PAStimes
Phoenix Astronomical Society
www.pasaz.org
March 2015
Volume 66 Issue 7
PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Alex Vrenios Presentation at March 5 PAS Meeting

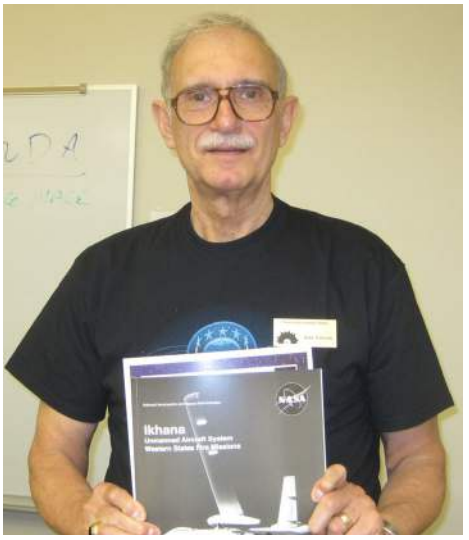
"You're So Far Away" by Alex Vrenios

You're So Far Away: Measuring the Distance to a Celestial Object" presents three techniques by which astronomers determine the distance to celestial objects: Stellar Parallax, Standard Candles and Standard Rulers. Each technique is presented both in theory and practice, with a discussion of their limitations.

You are invited to my presentation which starts with the use of parallax to measure the distances to the nearest stars. Then I will talk about how Sir Edwin Hubble discovered a Cepheid variable in what was thought to be the Andromeda nebula, and how his measurements promoted Andromeda to a galaxy outside our own, changing our view of the cosmos forever. Finally we present redshift, what it is, how it's measured and how it may be used to measure the distances to the most distant stellar objects in the universe.

Bio: Dr. Vrenios is a retired computer scientist and a Senior Member of the IEEE. He is a longtime Patron Member of the Astronomical League, with ten completed observing programs to his credit and about half a dozen more in progress. He enjoys the observing and outreach aspects of the hobby, but his true passion is investigating some obscure facet of the science of astronomy.

Terri writes: Bring a friend to this awesome meeting on Mar 5. It will be a meeting you will not want to miss. Bring a snack to share and join us as we welcome Alex to do his intriguing presentation for us. Everyone is welcome. See you there!



Alex Vrenios – March Guest Speaker – Photo taken at Apr 24 2014 PAS Awards Ceremony by Terri Finch.

PAS Meeting Feb 5

By Terri, Event Coordinator

The night began with an announcement by Kevin Witts that the ISS would be available to view at 6:44pm. I didn't make it out there in time as I was running a little late. When I got to the room, my telescope team had invited our guest speaker into the room to start setting up. Many thanks to all who arrived early enough to do that for me, in my absence.

The night began with a few very brief announcements: Mike was making a trip to Tucson on Saturday and two seats were still available in his van for the trip. Eric wanted to announce the Feb 15th Antenna's trip. Kevin Witts was also making a trip to Tucson on the 14th and 15th.

We had a few new folk join us at this meeting: Jan, Walter & Jake from Tucson, Bob who came to us through MeetUp and Ted Blank who had visited from New Hampshire back when we had the Venus Transit in 2012, now moved to Fountain Hills. Ted is the newest member of PAS - Welcome to PAS! Josie found us through Meet up and attended the meeting, too.

Jeff Stillman then did a super presentation on all he has learned about doing astrophotography. He also covered his mistakes, so that we don't have to make the same ones! He talked about types and costs of equipment, programs used to edit the images and all that was needed to create photos like the ones he shared with us that night. Many thanks to Jeff. He left me with a copy

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Phoenix Astronomical Society Contact Info

President / Librarian	Bruce Wurst	602-971-3555	President@pasaz.org
Vice President / Events Coordinator	Terri Finch	602-561-5398	VicePresident@pasaz.org
Treasurer	Mike Marron	480-488-3031	Treasurer@pasaz.org
Newsletter Editor	Don K. Boyd	480-963-7189	Editor@pasaz.org
PAS Host	Rodney Fong	602-432-4318	
Member-At-Large	Alfred P. Fantegrossi	603-548-8353	alfantegrossi@comcast.net
Member-At-Large	Jenny Weitz	602-787-6818	jennifer.weitz@paradisevalley.edu
Webmaster	Chris Johnson		Webmaster@pasaz.org

March Upcoming Events

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

Mar 1: Free Telescope Workshop at Bookmans, 19th Ave and Northern in Phoenix - 3:30pm to 5:30pm. RSVP is required with Terri. When you RSVP, email the make and model of the telescope you need assistance with. We also assist with suggestions and advice on what telescope to purchase to match your needs. We have no telescopes for sale at this event.

Mar 5: PAS Meeting in Room LS-205, Doors open at 7pm, Meeting starts at 7:30pm. Read about the Guest Speaker on page 1 in this issue. Everyone welcome. Bottled water provided by President Bruce. Bring a snack to share.

Mar 11: CTCA Private Star Party - PAStimes Star Tour Members Only

Mar 12: Huge public star party at Black Mountain Campus of PVCC & STEAMtastic event, 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&day=2015-3-12&c=1

Mar 13: Private Star Party in Black Canyon City - PAStimes Star Tours Members only.

Mar 13: School Star Party in Cave Creek (Private)

Mar 19: Jupiter, Venus, Orion Nebula & Mars

Mar 20: School Star Party in Tempe (Private)

Mar 21: Messier Marathon in Carefree (Private) - PAS Members Only. Sunset is 6:40. Potluck at 5:30.

Mar 24: School Star Party in Phoenix (Private) Back up Date

Mar 25: CTCA Back Up Date (Private)

Mar 26: ASU West Public Star Party and Open House 7:30 to 9:30pm. RSVP is required with Paul. See PAS Calendar for more details. ASU West is at 47th Ave and Thunderbird Road in Phoenix.

Mar 27: School Star Party in Phoenix (Private)

Mar 27: Private Star Party at PVCC - PAStimes Star Tours Members only.

Cochise Elementary Jan 9

By Cindy Chadwick, Teacher

Hi Terri, Roger was awesome with students and adults. We had a total of 60 bodies. The family who hosted grilled hot dogs, and students made Smores. Thank you so much for connecting me to Roger.

Roger writes: I think everything went quite well last night at the Cochise 5th grade backyard party. The backyard setting was perfect for the number of kids (about 30) and parents (about 15). Mr. and Mrs. Orm and their 5th grade son Carson were fantastic hosts, serving really delicious Hebrew National hot dogs with all the fixins. Cindy Chadwick is a fantastic teacher, she really cares about those kids.

After we all ate I conducted a question and answer forum with everyone around the cozy fire pit. Then, we moved to the 16" scope for everyone to check out the Great Nebula in Orion as I answered the next round of many questions. Everyone took a look at Comet Lovejoy before several parents gathered round to chat with me about all things astronomical while the kids roasted their smores. All in all, a very enjoyable evening.

For Sale

10" Lightbridge for Sale: I have relocated to a small townhouse and only have room for one scope - my small refractor. I have a new-condition 10" Meade Lightbridge truss tube Dobsonian purchased from Woodland Hills (5/15/13) which I would like to sell. It has been assembled and taken outside once, but not used due to persistent cloudiness. It assembles and disassembles easily for transport if necessary. Purchase price was $649 including the red dot finder and a Meade 26mm wide angle eyepiece. It has a battery powered mirror fan. I will also include in the deal, additional items purchased separately: Hotech 2" Laser Collimator (was $120), Astrozap tube shroud (like new). Orion outdoor scope cloak (like new). I am asking $475 total for everything. Gary gkiley77@gmail.com

PAS Meeting Feb 5

(Continued from page 1)

of his slides (power point), so if you were busily taking notes and wish to have a copy, drop an email to Events@pasaz.org and I will forward it out to you. He also left behind his pile of astrophotos for sale which I will have at the next several meetings. The large photos are $2 and the small ones are $1 and everything from the sale of the photos goes to PAS. I have about 10 of each size left for sale. Let me know you are interested

The raffle was won by Alex - congrats. The Guest speaker also provided a large framed photo to raffle off, the winner of which I can't recall. We also raffled off a magazine that was donated by Sam, and Ryan (a previous member of PAS) won it.

Many thanks to everyone who provided snacks at this meeting. Sam provided the popcorn. Some of the cookies were provided by Bob Senzer and Bruce Wurst. Water was provided by Bruce, too. It was a great meeting and we hope to see you at the next one on Mar 5. See you there!!!§

Bookmans Telescope Workshop Jan 11

By Terri, Event Coordinator

We had great attendance at this event! It was a rainy, laid back Sunday, but we had a really nice group.

Many thanks to my Telescope Team: William and Terri Finch, Howard Moneta, Don Boyd, Rodney Fong, Mike Marron, Bob Senzer, and Kevin Witts. Additionally helping, but not in PAS was Joe Acquavella who along with Bob assisted Mike with his meteorites.

Here is the recap of public attendance: Al and Cindy Smith from Minnesota came for help with their Celestron 8" 8SE Nexstar Telescope. Howard and Kevin assisted them. Dhivagar Palanisamy (goes by "D") attended to find out what telescope to purchase along with Michael Brewer and his wife Annie and Joseph Pepp. William, Terri and Rodney assisted these 3 guests. Lawrence Schindler attended with his borrowed Celestron Nexstar 130 scope, also wanting some additional info on what telescope to purchase. Don and Howard assisted Lawrence.

I wish to congratulate our newest 2 PAS members: Michael Brewer and Dhivagar "D" Palanisamy.

A separate thanks also to Mike for bringing his meteorites and drawing a crowd as usual. The photos from this event will be in the PAS Photo Gallery with several of them showing the crowd Mike was able to attract around his table.

After Bookmans, a group of 12 of us went to Carlos O'Briens for dinner. Attending were: William and Terri, Mike and Joe, Eric and Ora, Rodney, Bob, Kevin and Howard. It was a super successful event and we had a great time. Many thanks to Bookmans for lending us their front window area to do this telescope workshop.

Lawrence writes: I thought this event was excellent.

"D" writes: Terri, Yes it was helpful. All of you were very friendly and welcoming. Hope to see all of you in action at some star party:-)

Cindy writes: Hi Terri, Thank you so much for inviting us to join you for dinner.. We had a great time! And the telescope help really DID help!

(L to R) Lawrence, Joe, Howard, Don with the leafy shirt & Michael. Howard & Don assist Lawrence with his borrowed telescope while Joe & Michael watch, listen and learn. Photo by Terri.

At the Front door entrance, in this photo, we see a table set up where Mike is behind some stuff but a crowd is around his table. Then to the right of that table, we have Kevin assisting Al (sitting) & Cindy (standing) with their scope. In the foreground we have Williams' head, Rodney and then Joe looking at what I was taking a photo of from the PAS Table. Photo by Terri.

CTCA Jan 14 Review

By Don Boyd

Mike Marron, Terry Dancer, Kevin Witts and I were at the January 14 PAS Star Tours Event at CTCA. I arrived at CTCA at 5:30 with Kevin having arrived just a few minutes earlier. We went up to the fifth Floor Garden to set up our scopes, after which we observed Mercury and Venus. They were close enough together that I was able to get both in the field of view of a wide eyepiece! At about 6:15 we went down to the cafe to see if Mike or Terry had arrived - we waited till 6:30 and then decided we'd better go get something to eat. Mike and Ofelia Waters arrived just as we were sitting down to eat; Terry arrived just before 7pm. There were a half a dozen people in the cafe who had heard about the comet and wanted to see it. Terry found the comet first and then I found it, so Terry moved to the Orion Nebula. I showed the Pleiades and the Beehive Cluster and we both showed Jupiter when it came up. About 8pm 3 ladies came up and said they had heard from friends that we were up on the roof and wanted to view. They said that the advertising did not mention that there would be scopes and suggested that maybe we should include that next time. I sent the suggestion to Amanda our contact with CTCA, however she said it is mentioned in the larger sheet of activities but is not on the calendar due to space requirements.

DBG Luminaria Dec 19-23

By Various Attendees

In attendance at the December 19 Luminaria event at Desert Botanical Gardens were: Bruce Wurst with his 12" SCT, Terri Finch with her 8, Kevin Witts with his 8, Don Boyd (who saved the day) with his 8, along with Mike Marron doing Meteorites because there were clouds in the forecast.

Terri writes: The evening was super chilly, even when we started the event, and it wasn't until the crowd came up the hill that the cold quit stinging. Until the crowd left at 9:15pm, we had a steady stream of attendees. Susan Rubin, my contact at DBG, said they weren't sold out and that there were 1800 attending the 5:30 time, and another 900 to attend the 7:30 start time. I'd say we saw a minimum of 2,000 people. The people at the bottom of the hill did a fantastic job sending the patrons our way. Bruce and I set up at the Overlook - Bruce had started on the Ring Nebula but soon lost it as it was setting, so he changed to M103. I started on Alberio until Orion Nebula came up - I showed it with a Nebula filter, which would have been awesome, but we had 4 bright lights from a nearby game going on to the southeast that were shining right on what we were doing, too brightly. While the lights were blasting away our views, Orion Nebula didn't look all that spectacular, but then about 8pm or so, the lights finally went out. With the clear air, the view of Orion Nebula was crystal bright and awesome. Kevin was at the top of the hill and showed Mars until it set behind the mountain and then moved to Andromeda Galaxy. Don was on Pleiades the whole night. There was no time to change objects, as we had a steady stream of patrons. Mike was a very good addition to this evening's event, as he took some of the crowd (which he always draws) from us for a while. I wish to thank Susan for being patient with me with all the changes to this evening's event. We started out with Eric signed up to be part of the Team for the night, but due to being ill, he dropped. And then the backup which was to be Terry Dancer, also became ill and dropped. I was so glad Don was available to fill in. I definitely wish also to thank the Telescope Team, as everyone attending this night was in total black clothing as requested by DBG. It was very nice to see the Team matching and looking so sharp. The night started out with wispy clouds, which got in the way now and then, but we didn't get total cloud cover until about 10:15pm, after we had packed up and were waiting for the carts to come get us.

Kevin writes: Friday, 12-19 at DBG: I ran a scope on Friday night and took my place at the top of the hill. It was a rather cold but clear night. I began with some views of Mars as it peeked over the hilltop to the south. Mars is always a crowd pleaser and it allowed me to share some facts regarding Mars' distance, size and exploration.

Once it got sufficiently dark, I moved to coverage of the Andromeda Galaxy. The familiar object was crisp and clear all night. Clouds began to accumulate at around 8:30, so I moved to the Owl Cluster and stayed there for the rest of the evening. I'd estimate around 1500 visitors to the scope. Not too many kids this evening. It seems that a large number of guests to the garden are from out of town and see the Garden as a choice evening destination. The staff is always attentive and efficient. I continue to hear from people that the astronomy part is one of the highlights of the evening.

Don writes: I was very busy all night and stayed on the Pleiades the whole time. I tried to switch to the beehive at about 8:30, but it was still very low and also in the clouds, so I went right back to the Pleiades. Over head was mostly clear but the horizons were cloudy. It was also cold, I had to put my trench coat on over my jacket at about 8:00.

On Dec 20, the Telescope Team was Bruce Wurst with his 12" scope, set up at the ramada, Terri Finch with an 8", William Finch with a 10" (both at the overlook), Kevin Witts with his Moon display and Mike Marron with his Meteorites, both at the top of the hill.

Terri writes: This evening started with cloud cover. The clouds were wispy at first, so as it got dark we were able to find stars and align the scopes. Bruce had Andromeda Galaxy for some of the night, William had the E.T. Cluster, and Terri had Alberio. At first the objects were able to be seen through the clouds on and off, but then about an hour and a quarter prior to the end of the event, the clouds became so thick that our objects "left us". For the last hour or so, we chatted with the patrons and reminded them to go visit the Moon and Meteorite displays. The evening was really

Terri & her scope, Doctor Who, at DBG Luminaria. Photo taken by Bruce Wurst on Dec 26.

William and his scope, Orion. Photo taken by Bruce on Dec 26.

Howard and his scope, Cannon Jr. Taken by Bruce on Dec 26.

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more kids were in attendance on this evening which was not as cold.

It seemed like a smaller crowd for much of the evening, but when the clouds rolled in my display became extremely busy. People really seem to appreciate our presence there and consider it a highlight. I receive numerous compliments each evening.

There are certainly people every night who have an interest in astronomy and a desire to get a telescope. There are also some pretty bright kids who take interest in what we are doing.

On Dec 21, the Team consisted of: Kevin Witts as a presenter, Sam Insana with his 8", Don Boyd with 8", Howard Moneta with his 14" at the top of the hill, and Mike Marron with meteorites. Mike and Kevin were at the ramada this night. Sam and Don shared the overlook. Once again, it was a very cold night.

Sam writes: On Sunday night Dec 21st at the DBG Luminaria event we again had a lot of high thin clouds. I showed the binary star system Gamma Andromeda with my 8 inch newtonian reflector. The gold and blue stars delighted the hundreds of people who looked through my scope. I gave them facts about their distance from earth and how long it took them to revolve around their common center of mass. I also used the green laser pointer to show them the object they were looking at. Don showed the Orion nebula with his 8 inch scope. He pointed out the Trapezium and how young the stars were and how they were born out of the surrounding nebula of gas and dust. It was sometimes hard to see the nebula because of the high thin clouds, but the Trapezium looked great. Howard used his 14 inch telescope to show the Andromeda Galaxy, M31. There were large crowds around his scope and people could see the bright inner portion of an object 2.5 million light years away. Presenter Kevin set up a great table of outer space items for everyone to enjoy. Presenter Mike was again very popular for showing his meteorites, although one little girl broke one of his large polished meteorites in half. She grabbed it and smashed it so quickly, Frank, who was a volunteer helper for Mike, couldn't stop her in time. Frank asked all the PAS people if they needed breaks for restrooms or drinking fountains. He also helped unload some of the equipment from the mobile carts. The weather was cool, but all the customers seemed very happy with their hot drinks and the PAS presentations and telescopes.

Howard writes: Sunday night went really well. We had some lingering cloud cover that reduced the number of objects that we could observe but we always had something to show, at least until about 9 PM when the clouds really moved in.

I started with the planet Mars until it was too low on the horizon, at which point I moved on to the Andromeda galaxy and showed that for the remainder of the evening. Lines were long, people had great questions - everyone I talked to was really enjoying what we were showing.

After they looked through my telescope, I directed people to the presenter booths and noticed that people were staying there for quite a while looking at all of the interesting items that Kevin and Mike were showing.

It wasn't really cold last night and as far as I know, nobody's telescope got fogged up like last weekend. I showed the Andromeda Galaxy all night. People LOVED it.

Kevin writes: Sunday, 12-21 at DBG: The scopes were blanked out due to clouds for much of the night, so the displays within the ramada were well visited.

People are very interested in the Moons of the solar system and also the planet size comparisons. Most are enlightened about planet comparisons when they review the information that I've created.

The Moon Globe and Mars Globe apps on the iPad are also very popular. I had a teacher from Michigan photographing many of the materials for use with her classes. I gave her my e-mail address and promised to send her files with the info that I've created. We also had a long discussion about activities that could drive home information about the sky and planets.

It's also very apparent that people support exploration of the stars and question why we aren't doing more. That's nice to see.

We also continue to hear how much our presence at the garden is appreciated and how unique the experience is. I think we are building a great relationship with the DBG.

Don writes: Last night started out with high thin clouds, and they got worse as the night went on we never had the breaks in the clouds we were hoping for. I tried to align my scope for about an hour and then Kevin suggested I try Mars, which was just above the hill to the southwest. I had it for about an hour before it wqent behind the hill. After that I struggled for quite a while trying to find the Orion neb, as I could not see the sword at all. Sams helped me find it and I stayed on it till we shut down, By the time we left the clouds were so thick that if we had lost the trapizium, we would never have found it again.

Bruce and his 12" GPS Meade, at DBG, taken on Bruce's I-phone by Terri on Dec 26.

On Dec 22, My awesome telescope team consisted of: Kevin Witts with his 8" scope at the top of the hill, Bruce Wurst with his 12 along with Terri Finch (8") in the overlook, and Don Boyd with his 8" at the ramada. No Presenters were needed this evening, as the sky forecast was Clear.

Terri writes: It was a different kind of evening, one that found us facing very argumentative attendees. It didn't matter what we said: it wasn't good enough. But we still showed a bunch of really cool objects. Even though my scope doesn't like to do the upside down thing, many people craned their necks to see the E.T. Cluster, which is what I put my scope on in the beginning. Then Orion Nebula peeked out over the power lines and for the rest of the night I was showing it. It got colder as the night went on - no clouds, clear skies - it was awesome except for the nasty brown haze over Phoenix. My Nebula became a super beautiful object as the night pro-

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gressed.

Kevin writes: A cool, clear night at the DBG for the Luminaria star party. I fixed on Mars as it rose over the southern mountain and gave early arrivers their first glimpse of the red planet. I then switched to Andromeda as Mars said good night.

I was able to catch both Andromeda and a companion galaxy in one view and stayed on it for the remainder of the night. There were some ooohs and ahhhs and also a few people who were generally unimpressed with the view. Considering the light pollution at the top of the hill, it's a wonder that we can see anything at all. A good night with approximately 1000 visitors.

On Dec 23, the Telescope Team did one last event at DBG before Christmas. In attendance were: Sam Insana (8") at the Overlook Terry Dancer 5" refractor at the Overlook, Bruce (12") at the Ramada, and Roger (16") at the Top of the Hill.§

DBG Luminaria Dec 26-30

Intro by Terri Finch, followed by Various Attendees

Many many thanks to the PAStimes Star Tours Team Members who braved the cold to do these events. We had clouds, we had some unexpected rainfall, and yet the Patrons of DBG kept coming our way. Many thanks also to those volunteers at DBG who sent the 4,000 patrons a night up to see our telescopes and displays. And many many thousands of thanks to Susan Rubin for being a perfect contact at DBG and keeping in touch with me daily as I figured out who to send to DBG that night, based on what we had available. It was a long event, but we all enjoyed doing it! I have the best Telescope Team in the Universe! Many thanks finally to the team of cart drivers who transported us up to "Space Mountain" to do the event.

On Dec 26, the Telescope Team was: Bruce Wurst with his 12" scope at the Ramada, Terri Finch with her 8 with William Finch with his 10 at the Overlook and Howard Moneta at the Top of the hill with his 14. This was the first night we had 4 different size telescopes. We also had Donna Zander in attendance as a helper.

Don writes: Accuweather is saying down to the low 40's by 10pm.

Terri writes: The night was cold, soooooo cold - by the time we packed up, it was 35 degrees outside. I wish to thank the Telescope Team for coming in proper dress, all black! We looked sharp! Howard was amazing at the top of the hill. Down by the overlook, I was on the Orion Nebula explaining that the Orion Nebula was "baby" stars. We had William on the E.T. Open Cluster which are "teenage" stars while Bruce was on M103 a Globular Cluster, which were the "adult" stars. That interested a lot of people. Bruce stayed on M103 all night. William had a green Moon filter and was zoomed in on the middle crater with a peak along the terminator line. I was on the whole moon in red, and I pointed out the crater William was showing. We were on the Moon for half the night before changing to our other object. Unfortunately, during the change, which wasn't more than 30 seconds, William walked away to get another eyepiece and people began touching his scope within seconds. And they didn't like it when I told them not to touch the telescope!! I wish to thank Donna, Bruce's fianceé for attending to be the bathroom reliever. She watched Bruce's scope because it was able to track and stay on M103, while Bruce covered for Howard and then came to us to offer bathroom breaks. We didn't need one at that time, and the line was long. The sign at the entrance to DBG said the event was sold out, which meant 4,000 in attendance. We saw at least 2500 of those people in a steady stream all through the night. Before taking down my scope, from about 9:25 to 9:40 I offered views of Jupiter to a few guests and then to the volunteers of DBG who were chasing the people out at the end of the event. The night was clear of clouds, but the seeing was awful near the horizons so Jupiter may have started to rise about 8:30 or so, but wasn't good for viewing until closer to 9:15 due to the thickness of the atmosphere. Likewise, I had to wait for Orion to get out of the muck before putting my scope on it.

On Dec 27, we had the following Telescope Team at DBG Luminaria: William Finch with his 10" scope, Terri Finch with her 8" at the Overlook. Bruce Wurst with his 12 at the top of the hill, and Don Boyd with his 8 at the Ramada.

Terri writes: This was another very cold evening. All of the scopes started viewing the Moon in various colors of filters to make it more interesting to the patrons. Bruce started out showing the Moon and then showed Andromeda Galaxy the rest of the night. I took the Moon, then moved to Orion Nebula. Near the end of the evening about 9pm, I showed Jupiter as it was rising. William took the Moon, then moved to M103 while I was on Orion; he then took Orion when I moved to Jupiter.

Sam Insana writes: This photo of Don makes him look particularly earthy, a global personality. It seemed he has the weight of the world on his shoulders. Photo by Kevin Witts on Dec 28.

Howard at DBG Dec 28. Photo taken by Kevin

On Dec 28: My awesome telescope team members were: Sam Insana and Howard Moneta set up at the overlook both with 8" scopes, Roger Anzini with his 16" scope at the top of the hill, while Don Boyd brought his 8" and was set up at the Ramada. We added Kevin Witts with his Moon display because clouds were predicted.

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Sam provides the following info about this evening's weather: The 8 weather forecasts predicted clouds for the first half of the night and then clearing. It turned out it was cloudy for the first hour and the last 3 hours were great, clear and cold. The telescopes were manned by Roger, Howard, Don and Sam.

Kevin had his moon and planet display as our presenter, which we very much needed the first hour. For the night our 4 telescopes showed the moon, the Orion Nebula, the Pleiades, the Andromeda Galaxy, and the Gamma Andromeda binary star system. At the end I found Comet 2014/Q2, the Lovejoy comet which had been discovered in August in Australia but only recently appeared in the northern hemisphere. Because of the light pollution from the quarter moon, it only showed the coma - no tail. It was next to M79 globular cluster in the same view using my 26 mm eyepiece. I showed our DBG Hostess Susan, and she was happy to see the comet. I had several customers say they had been to many luminaria nights at DBG over the years and they were very happy to see telescopes for the first time. I suggested they contact DBG and let them know how much they liked the telescopes.

On Sunday night, Dec 28th, at the DBG luminaria night, I spotted comet C2014/Q2, the latest Lovejoy comet, with my 8 inch newtonian reflector. It had been in the southern hemisphere for the last several months, but it recently made its appearance in the northern hemisphere. I saw it next to M79, the globular cluster in the same 26 mm eyepiece view. I could see the coma, but no tail. There was quite a bit of light pollution, with the quarter moon and the city lights of Phoenix. The best time to view the comet will be from Jan 8-15, 2015, when it should be magnitude 4.5 and be high in the sky in Taurus and have no moon interference. You can google the exact coordinates, of Right Ascension and Declination for each night. Have fun viewing it.

Kevin writes: I was a presenter on this evening and brought my set up to show the planets and the Moon. People, as usual, were interested in the information on the Apollo missions and the rocket. The Moon Globe app for the iPad got a lot of attention and I was also able to discuss much about plans to explore Mars and about findings by Curiosity. The highlight of the evening came at the beginning as I was able to round up the crowd early on and watch a 6 minute fly-over of the International Space Station, which cruised directly overhead. Many remarked that it was the coolest thing they'd ever seen. I was also able to introduce some young kids to meteorites as they enjoyed holding the 4 lb Iron Meteorite from my collection. I was also able to show tektites, Lybian glass and Moldavite and describe where each came from.

Don writes: You should have gotten a picture of my scope not set up or ready to go by 5:15. What happened is: I had noticed the last few nights especially Saturday that something was wrong with the rings, so Sunday night since we got there early and I had a little time, I decided to take a look and see what was wrong. I found the problem was that one of the bolts that held my rings to the dovetail was too short and it had stripped out the first thread on the ring. Fortunately the bolt would still thread into the ring but I would need a longer bolt, which I did not have with me. This was at 4:30. Sam told me there was a home depot at 30th street and Thomas, so I rushed over there to find a longer bolt. I got back about 5:30 and put the new bolt in and got my scope working just before dark. I would not have been able to view anything anyway as the moon was behind the slats of the Ramada (again). I was planning on working on my scope at home, if I had not done so at DBG this night.

On Dec 29 we had: Terry Dancer with his 5" refractor (Leeloo) at the overlook, sharing the area with Terri Finch with her 8" (Doctor Who). Bruce Wurst was at the ramada with his 12, and Kevin Witts was at the top of the hill with his 8" scope.

Kevin writes: I was a scope at the top of the hill on this evening and was showing the Moon all night. I was able to point out the Appennius mountain range and where Apollo 15 had landed. We also had good views of Plato, Archimedes and Eratosthenes craters. People commented that the moon finally looked real to them as they enjoyed the view of the features during the half-moon cycle.

Terri writes: Terry and I set up in the overlook. We were set up and ready by

Sam at DBG Dec 28. Photo taken by Kevin on Dec 28. Kevin writes: Sam was rocking the Russian hat last night. He looked like a true cosmonaut.

Kevin with his Moon Display at DBG on Dec 28. Howard took the photo using Kevin's cell phone.

Terry and his 5" scope, Leeloo, at DBG event. Photo by Bruce on Dec 29.

DBG Luminaria Dec 26-30

5:15, but it was a slow day. 5:30 came and went, maybe even 5:50pm before we saw the first set of people. The people enjoyed Kevin's Moon display, then came down and saw the Moon in Terry's and my scopes. I had of course, a red Moon. All three of us were pretty much showing the whole moon; Bruce couldn't get the Moon since the slats of the Ramada were in the way, so he waited it out until the first star could be seen.

The sky was clear, the night was super cold and there was a breeze. This event was not sold out and had less attendance than previous nights. but once the patrons started visiting the scopes, it was mostly a steady, unending line. Later this night, Terry showed the Pleiades while Terri (me) showed the Orion Nebula. About 9pm, Terry moved to Jupiter. Please see the photo of Earthy Don and the awesome caption written by Sam, in this issue.

Shortly after the North Star peeked through, I aligned my scope and then went back to the Moon for a while until the Orion Nebula was not as much in the pollution.

On Dec 30, the last day of this event, we had the following Telescope Team Members: Terry Dancer with his 5" refractor at the overlook, Sam Insana at the overlook, as well, with his 8" scope, Kevin Witts with his Moon display at the ramada and Don, also at the ramada with his 8" scope. Mike Marron came with his Meteorites, as a last minute fill in. Ofelia Waters attended to assist Mike and provide bathroom breaks through the night.

Kevin writes: I was a presenter on this evening and spent a good part of the evening helping Mike out as he had some issues fulfilling his duties on that evening. I was able to show some interesting information about planetary exploration using charts I'd created and also discuss some Apollo information with some folks who helped build some of the components. It wasn't the most satisfying evening I'd ever spent as my focus was divided between the public and ensuring that people were able to maneuver the tight space without harm.

Terri adds: Many thanks to my telescope team. They all did a great job of helping the patrons of DBG enjoy their evening visits. Many thanks also to those team members who were on standby, and filled in where needed.

Kevin and his 8" scope. Photo by Bruce on Dec 29.

"Tails of Plasma, Part 1" Lecture Dec 11

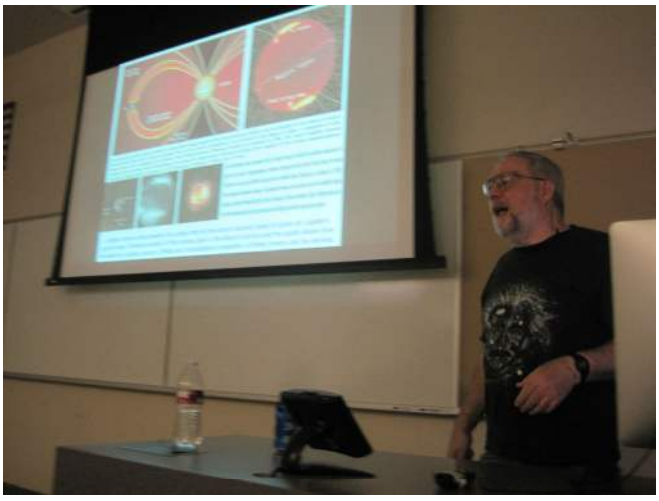
By Terri, Event Coordinator

This was a fun lecture given by Mike Marron. We set up at 6:30 with some help from the attendees; the lecture started at 7:10pm and went to 9:26pm. Our audience consisted of William and Terri Finch, Alex and Diane Vrenios, Ed and Bette Wurst, Don Boyd, Ofelia Waters, Kevin Adams, Bob Senzer, Kevin Harcey, Rodney Fong and Sam Insana. It was awesome to have a nice size audience for Mike to do his presentation.

We had some excitement during this lecture. It started with getting 3 video cameras ready to record Mike. William's video camera shot from the center of the room. Bruce's camera shot from the left front of the room, and Alex's was at the back right of the room. The majority of the video was captured, but the last 20+ minutes didn't record on Bruce's camera, as we used up the whole battery.

We also had 2 still cameras shooting still photos. Don sat front left and I was back a row, against the wall on the front right. The goal was to get enough angles to get some great photos and videos to put together this whole lecture and post it to the internet on Youtube.

Part way through the lecture, several of us realized there were typos in Mike's slides. Then, somehow, the slides quit working, as they showed up blank. With Mike being very concerned over missing slides and info, he stopped the lecture - we had some help from William in trying to get the slides to show their missing photos and finally got back on track. There were several additional times we took an intermission when the slides again wouldn't show and we had to figure out what was going on with them.



Mike "Tails of Plasma, Part 1" Lecture at PVCC.

What I liked about this lecture was the detail. Mike did some great research and found just the right images to match what he wanted us to know. He presented it very well and kept the attention of all the attendees.

I wish to thank the attendees for being an awesome, quiet audience. I would also like to thank the attendees for the snacks we shared and many thanks to Bruce who provided the bottled water for this event. Many thanks also to all who did the photography and provided that data to me for inclusion in the video. This is Lecture 1 of 2. The next lecture will be in the Spring of 2015. Watch for an announcement of where to find the video and of the schedule for the next talk.

The heavyweight champion of the Cosmos

By Dr. Ethan Siegel

As crazy as it once seemed, we once assumed that the Earth was the largest thing in all the universe. 2,500 years ago, the Greek philosopher Anaxagoras was ridiculed for suggesting that the Sun might be even larger than the Peloponnesus peninsula, about 16% of modern-day Greece. Today, we know that planets are dwarfed by stars, which themselves are bound together by the billions or even trillions into galaxies.

But gravitationally bound structures extend far beyond galaxies, which themselves can bind together into massive clusters across the cosmos. While dark energy may be driving most galaxy clusters apart from one another, preventing our local group from falling into the Virgo Cluster, for example, on occasion, huge galaxy clusters can merge, forming the largest gravitationally bound structures in the universe.

Take the "El Gordo" galaxy cluster, catalogued as ACT-CL J0102-4915. It's the largest known galaxy cluster in the distant universe. A galaxy like the Milky Way might contain a few hundred billion stars and up to just over a trillion (10^{12}) solar masses worth of matter, the El Gordo cluster has an estimated mass of 3×10^{15} solar masses, or 3,000 times as much as our own galaxy! The way we've figured this out is fascinating. By seeing how the shapes of background galaxies are distorted into more elliptical-than-average shapes along a particular set of axes, we can reconstruct how much mass is present in the cluster: a phenomenon known as weak gravitational lensing.

That reconstruction is shown in blue, but doesn't match up with where the X-rays are, which are shown in pink! This is because, when galaxy clusters collide, the neutral gas inside heats up to emit X-rays, but the individual galaxies (mostly) and dark matter (completely) pass through one another, resulting in a displacement of the cluster's mass from its center. This has been observed before in objects like the Bullet Cluster, but El Gordo is much younger and farther away. At 10 billion light-years distant, the light reaching us now was emitted more than 7 billion years ago, when the universe was less than half its present age.

It's a good thing, too, because about 6 billion years ago, the universe began accelerating, meaning that El Gordo just might be the largest cosmic heavyweight of all. There's still more universe left to explore, but for right now, this is the heavyweight champion of the distant universe!

Learn more about "El Gordo" here: http://www.nasa.gov/press/2014/april/nasa-hubble-team-finds-monster-el-gordo-galaxy-cluster-bigger-than-thought/

El Gordo is certainly huge, but what about really tiny galaxies? Kids can learn about satellite galaxies at NASA's Space Place http://spaceplace.nasa.gov/satellite galaxies/.

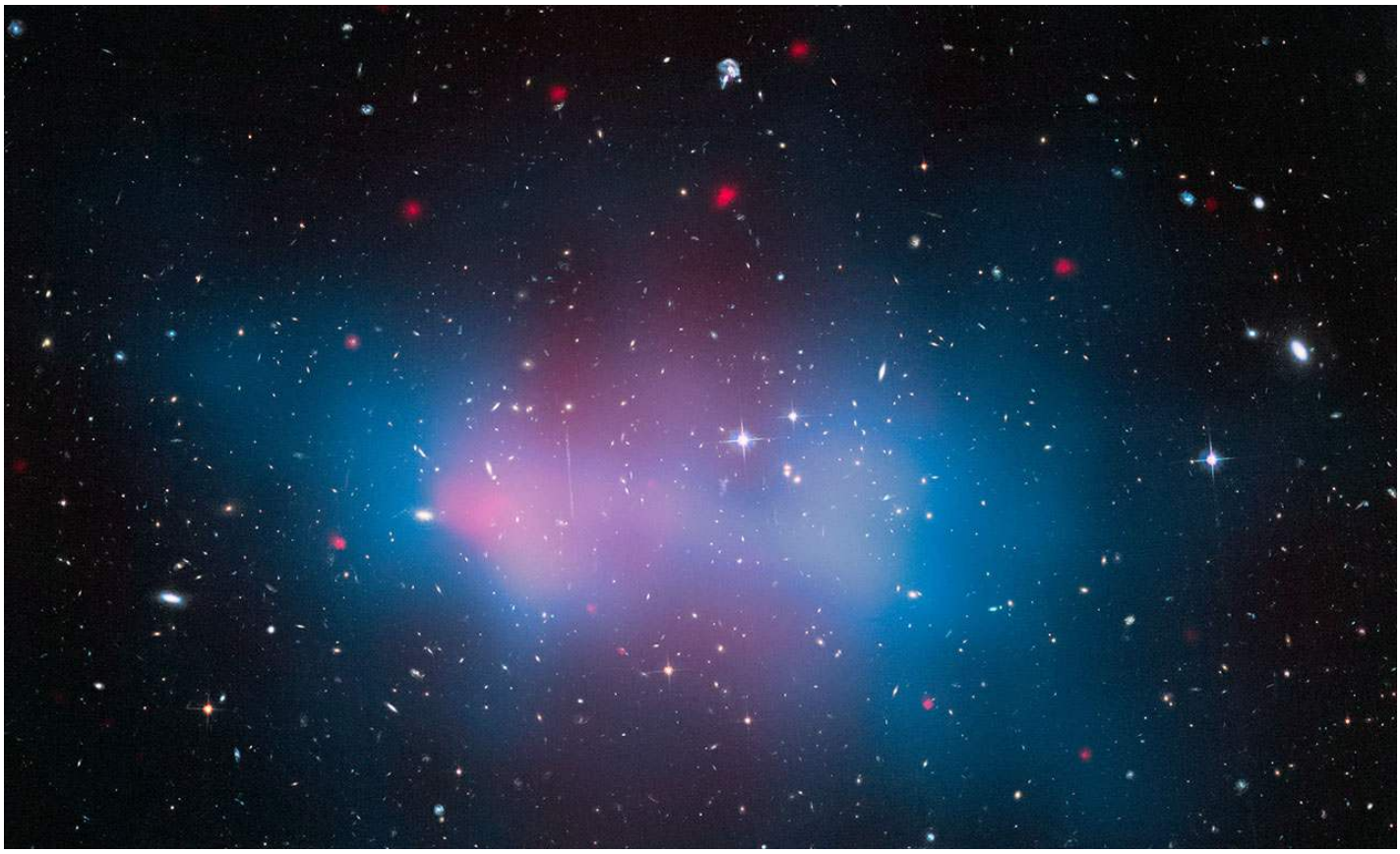


Image credit: NASA, ESA, J. Jee (UC Davis), J. Hughes (Rutgers U.), F. Menanteau (Rutgers U. and UIUC), C. Sifon (Leiden Observatory), R. Mandelbum (Carnegie Mellon U.), L. Barrientos (Universidad Catolica de Chile), and K. Ng (UC Davis). X-rays are shown in pink from Chandra; the overall matter density is shown in blue, from lensing derived from the Hubble space telescope. 10 billion light-years distant, El Gordo is the most massive galaxy cluster ever found.

Thanks from DBG

By 2 Awesome Ladies: Luana & Angelica

Terri writes: I received this wonderful card through the mail (yes, snail mail - the postal service) from DBG, mailed on Jan 31, 2015. I felt it might be nice to share this with the Telescope Team members who also do the Kids Education and Adult Education events at Desert Botanical Gardens with me, as this is also a thank you to you: William, Don, Mike & Bruce.

Angelica writes: Terri, Wishing you a Happy 2015! Thank you for providing enjoyable experiences to the Garden's students, Angelica.

Luana writes: Thank you for being part of our instructor team, Terri! Wishing you the best in 2015, Luana.

Biltmore Prep School Star Party Jan 16

By Various Attendees

The PAS Telescope Team for this event consisted of: Don Boyd (8"), Sam Insana (8"), Rick Cunningham (8"), Roger Anzini (16"), Kevin Witts (8"), and Mike with his meteorites. Many thanks to Thula Ngwenyama for having us at her school event.

Sam writes: On January 16, we had a star party at Biltmore Prep school. It was supposed to be from 7-9 pm, but people started lining up at our scopes at 6 pm. We didn't want to disappoint, so we started showing the night sky one hour early. Kevin, Don, Roger, Rick and Sam showed many different objects like: Venus, Mercury, Uranus, Jupiter, Orion Nebula, Gamma Andromeda double star, Sirius, the Comet Lovejoy, the Pleiades, the Double Cluster in Perseus and other heavenly objects. There were some high thin clouds and some lighting issues but you could still see the objects well enough for people to enjoy themselves. There were several signs telling people not to touch the telescopes, and I told everyone viewing my scope not to touch the scope because with the thin clouds and lighting it would take me 10 minutes to refind the comet. Near the end of the star party a child grabbed my telescope and pushed it around after I had told him not to touch it. He then demanded to see the comet. I told him he could see it in 10,000 years when it came back again but I wasn't going to spend another 10 minutes trying to find it again, so I switched to Jupiter which had just risen above Camelback Mountain. Jupiter only showed 3 Galilean moons that night. The adults seemed to enjoy the comet more than the children who probably expected a fireball racing across the sky. Mike was again a hit with his meteorites.

We were fed Pizza, a lemon cupcake and bottled watered. It was the second year I have done this star party and I would do it again.

Don writes: It was a good event probably 100 attendees. I showed the Pleiades, the Beehive, the double cluster and comet Lovejoy.

Thula writes: Hi Terri, Thanks so much for another amazing event. The kids loved it, though many were not able to hang in there past 8 pm! We hope to make this an annual occasion and appreciate you sharing with us.

Roger writes: Friday January 16 at Biltmore Prep School: I arrived at approx. 4:45pm, parked near the basketball court. I introduced myself to a lady named Claudia, asked if Thula was on the campus. Claudia said that Thula would be arriving shortly and she offered to unlock the basketball court gate so that we might begin setting up for the evening.

All scopes were ready as the sun set into high thin pink clouds. A kind lady from the school offered our group a case of water bottles, and we were invited to partake of any pizza we wanted. With some light remaining in the west several students and parents began joining us on the basketball court. Kevin was the first to point out that Venus could be seen and several scopes swung into action in that direction. Before long Venus slipped behind a courtyard tree and I turned my scope and my viewers to the first star of the evening, sharing a view of golden Capella with several folks, then we turned the scope toward Rigel and its tiny companion.

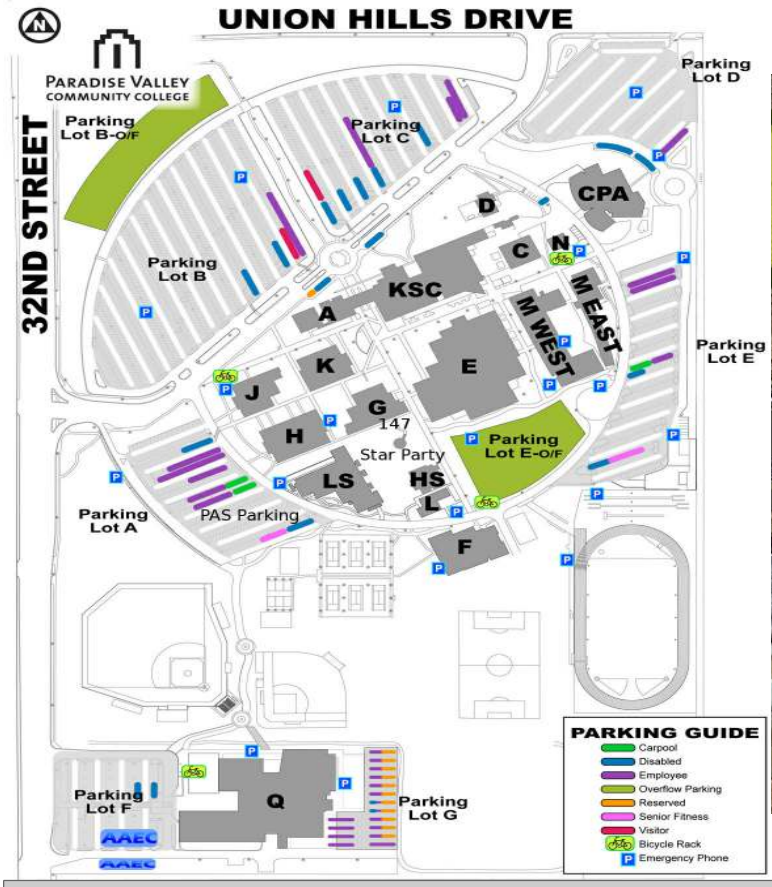
As darkness settled upon us I began to point out the wonders of Orion to several standing with me. The distant stars of The Great Nebula held the attention of students, parents and teachers alike for much of the evening. After showing the fuzzball of Comet Lovejoy to a group of disappointed 5th graders last week I chose not to go there again. So, the Dobsonian went Eastward for Jupiter, only to find that far horizon thick with yellow gloom and smog. Jupiter was there, but that was about all one could say. Suddenly, around 8:30 I looked around for more viewers but the hundreds who had shared the stars with us had all but vanished into the night - and ten minutes after that we were completely alone on a quiet basketball court and looking into an empty parking lot in the distance. After a few more minutes we went back to Jupiter again, it was a bit better but it would be at least another hour before it could climb up out of the Scottsdale gloom. As always, some folks were more excited than others but it seems everyone was happy to join us for a night under the stars.

Kevin writes: I arrived at the star party at approximately 5:30 to set up for the 7:00 start. We set up on the basketball court with a clear view of the southern sky. Once the Sun set, I was able to point out to the attendees that Mercury, Venus and Mars were all visible to the naked eye. I trained my scope on all three and was able to start early (approximately 6:30) and give early arrivals views of all. I stayed on Mars until it set behind some trees at about 7:15 or so. People are always fascinated with Mars, and I was able to discuss the work that the rovers are doing as well as the recent discovery of the ESA's "Beagle" lander that was thought lost on its surface.

I then switched to views of the Perseus Double Cluster and NGC 357 (the Owl Cluster) which is a favorite with kids. There were patchy clouds throughout the night but I was also able to pull in the Blue Snowball planetary nebula and also a view of Uranus. Towards the very end of the evening, Jupiter rose and I was able to give the remaining attendees a look. All attendees were gone by 8:30 so we just spent time talking and looking through each other's scopes until 9:00.

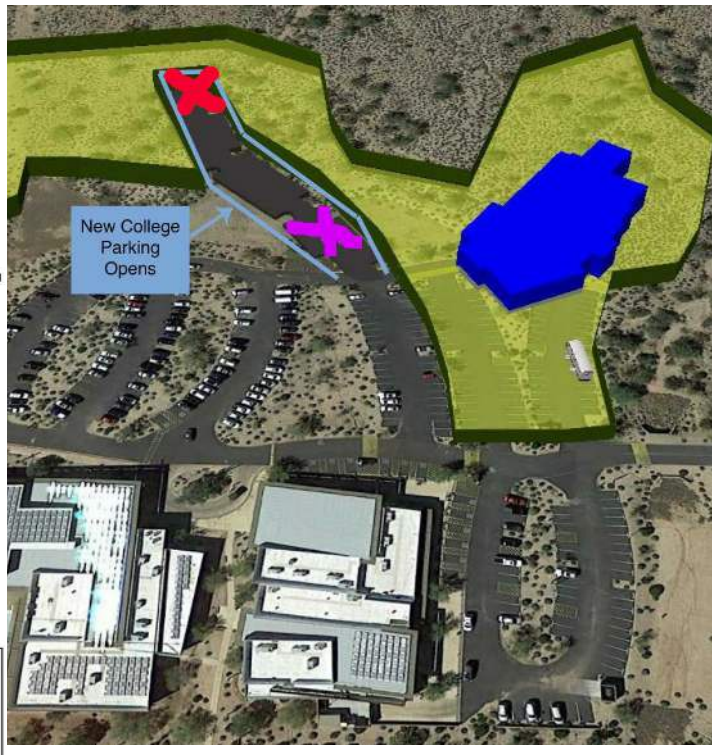
Map of PVCC Main Location

18401 N. 32nd Street | Phoenix, AZ 85032



Black Mountain Campus of PVCC

34250 North 60th Street, Scottsdale, AZ 85266



The Red X is Scope set up. The Purple X is PAS Parking.

March 2015

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 Free Telescope Workshop	2	3	4	5 PAS Meeting LS-205	6	7
8	9	10	11 CTCA (Private)	12 BMC Star Party	13 3 Private Star Parties	14 Visible: Jupiter, Venus, Orion Nebula and Mars
15	16	17	18	19	20	21 Messier Marathon (Private)
22	23	24 School Star Party (Private)	25 CTCA Back up (Private)	26 ASU West Public Star Party	27 2 Private Star Parties	28
29	30	31				

Don Boyd
PAStimes Editor
3039 W Peoria Ave 102-188
Phoenix AZ 85029

To:

2015 PAS GUEST SPEAKER LINE-UP

By Terri, Event Coordinator, Events@pasaz.org

Do you have an idea for a Guest Speaker? Email me the details.
Here's the scheduled Guest Speakers at PAS:
http://www.pasaz.org/index.php?pageid=meetings

Apr 2: Dolores Hill - Topic: TBA
May 7: Earl DeLong "Our Journey to Pluto: Nasa's New Horizons Mission"
Sep 6: Members & Guests Night: Sign up with Terri to do a mini presentation.

Follow PAS on:

Twitter - https://twitter.com/PASevents
Facebook - https://www.facebook.com/PhoenixAstronomicalSociety
Meetup.com - http://www.meetup.com/Phoenix-Astronomical-Society/

What's Up For March?

By Rod Sutter, PAS Past President

Planets

Name	Date	Rise	Set
Mercury	03-15-15	05:53	16:52
Venus	**03-15-15**	**08:09**	**21:10**
Mars	**03-15-15**	**07:43**	**20:22**
Jupiter	**03-15-15**	**15:09**	**04:53**
Saturn	03-15-15	23:57	10:20
Uranus	**03-15-15**	**07:36**	**20:08**
Neptune	03-15-15	05:58	17:53
Pluto	03-15-15	02:57	13:08

All Times Arizona Time

March 15 2015

Sunrise: 06:39
Sunset: 18:36

Full: March 5

Q3: March 13

New: March 20

Q1:March 27