3 PAS Meeting	4 Rock A Rama	5 Rock A Rama
6 Rock A Rama	7	8	9	10 Telescope Workshop	11 Veterans Day	12
13	14	15	16	17 Public Star Party	18	19
20 Telescope Workshop	21	22	23	24 Thanksgiving	25 DBG Lumi	26 DBG Lumi
27	28	29	30			