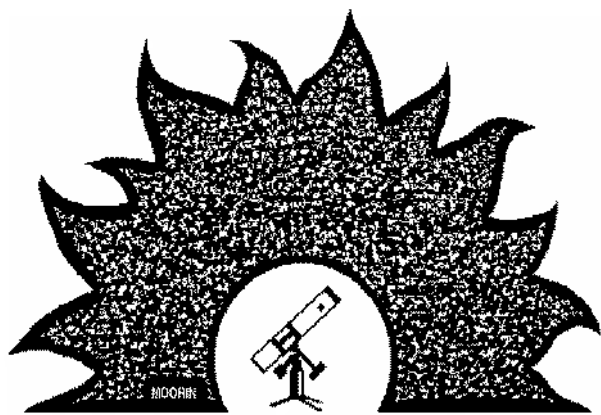




PAStimes

Phoenix Astronomical Society

www.pasaz.org

February 2017

Volume 68 Issue 6

PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Dr. Alex Vrenios to Speak at February Meeting

Please NOTE Change in Room LS-203

By Terri, Event Manager

We have a spectacular meeting lined up for February. Bring a friend to the meeting! Help us out by bringing a snack to share - finger foods, and the PAS Snack Fund will provide bottled water. Please also, if you do not bring a snack, donate a little \$\$ to the snack fund, anything helps. The snack fund pays for the case of water for each meeting. Also, please note the NEW Room we are in for the rest of Spring 2017 is LS-203. Doors open at 7pm for set up, socializing, snacking and set up of the Guest Speaker. Meeting will begin at 7:30 and the Guest Speaker will take over after

about 10 minutes of announcements. See you there!

Amateur Radio Astronomy: Five Projects

By Dr. Alex Vrenios, Guest Speaker

Alex will present five radio astronomy projects that can be done by amateurs on a small budget. These projects correspond to the Astronomical League's requirements for the Radio Astronomy Observing Program and if completed, can result in a bronze level certificate, a silver level certificate and pin, or even a gold level certi-

cate and pin. The talk concludes with a detailed look at radio astronomical imaging.



Dr. Alex Vrenios is the February Meeting Guest Speaker. This photo was taken by Don Boyd at the April 14 2016 PAS Awards Ceremony.

PAS Meeting of January 19

By Terri, Event Manager

This was a fantastic meeting. We had 44 in attendance! Several of us arrived prior to 7pm to find out LS-205 was occupied by a class still in progress. Luckily, Jenny (our contact at PVCC) was in her office and came over, checked out the situation and then got us into room LS-203. Just as a side note, we like room 203, as it is bigger, and for this meeting, it was enough seating for everyone who attended.

President Sam Insana opened the meeting with some brief announcements, intros of those who were new visiting the meeting and the Officers of the club. This took about 10 minutes and then we turned the floor over to our Fantastic Guest Speaker Dr. Lauren Edgar. And Lauren was absolutely a wonderful, full of energy, informative, entertaining speaker. She shared with us great info about the Rovers on Mars and what they (her team) found out, what they have been studying for the past 4 years and what is happening with the Rover in the

future. Lauren came down to us from the USGS in Flagstaff. She entertained many fun questions during her presentation and after she concluded the presentation. She also brought some great lithographs for everyone to take home. Thank you so much, Lauren, for coming to PAS and giving a most awesome presentation!

After Lauren's presentation, Sam offered a 10 minute break around 9:15pm. During this time, Lauren packed up and left, and Jenny, who had stayed for the presentation, also left around this time. Then Sam went offered some time for various announcements. It started with Bill Powell talking about his Spectroscopy SIG and the meeting they are having the following week. Leah Sapir then shared some info about an astronomy package that she and Sam felt the club should purchase, and it was voted that the club purchase the package. So, she will be ordering it and then it will be decided who will manage the shar-

ing of that program on DVD as a Library format, borrow one DVD at a time and return it before getting the next one. Rod

See Jan 19 Meeting on page 5



Dr. Lauren Edgar from the U.S. Geological Survey in Flagstaff came down to the PAS Meeting of January to share her knowledge of the Missions to Mars. Photo by Don.

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February 2017 Upcoming PAS Events

By Terri Finch, Event Manager

Check out these and other fun events on the PAS Calendar: <http://www.pasaz.org/forums/calendar.php>. RSVP where requested to Events@pasaz.org.

Feb 2: PAS Meeting at PVCC in Room LS 203. Come enjoy a presentation by Alex Vrenios, PhD. 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=2007&day=2017-22&c=1>

Feb 9: 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 number of your telescope. Bring your telescope and accessories to this

event. We meet in both 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=2014&day=2017-29&c=1>

Feb 11: Free Solar Viewing event at Burton Barr Library from 10am to 1pm. Come view through our safely filtered telescopes - sun spots, solar flares, and solar prominences. RSVP is requested in case weather cancels this event. More details can be found here: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2217&day=2017-211&c=1>

Feb 12: 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=2018&day=2017-212&c=1>

Feb 16: School Star Party (Private)

Feb 22: School Star Party (Private)

Feb 23: 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 <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2089&day=2017-223&c=11>

Star Tours Meeting of Jan 13

By Terri, Event Manager

The meeting took place at Mike's home in Carefree running from about 7:15 pm to 9:30 pm. Members of Star Tours in attendance were: Mark Johnston, William and Terri Finch, Sam Insana, Don Boyd, Howard Moneta, Kevin Witts, Bruce Wurst, Roger Anzini, Eric Steinberg and Mike Marron (host of the event).

The meeting opened up with a discussion about the nature of the Star Tours

group and several great ideas were discussed. Then Terri lead a discussion about the rules of being in the Star Tours SIG, followed by a specific look at rules and procedures for the recent DBG Lumi Events. We then discussed the rotation list / point system and it was decided to do away with the point system and go back to a rotation list format. We discussed what the RSVP / Liaison does in Terri's absence at events and we talked about the use of the

club insurance at events. Roger added some thoughts on summer activities at DBG which then led to other ideas of what we could do during the summer for viewing options at various locations like First Friday in downtown Phoenix. It was a productive meeting with good discussions and input. Many thanks to Mike for hosting this meeting, and thanks to everyone who provided snacks.

PRESIDENT'S CORNER

By President Sam Insana



PAS President Sam Insana. Photo by Terri

“Ask not what your club can do for you, ask what you can do for your club.”

JFK may not have used those exact words, but the idea is still there. PAS can do a lot for you in the form of fun astronomy activities: private and public star parties; informative general meetings with guest speakers; telescope workshops; night sky training sessions; socials; field trips to planetariums and observatories; a first class newsletter; citizen science projects like meteor studies, occultations, spectroscopy and astrophotography. We have a listserv and website that let us communicate fun and

important astronomy information. But what can you do for your club? Being an officer of PAS and on the Board of Directors is a very important thing members can do. Elections will be coming up in May and the new officers will take over at the first meeting in September. This gives plenty of time to think about how you would like to serve. Some of us serve for many years, some of us for just a short time, but serving is something everyone should at least try once. Please call or email me if you have any interest in any of our elected positions so I can help answer your questions.

PAS Meeting of the Minds Jan 5

By Terri, Event Manager

Many PAS Members attended the PAS Meeting of the Minds (business meeting) on January 5 at IHOP. In attendance were: Ora, Eric, William, Terri, Pete, Alex, Sam, Vera, Diane, Christine, Kevin, Don, Mark, Mike, Roger, Ed, Bette, Bruce, Bill, plus

Chris Johnson and his son. We had discussions about several topics which included a PAS Treasury Report from Eric, reducing the number of emails sent through the PAS listserv, PAS funds and where they should be spent or invested, the Star Tours point

system, the upcoming events at Arcosanti, Comicon, and Leprecon and appointing Terri Finch to continue as Events Manager. The meeting was about 2.5 hours long and had some great ideas shared. Thank you all for attending.

All Arizona Star Party Oct 29

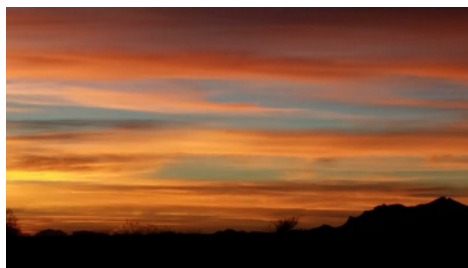
By President Sam Insana

a well deserved breakfast buffet.

Several PAS members attended the All Arizona Star Party at the airfield near the Antennas. Howard Moneta, Peter Turner, Frank and myself, and Earl DeLong braved the cloudy weather with hopes of a few hours of good observing. When we arrived before sunset, the skies were about 50% covered in high, thin clouds. By 6 pm it was even more cloudy, but by 7 pm, as it got dark, most the clouds were gone, giving us around 3 to 4 hours of very good observing. There appeared to be only about half as many amateur astronomers compared to the previous year, but that was probably because of the “risky” sky conditions. There was no wind or rain, but around 11 pm, the sky clouded up again. No one left early because of several people taking astro photographs that would have been ruined by car headlights. Hot chocolate, coffee, and various cookies and brownies were being sold to the attendees. There were even Jay Johns available for use. We met several people from SAC and EVAC and had nice conversations during the cloudy periods. The next morning showed a beautiful sunrise and an even more beautiful Jupiter. We then stopped off at the Country Pride restaurant at exit 103 on the way back, and had



The attendees of the All Arizona Star Party of Oct 29, a yearly event. Attendees from PAS: Sam taking the photo, Pete, Frank, Earl and Howard. It was a fun event!



Sunday morning after the All AZ Star Party at Antennas. Photo by Sam.



The next morning, after a full night of observing in a really dark location, the group enjoys breakfast together before coming home that Sunday morning. Photo provided by Sam.

PAS PR-AM OPPORTUNITIES TO PARTICIPATE IN ASTEROID SCIENCE IN MARCH

By paul d. maley (pdmaley@yahoo.com)

PAS members have three valuable opportunities to help video-record any of three asteroid occultations of stars in the month of March. It will require you to drive to the path and spend as long as 2 hours at your site before returning home. I will supply all the equipment and all you have to do is to let me know of your availability and I will show you what needs to be done prior to the occultation. The objective is to map the shape and size of the asteroid by using the combined times of disappearance and reappearance of the occulted star from different locations. To make this happen we need to establish multiple sites 5 to 20km apart (separation is dependent on the number of observers). The graphic below shows an example of the results of a similar expedition. The line at the upper left is from an observer who saw no occultation. If you staff the station, then your name is put on the reduced profile and you are given credit for the observation! The video process allows zero human errors to be introduced into the timing process and provides a professional grade timing accuracy of .03 seconds.

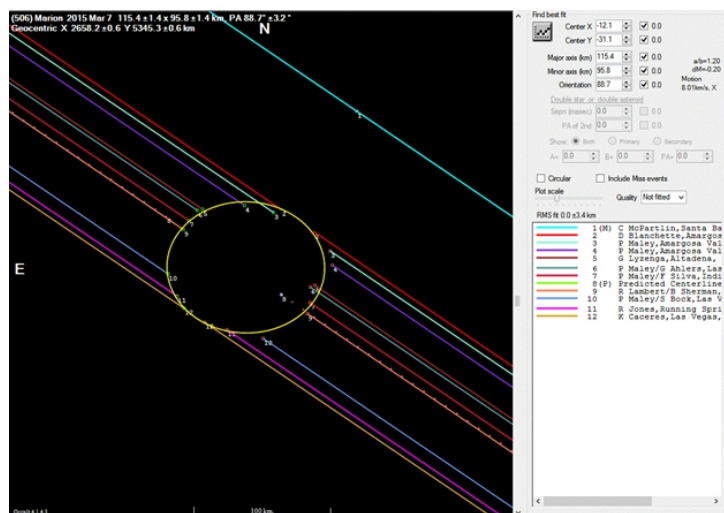


Figure 1. Example of the results of an asteroid occultation group effort.

Here are the overall details.

March 2 (Thursday) morning at 1:05am. The middle of the night is the best time for reduced traffic and lessened likelihood of interference from human activity. The eclipse is of a 10.4 magnitude star by the asteroid Turnera. The path crosses downtown Phoenix but the sites will have to be located along Sun Valley Parkway in order to get enough dark sky in the direction of the star. It is the closest of the three events and gives us the most time to lay out the stations to get each person prepared.

March 7 (Tuesday) night at 11:52pm. It occurs fairly late at night and though it is a good distance away from town, the path has the least predicted error. The eclipse is of a 9.0 magnitude star by the asteroid Carolina. This is the farthest of the three events from phoenix and will entail driving either north on I-17 or northwest on 93.

March 13 (Monday) night at 9:00pm. This is the best time of night and not all that far from town. The path error margin is also quite favorable. The eclipse is of a 10.0 magnitude star by the asteroid Amalthea. This path is the next closest to town and crosses

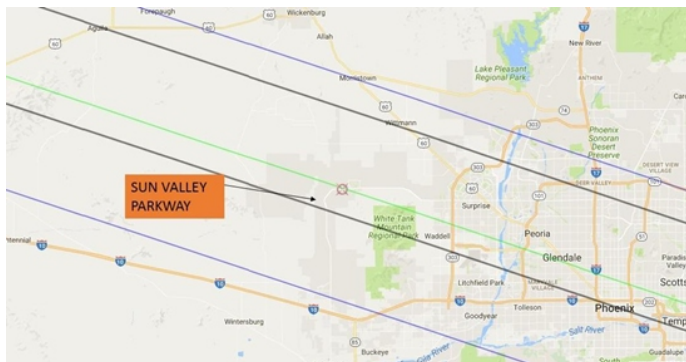


Figure 2. Map of March 2 occultation zone.

highway 85 as well as passing south of Phoenix. Highway 85 has a lot of good places to set up.

What makes these three events important? They involve stars brighter than magnitude 11 which can be detected by the telescope/camera system in a dark sky. For example, in the months

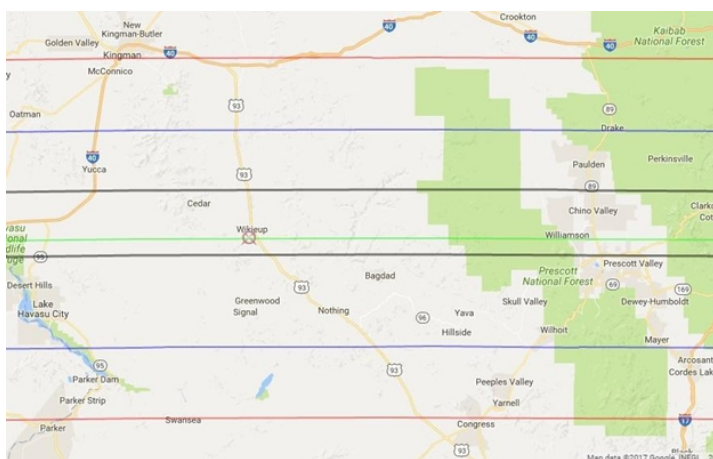


Figure 3. Map of March 7 occultation zone.

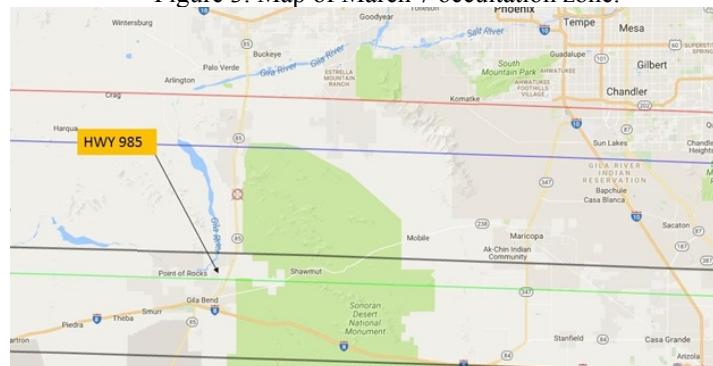


Figure 4. Map of March 13 occultation zone.

of January and February there were no such events within relatively easy proximity to Phoenix.

Seriously, we do need your help to staff these portable stations without which the amount of data collected will be deficient. Each site will be equipped with an 80mm refractor, camera and camcorder and with luck you may be able to see the occultation on the camcorder flip screen. **If you think you would want to help, kindly contact me at pdmaley@yahoo.com**

From page 1

PAS Meeting of January 19

Sutter, the current PAS Librarian, wasn't present but was discussed as one option for lending out the DVD's. Then Chet Schuler gave a quick recap about the passing of Gene Lucas (who was a member of SAC, EVAC and PAS at various times in his life). An interesting fact that was shared was that Gene passed on Dec 2 but it took until Dec 8 for anyone to discover the body, because Gene lived alone. Terri Finch then did the upcoming events for the rest of January and all through February. And Sam closed the meeting after talking about the orders of T-shirts and other fun stuff through Dirk at Infini-tees.

This was a great meeting with a super turnout. There were snacks and handouts at

the back of the room. Chet won the first raffle and Bruce won the 2nd one which was a wonderful item donated by Sam. Thanks to all the wonderful attendees!



President Sam Insana gives a PAS T-shirt to Lauren at the meeting. Photo by Don.

Bill Powell adds: Quite a turnout for the meeting last night. Great presentation on the Mars exploration projects. A good night!



Dr. Lauren Edgar & President Sam Insana were seen at the 2017 January Meeting at PVCC. Photo by Don.

Black Mountain Campus Huge Star Party Nov 17

By President Sam Insana

The BMC star party started out with Jenny giving a fine astronomy lecture in the Aquila Science building at 6 pm while PAS members set up their telescopes.

Unfortunately Pete's scope fell onto the cement and that was it for the night. Then 30 minutes later, George's scope also fell to the pavement and had some problems after that. Fortunately there were no more mishaps the rest of the evening. Eric had his 22 inch to wow the crowd. Sam and Don had their 8 inch reflectors. Alex had his 8 inch SC, Bill Powell had his 80 mm refractor, and there was a 10 inch scope operated by Chris. Ray Adams brought out his new video camera and monitor which he attached to his telescope and entertained the crowd with dazzling pictures.

The skies were beautiful with no clouds, wind or rain and the temperature was in the 50's. it was a great night for observing Venus, Uranus, M13, M31, M57, Perseus double cluster, M45, Gamma Andromeda double, Albireo double, M27, and several other heavenly objects. The 100 to 200+ people attending were very excited about seeing such objects on a beautiful night. Terri and William handed out PAS literature, Mike showed his famous meteorite collection, and Paul helped cars go on and off the observation deck. Ron Walker, from the Star Barn, showed up and helped many of the people understand the night sky. Loretta, our BMC PVCC contact also attended and took some photos of the event.

Alex writes: It got quite nippy that night. I remembered to bring a sweater, but I was sorry it didn't have a hood. It was already

dark when I set up and people were arriving early so I focused on Venus before it set. While the object wasn't so interesting (not so different from what one might see naked-eye, just bigger), it was a conversation starter. We talked about things like morning vs. evening star, how far a way it was at present, why it's brighter when it's on the far side of the Sun, etc. Afterward I set up on the Pleiades and had viewers compare the image in the telescope eyepiece, at 50X, to that of the ten power spotting scope. There were lots of parents children and students who asked questions and marked down notes on their clipboards for extra credit. One girl said she wanted to pursue a career in astronomy! I gave her and her friend a business card and invited her to our upcoming meeting.

It was very busy all night, but for a few minutes at the end, I sat down in a gravity chair and looked up to relax and was able to see one Leonid meteor coming from the northeast at about 9:30 pm.

Terri, Event Manager writes: We also had about 70 students, their parents and siblings attend from Thunderbird High School. I met their teacher and we set up to do a star party at their school for November 2017.

A special thanks to Mike Russell, the PVCC BMC security man who helped with access to the observing location. Looking forward to the next BMC Star Party scheduled to be on Jan 26, weather permitting. Details about that event can be found here: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2088&day=2017-1-26&c=1>.



At the back of this photo, standing up in black is William, then Terri sitting down, and Mike at this table sharing his meteorites. This photo was provided by Kevin Harcey.



Sam's niece Mary, with a foreign exchange student from China who stays with her and her husband, Jerame came out to view the night sky at BMC. They are standing next to Sam's scope and Mary looks frozen. It was very cold this night. Photo by Sam.

Anasazi School Star Party Nov 18

By President Sam Insana

Friday, Nov 18, Seven PAS members put on a star party for the Anasazi school in Scottsdale. Don and Sam used 8 inch reflectors, Ted used a 9.25 inch SCT, Roger brought his 16 inch dob and Pete used his binos and 3 inch refractor. We showed Venus, Mars, Andromeda Galaxy, Gamma Andromeda double star, Albireo double star, the Ring Nebula, the Perseus double cluster, the Pleiades open cluster, and several other gems. The sky was reasonably dark, Bortle 5.5, however the school left on one bright light for security that caused a few problems. Mike showed his meteorites and Kevin had a great Mars exhibit. The students were bright, asked good questions and were eager to learn. The teachers and parents were helpful keeping everything going smoothly without incidents.

The campus was beautiful and the night was perfect with no wind, rain or clouds and a mild temperature. Cathy, our school contact, made us comfortable with a good meal and helped us with our setup locations and directing us to restrooms and answering our questions. The star party was only 2 hours long, but the approximately 100 children and adults had a great time with a variety of astronomical exhibits and viewings. The one surprise was how many people enjoyed viewing through Pete's binoculars. They began to realize how convenient binos can be when hiking or camping or taking a trip and that they can open a beautiful world of wonders in the night sky. We directed them to our PAS website and the Bino objects list in our observing section. I would definitely recommend doing more star parties at his fine location. It would be nice to get that one light turned off.

Pete writes: I had a 3" refractor and a set of 12x60 binos on a stand and spent most of the night with the binos looking at The Pleiades. They were a great sight, filling up the field of view.

Cathy writes: "Dear Terri, Please send my thanks and appreciation to all of the wonderful astronomers who came to Anasazi Friday night. The students loved Kevin and Mike's special presentations, and all the gentlemen who shared their knowledge of the stars and our extraordinary universe. The students gave me such positive feedback and really enjoyed observing the night sky. I really appreciate all the hard work you also do to set this up. It

was an experience we all will remember for a long time.

Happy Thanksgiving to you and all of your family. I am certainly thankful to all the astronomers who were willing to share their time and knowledge with all of us. You are the best, and light up the sky.

Sincerely, Cathy"

Roger writes: After attending the last astro event at this school, nestled high and snug up against the McDowell Mountain Preserve, I was very much looking forward to another evening with those fantastic kids, parents and the always helpful staff.

Thanks to Ted for his help and for showing us how his very smart iOptron mini tower mount knows it's way around the stars almost by itself.

Ted writes: I brought a 9 1/4" SCT on an iOptron Minitower and showed people Mars, Alberio, M57, and a few other things but spent a lot of time on M31, Andromeda Galaxy. The skies were quite dark and it showed a lot of detail in the 9" scope. One little "fact" I like to relate is that if there were people on planets around stars in Andromeda, and they were looking back at the Milky Way in similar telescopes, this is what we would look like to them. The students asked a lot of good questions, and the teachers were very involved too. Great night.



Mike Marron, PAS's Meteorite Man, always has a crowd around him. Photo by Sam.



Ted Blank having a wonderful time showing the attendees objects through his telescope at this school. It was a great night for viewing. Photo by Sam.



Don Boyd set up at Anasazi School on Nov 18 with his scope. Photo by Sam Insana.



Kevin Witts set up at this school with his Mars Table and Posters along the wall. Many attendees enjoyed his various informational items at his presentation table. Photo by Sam.



Roger Anzini sharing the night sky with the attendees at Anasazi School on this night through his scope. Photo by Sam.

Country Meadows School Dec 8

By President Sam Insana

PAS Star Tours put on a fun night of observing and presentations at Country Meadows school in Peoria. Mike Marron had his meteorite display and Kevin Witts had a moon display along with a huge saturn V rocket model. Sam Insana had his 8 inch scope, Pete Turner his new 12 dob and Roger Anzini his 16 inch canon. Venus, the Moon, the Pleiades, and Gamma Andromeda double star were shown during the 2 hour star party. When showing Venus to a middle school girl I told her it was covered with clouds. She then said it can't be totally covered, and I said it is. She then said how can you cover the entire planet with clowns. That miscommunication was only beat by the fact that Roger called Terri a few hours before the star party and told her that Sam Insana had called him from the emergency room. Terri then called me and asked what happened. I told her I hadn't talked to Roger all day and I wasn't in the hospital. I then called Roger and we then figured out some stranger called Roger by mistake and his name was Sam and he said he was in the ER! What a mess!

Country Meadows was supposed to have about 500 people but only about 100 to 200 people showed up. Still, they were all thrilled with the star party and the other displays from several places like the Phoenix Zoo, the Wildlife World Zoo, etc.

Terri, Event Manager adds: Our contact at the school was **Sarah Tekulve** who writes: "I just want to say thank you all for coming out to our science night last Thurs-



Kevin Witts' Moon display at Country Meadows School on Dec 8. Photo by Sam.

day! It was a huge success and the kids are still raving about it this morning! There were about 350 people who attended (or at least who checked in - some may have slipped by) in case any of you want numbers. These students might not always get to experience everything but that night you lit up their worlds with your hands on activities, animals, games, and learning! Thank you all SOOOOO much!"



Mike Marron and his many Groupies and Meteorites at Country Meadows. Photo by Sam.

What's Up For February?

By Rod Sutter

Planets

Name	Date	Rise	Set
Mercury	02-15-17	06:38	16:58
Venus	02-15-17	08:47	21:27
Mars	02-15-17	09:19	21:50
Jupiter	02-15-17	22:27	09:54
Saturn	02-15-17	03:27	13:27
Uranus	02-15-17	09:41	22:26
Neptune	02-15-17	07:56	19:16
Pluto	02-15-17	05:01	15:07

All Times Arizona Time

Bolded dates and times are nighttime objects

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February 15 2017

Sunrise: 07:32

Sunset: 17:44



Q1: February 3



Full: February 10



Q3: February 18



New: February 26



Comet Campaign: Amateurs Wanted

By Marcus Woo

In a cosmic coincidence, three comets will soon be approaching Earth—and astronomers want you to help study them. This global campaign, which will begin at the end of January when the first comet is bright enough, will enlist amateur astronomers to help researchers continuously monitor how the comets change over time and, ultimately, learn what these ancient ice chunks reveal about the origins of the solar system.

Over the last few years, spacecraft like NASA's Deep Impact/EPOXI or ESA's Rosetta (of which NASA played a part) discovered that comets are more dynamic than anyone realized. The missions found that dust and gas burst from a comet's nucleus every few days or weeks—fleeting phenomena that would have gone unnoticed if it weren't for the constant and nearby observations. But space missions are expensive, so for three upcoming cometary visits, researchers are instead recruiting the combined efforts of telescopes from around the

world.

"This is a way that we hope can get the same sorts of observations: by harnessing the power of the masses from various amateurs," says Matthew Knight, an astronomer at the University of Maryland.

By observing the gas and dust in the coma (the comet's atmosphere of gas and dust), and tracking outbursts, amateurs will help professional researchers measure the properties of the comet's nucleus, such as its composition, rotation speed, and how well it holds together.

The observations may also help NASA scout out future destinations. The three targets are so-called Jupiter family comets, with relatively short periods just over five years—and orbits that are accessible to spacecraft. "The better understood a comet is," Knight says, "the better NASA can plan for a mission and figure out what the environment is going to be like, and what specifications the spacecraft will need to ensure

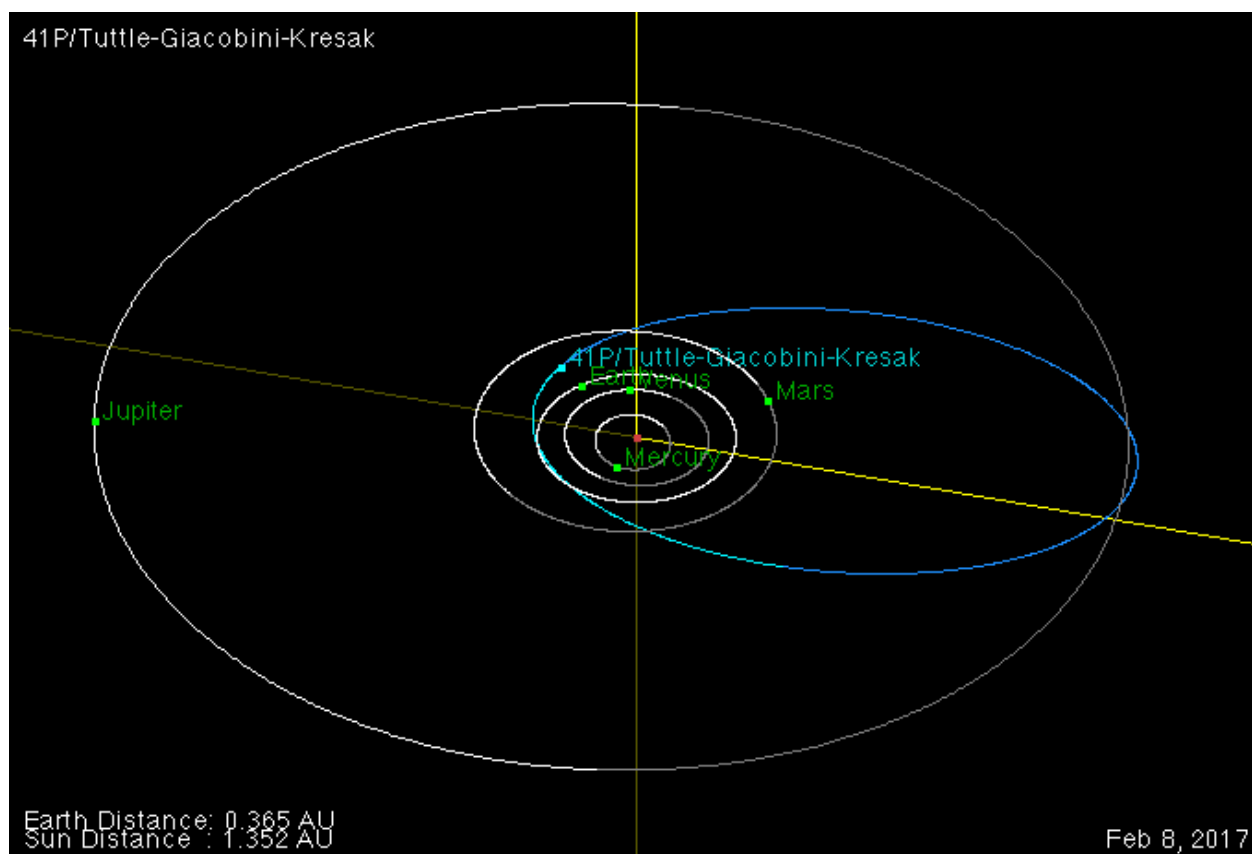
that it will be successful."

The first comet to arrive is 41P/Tuttle-Giacobini-Kresak, whose prime window runs from the end of January to the end of July. Comet 45P/Honda-Mrkos-Pajdusakova will be most visible between mid-February and mid-March. The third target, comet 46P/Wirtanen won't arrive until 2018.

Still, the opportunity to observe three relatively bright comets within roughly 18 months is rare. "We're talking 20 or more years since we've had anything remotely resembling this," Knight says. "Telescope technology and our knowledge of comets are just totally different now than the last time any of these were good for observing."

For more information about how to participate in the campaign, visit <http://www.psi.edu/41P45P46P>.

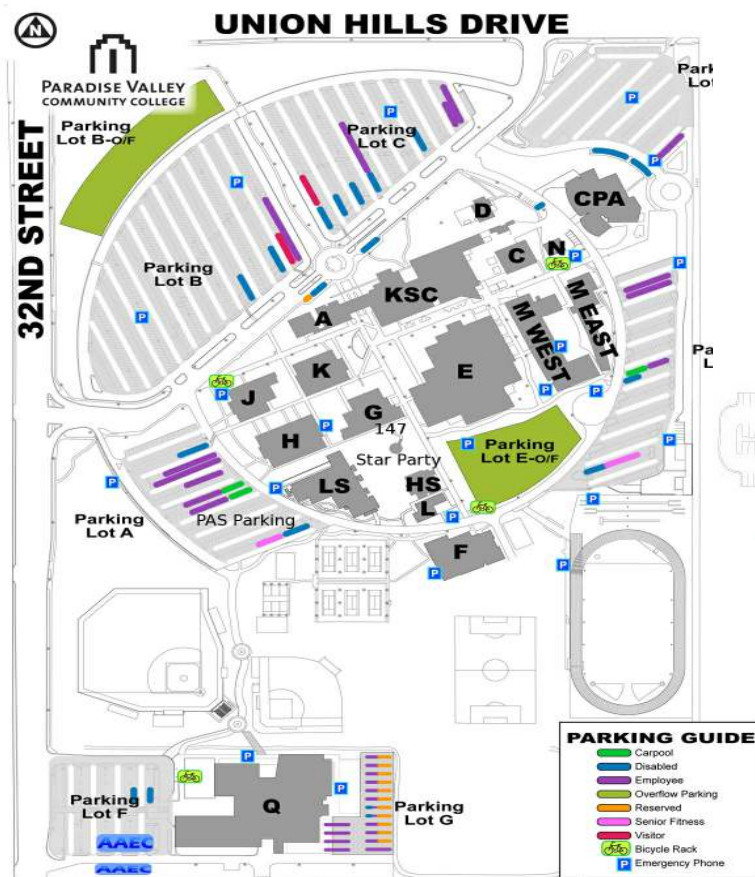
Want to teach kids about the anatomy of a comet? Go to the NASA Space Place and use Comet on a Stick activity! <http://spaceplace.nasa.gov/comet-stick/>



An orbit diagram of comet 41P/Tuttle-Giacobini-Kresak on February 8, 2017—a day that falls during the comet's prime visibility window. The planets orbits are white curves and the comet's orbit is a blue curve. The brighter lines indicate the portion of the orbit that is above the ecliptic plane defined by Earth's orbital plane and the darker portions are below the ecliptic plane. This image was created with the Orbit Viewer applet, provided by the Osamu Ajiki (AstroArts) and modified by Ron Baalke (Solar System Dynamics group, JPL). <http://ssd.jpl.nasa.gov/sbdb.cgi?orb=1;sstr=41P>

Map of PVCC Main Location

18401 N. 32nd Street | Phoenix, AZ 85032



Map of PVCC Black Mountain

34250 N. 60th Street | Scottsdale, AZ 85266



2017 PAS GUEST SPEAKER LINE-UP

By Terri Finch, Event Manager, Events@pasaz.org

PAS Meetings are held on Thursdays in Room LS-203 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>

Mar 2: Andy Odell "The Life and Times of the Sun and Stars"

Apr 6: Harrison Smith "Potential Life on Exoplanets"

May 11: TBA

February 2017

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2 <i>PAS Meeting</i>	3 <i>School (Private)</i>	4
5	6	7	8	9 <i>Telescope Workshop</i>	10	11 <i>Public Star Party</i>
12 <i>Telescope Workshop</i>	13	14	15	16 <i>School (Private)</i>	17	18
19	20 <i>President's Day</i>	21	22 <i>School (Private)</i>	23 <i>Public Star Party</i>	24 <i>School (Private)</i>	25
26	27	28 <i>School (Private)</i>				