



PAStimes

Phoenix Astronomical Society

www.pasaz.org

January 2020

Volume 71 Issue 5

PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

John Barentine to Speak at Jan 16th Meeting

Data provided by John Barentine

Follow the Gas: How Atoms and Molecules Build Stars, Galaxies and the Structure of the Universe

The story of a typical spiral galaxy like the Milky Way is a tale of the transformation of hydrogen gas to heavier elements through nuclear burning in stars. This gas is thought to arrive in both early times during the assembly of a galaxy and at late times through a combination of hot and cold “flows” representing external processes that continue to the present. Hydrogen is converted to molecules that collect into clouds, cool, condense, and form stars; at the end of these stars’ lives, much of their gas is returned to the galaxy to participate in later generations of star formation. Interactions between galaxies bring more gas to fuel star formation, but the expanding universe continues to carry galaxies further apart making future interactions rare. Then slow, internal processes take over in galaxies, where gas (and the stars it makes) con-

tinue to determine their structures. In this presentation, I will take the audience on a multi-billion-year journey from the Big Bang to the distant future, noting how some of the tiniest constituents of nature — atoms — shape much of the universe we see around us.

John Barentine is the Director of Public Policy for the International Dark-Sky Association (IDA). He earned a Ph.D. in astronomy from the University of Texas at Austin, and previously held staff positions at the National Solar Observatory, Apache Point Observatory, and the Sloan Digital Sky Survey. Throughout his career, he has been involved in education and outreach efforts to help increase the public understanding of science. In addition to his work for IDA, he is a founding member of the University of Utah Consortium for Dark Sky Studies, serves on light pollution committees of both the American Astronomical Society and the International Astronomical Union, and is a Fellow of the Royal Astro-



John Barentine (photo provided by John C. Barentine)

nomical Society. John is the author of two books on the history of astronomy, *The Lost Constellations* and *Uncharted Constellations*. The asteroid (14505) Barentine is named in his honor. His interests outside of

See "Jan 16th Meeting" at top of page 3

December 5th PAS Meeting

By Terri Finch, Event Manager

The meeting started with a Meet & Greet Dinner before the meeting at Chili's on 7th Street and Bell Rd in Phoenix. Ten attendees enjoyed dinner together which included our wonderful Guest Speaker, David Williams and his wife Kim.

The meeting was opened at 7:30pm by President Mike Marron and Sam Insana read a letter from the recipient of the PAS Annual Scholarship, James Arnold. Mike then gave the floor to David. David's presentation on Small Body Missions covered 16 Psyche, Osiris Rex, Lucy Jupiter Orbiter, plus more. David concluded his talk about 8:25pm and then opened up Q&A which

went to 8:40pm.

Mike then took the floor and we had announcements. The announcements and upcoming events were brief this month, then the meeting was adjourned to allow time for the Annual Swapmeet & Garage Sale to proceed. About 9:15pm, President Mike announced all sales would be concluded at this time. Many attendees had left at the conclusion of the meeting, but many more stuck around to finish their transactions. This meeting was really interesting and standing room only. At the conclusion of David's presentation, I counted 35 in attendance, but I was informed that about

See "December 5th Meeting" on page 3.



Dr. David Williams put on a very informative presentation at the Dec 5 PAS meeting. Photo by Don Boyd.

Phoenix Astronomical Society Contact Info

President	Mike Marron	480-488-3031	President@pasaz.org
Vice President	Paul Facuna	602-246-1554	VicePresident@pasaz.org
Secretary	Pete Turner		
Treasurer	Eric Steinberg		
Event Manager	Terri Finch	602-561-5398	Events@pasaz.org
Newsletter Editor	Don K. Boyd		Editor@pasaz.org
PAS Host	Stu Brackney	480-221-5711	stubrckney@gmail.com
Librarian	Rod Sutter		Librarian@pasaz.org
Member at Large	Jenny Weitz	602-787-6818	
Member at Large/Equipment Manager	Bruce Wurst	602-971-3555	Brulipps@yahoo.com
Webmaster	Chris Johnson		Webmaster@pasaz.org

Phoenix Astronomical Society 3039 W Peoria Ave Ste 102 PMB 188. Phoenix AZ 85029

PAS Upcoming Events for January

By Terri Finch, Event Manager

Check out these and other fun events on the PAS Calendar: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2997&day=2020-1-16&c=1> RSVP where requested to Events@pasaz.org. On the PAS Calendar, "Private" means the event is for PAS members only. If you wish to become a PAS member and attend the private events, please download a membership form here: <http://www.pasaz.org/forums/downloads.php?do=file&id=129>

Jan 16: PAS Meeting at PVCC Main Campus in LS-203 at 7pm. More details:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2997&day=2020-1-16&c=1>

Jan 23: Huge Public Star Party at Black Mountain Campus of PVCC from 6pm to 9:30pm. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2991&day=2020-1-23&c=1>

Jan 25: Public Star Party at Tonto National Monument from 6pm to 10pm: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=3029&day=2020-1-25&c=1>

[25&c=1](http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2983&day=2020-1-30&c=1)

Jan 30: Free Telescope Workshop from 7pm to 9:30pm: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2983&day=2020-1-30&c=1>

At the time of completion of this issue of the newsletter, several more events were in the planning stages and could not be listed as "Scheduled" until they are definitely happening. Please see our online calendar for the events that didn't make it into this list: the link is at the top of this article.



Isis Delph with her "Space Painting" in her bedroom at her piano.
Photo by Terri.



For the Oct 11, 2018 PAS 70th Year Anniversary celebration held at Black Mountain Campus, Terri's flute and piano student painted an awesome space related image to be part of the display at this event.
Photo by Terri Finch.

Continued from page 1

astronomy and light pollution research include history, art and architecture, politics, law and current events.

Terri, Event Manager adds: John will be doing a book signing of his books at the meeting. However, he doesn't have that many hard copies to sell in person and asks that you purchase his book on Amazon, and

Jan 16th Meeting

bring it along to be signed. He will have a few copies for sale at the meeting.

Bring family and friends as we Ring In The New Year at the January 16th PAS Meeting with this fantastic Guest Speaker. Please bring a snack to share and if you don't have time to grab one on your way to the meeting, bring a donation for the snack

fund. The plan is that all snack fund cash will be used to pay for part of the Pizza Party in April 2020.

We hope you can join us at this meeting. Doors open at 7pm and by 7:30pm the meeting begins. Water will be provided by the PAS Snack Fund. Happy New Year!!!

Continued from page 1

December 5th PAS Meeting

10 more attendees had left earlier in the evening due to a lack of seating.

Many thanks to Stu Brackney for being the wonderful Host of this meeting and asking everyone to sign in. Stu also delivered delicious snacks around the room before the meeting started, and he brought the popcorn. Thank you so much Stu.

I wish to thank the attendees for bringing so many snacks. The case of water was purchased through the snack fund. I must apologize for forgetting to bring the snack fund box and this month, PAS didn't take

any cash in for the snacks.

I also wish to thank everyone who updated their membership for 2020 on this evening, and those who picked up their name badges. I wish to thank John Kundrat for purchasing a raffle ticket and then donating it to the club. It didn't win this time, but the gesture is very much appreciated. The raffle was won by PAS Member, Jean.

It was a wonderful meeting, really quick and short, even though several of the Members were still in the room until 9:55pm chatting.

Stu writes: December 7, 2019, Good Saturday morning Paul,

Just a brief note to express my appreciation of the guest speakers you obtain for our club. Professor Williams tickled my interest in all that he discussed this past PAS meeting, although I must admit discussions about mineral makeup of meteorites and asteroids is a bit above my level of knowledge.

Again, thanks for what you do to keep all of us informed and learning more about that which hovers above us.

2020 Spring Upcoming PAS Events

By Terri Finch, Event Manager

PAS has a very busy schedule set up for Spring 2020 and we would love for everyone to enjoy these upcoming Public events. More events can be found at the Online PAS Calendar at <http://www.pasaz.org/forums/calendar.php>.

* Free Telescope Workshop: The Spring 2020 dates for this event are Jan 30, Feb 13, and Apr 9.

* PAS Monthly Meeting with Guest Speaker: These events fall on Jan 16, Feb 6, Mar 4, Apr 2, and May 7.

* Black Mountain Campus Public Star Parties: These events are on Jan 23, Feb 20,

Mar 19, and Apr 16.

* Additional Public Events for Spring 2020 are: Public Star Party on Jan 25, and Public Star Party Apr 25.

More events will be posted to the Calendar as they become planned and scheduled. Thanks to everyone who attends our events. Hope to see you there!!!

What's Up For January?

By Don K. Boyd, PAStimes Editor

Name	Date	Rise	Set
Mercury	01-15-19	07:55	17:52
Venus	01-15-19	09:01	20:36
Mars	01-15-19	04:15	14:19
Jupiter	01-15-19	06:33	16:28
Saturn	01-15-19	07:24	17:28
Uranus	01-15-19	12:13	01:25
Neptune	01-15-19	10:12	21:43
Pluto	01-15-19	07:269	17:26

All Times Arizona Time

Bold means the object is "visible" in the evening

PAS is incorporated in the state of Arizona as a non-profit, scientific and educational 501(c)(3) organization. Our newsletter PAStimes is published monthly from September to May and distributed via Internet. All Issues are available for download on our website www.pasaz.org. Ads for astronomy equipment are provided as a courtesy to sellers and buyers, and do not constitute any endorsement by PAS. All Photos by Don Boyd unless otherwise credited. All articles and photos are copyright their authors or PAStimes.

January 15, 2019

Sunrise: 7:33

Sunset: 17:43



Q1: January 2

Full: January 10

Q3: January 17

New: January 24

GODO Dedication Ceremony Sept 14

By Invited PAS Attendees of this Event

Terri Finch writes: Lowell Observatory in Flagstaff invited a few PAS Members to the Dedication Ceremony of the Giovae Open Deck Observatory. Attending from PAS was President Mike Marron, William and Terri Finch, Ed, Bette and Bruce Wurst, Sam Insana and Vice President Paul Facuna.

The evening included snacks and drinks, which were very tasty and appreciated, mingling with other sponsors of the GODO, and then the dedication ceremony. It was just getting dark when the dedication started. The microphones had trouble many times during the evening, but the event went well. Afterwards, we were allowed to walk between the telescopes, talk to the volunteers standing by each telescope, and check out the Donator's Wall and other features of this awesome event.

William and I stayed around the telescopes talking to the operators (it was too cloudy to see anything through the telescopes) and then, at about 9pm, we wandered into the Gift Store at Lowell, joined Sam and Paul as they were waiting on Mike to finish talking about the Cave Creek Crater. We all departed at about 10:15pm.

I wish to thank Bruce Kovaseach for inviting PAS to be involved in the donation and participation in the Dedication Ceremony. PAS is named at two locations at the Observing Deck, a smaller circle on the Dedication Wall, and the E=MC2 plaque which can be found near the entrance and path to the bathrooms. It was an enjoyable evening.

Bruce Kosaveach adds: Thanks so much for driving up for the dedication and I'm glad you enjoyed it. I worked the GODO last Thursday for one of the member preview nights and luckily it was a clear night. The telescopes performed magnificently and you guys are in for a real treat when you can come up again! The PAS has been a great supporter of Lowell and we're very appreciative. Thanks for all you do - it's a pleasure to know you all!

Update from Lowell Observatory

PAS received a very nice letter from Lowell Observatory with an update about the GODO project. Please enjoy!

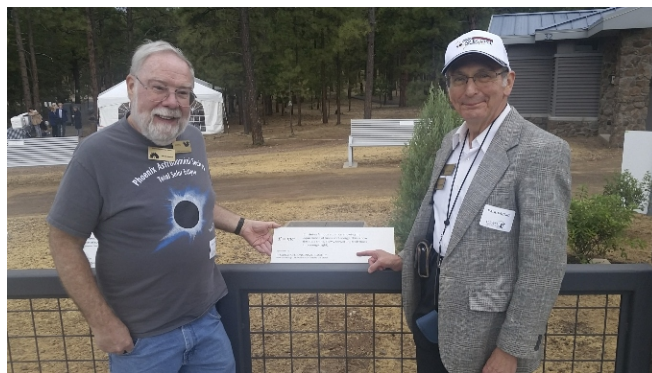
By Jeffrey Hall, Director

The GODO is up and running, and we're beyond thrilled with how it turned out. After our donor preview on September 14, we entertained hundreds of our members on our "sneak peek" nights in late September, and the grand opening on October 5 exceeded all expectations. We had 1,813 visitors that day - our largest one-day attendance ever - and a completely clear night for viewing.

Despite the enormous October 5 crowd, I was struck at how relatively uncrowded the campus felt. It suddenly felt like there were so many venues, from the Clark to the Slipper Building, the Steele Visitor Center, and the GODO, that there was just a huge amount to do and a tremendous amount of space for everyone.

Another thing that became clear was how well the design of the GODO works. The spacious plaza handled all the people and the lines effortlessly. At all times, there was plenty of room between the telescopes, so people could easily walk around to the viewing experience of their choice. And the lines moved much more quickly! No more will our educators have to be constantly repointing the instruments, or helping folks up to inconveniently-placed eyepieces. The whole facility is incredibly efficient, which will markedly improve our guests' experience here.

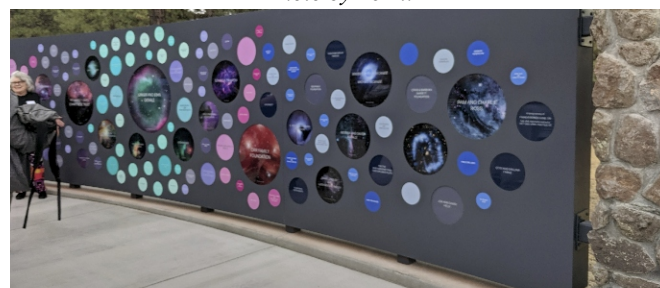
And finally, there's the impact on lives that is already becoming apparent. Our faculty member Phil Massey was on duty for the evening's "Meet an Astronomer." He later reported



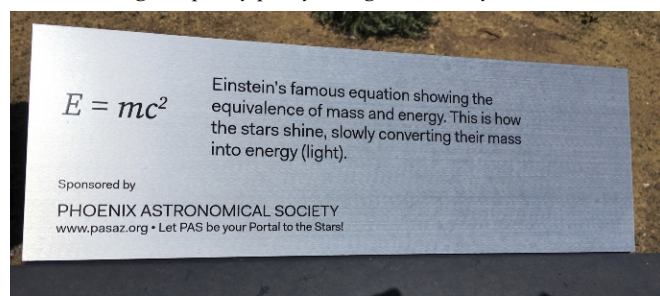
President Mike and Vice President Paul stand near the plaque PAS purchased. The Plaque says E=MC2. Photo taken by Sam Insana.



Sam at the GODO Dedication Ceremony of Sept 14, 2019. The clouds never went away this evening. Sam's tie is astronomical! Photo by Terri.



This is the majority of the Donor Wall. PAS can be found in the center of the wall, in the light green area, at the bottom. This wall lights up very pretty at night. Photo by Terri.



This is the plaque PAS purchased to help Lowell Observatory create the Giovae Open Deck Observatory. Many thanks to Bruce Kosaveach for sending me this photo.

that as he left, he overheard a kid saying excitedly how cool the experience was...and that he had decided to become the first Native American to walk on the Moon. Our Deputy Director for Education, Samantha Gorney, also reported an anecdote to me. One of our guests last Saturday night was a little girl in a wheelchair. Her parents were looking a bit uncertain as they

wheeled her up to one of the big telescopes. But with a quick tap on an iPad, our educator Jakob Irish engaged our adjustable telescope pier and the whole instrument smoothly dropped downward with a quiet whirr, putting the eyepiece right where it needed to be for the little girl to share the experience of the evening. As Samantha reported it, her parents were taken aback -

in the most pleasant way imaginable.

With the GODO, we are now playing at a whole new level in the

astronomy outreach arena. Walking around the campus on Saturday night, watching the buzz of activity and all the inspiration and awe that was being provided to so many, I felt incredibly proud of the team and so grateful to you and everyone who made this marvelous facility happen. Thank you!

Best, Jeffrey Hall Director

P.S. I've enclosed a photo of the Albert Einstein equation your organization sponsored. I'm delighted to have you represented on the GODO plaza and donor wall.

Bruce Kosaveach from Lowell Observatory provided this link to PAS: Here is a link to the Giovale Open Deck Observatory with photos of the telescopes:

<https://lowell.edu/giovale-open-deck-observatory/telescopes/>



Giovale Dome open showing 6 telescopes. Photo by Jeffrey Hall.



Giovale Dome closed. Photo provided by Jeffrey Hall at Lowell Observatory.



The roof of the building slid off to reveal the 6 telescopes mounted on the observing deck. Many people were at this dedication ceremony. Photo by Terri.



Prior to the dedication ceremony, I took this photo through the window of the closed building that houses the 6 telescopes. Photo by Terri.



PAS is on the Donor Wall in the bottom center pale green circle. Photo by Terri.

Otsukimi Moon Viewing Festival Oct 11 & 12

By Terri Finch, Event Manager

October 11th at the Japanese Friendship Garden (JFG) was an amazing event. Attending from PAS were: William and Terri Finch with the PAS Table of hand-outs, Sam Insana who brought his 8" telescope and Mike Marron with his meteorite collection. Shayna Price requested that everyone, not just PAS, set up at 5pm and be ready for the public to arrive from 6:30pm to 10pm. Sam arrived first and chose a wonderful location for his telescope set up. Mike arrived about the same time as William and I, and we set up at the 2 tables down the walkway from Sam's location.

The weather was extremely awesome and it was totally clear skies. Sam was able to show first Jupiter, then Saturn, then the Moon, which of course, due to the name of this event, is the star of the show!

During the evening, Frank Otsuka and his wife Kathy, from PAS, attended the event and PAS took in new member Natalie Harbeke. Welcome to PAS Natalie!

Sam had gotten food about 6:30pm, and the event started and he didn't finish eating his dinner until 9:30pm when the crowd stopped visiting his table and he had a moment to finish eating and then pack up to go home.

The event concluded about 9:30pm when most of the public departed and Sam and I started to pack up. Mike, of course, was talking to the public until 10:30pm, when I suggested he pack up as he has to do this event again the next day.

Then on Oct 12th, with a similar set up,

we had William and Terri with the PAS table, Mike with meteorites, and this time Paul Facuna brought Don Boyd and Don's scope to the event. Don set up where Sam was the night before.

On both nights, the scope operator had no time to think between people. It was a constant line of the attendees to look through the telescope. Mike also had a constant collection of people around his table for most of the night. On this night, Don had picked up a Subway sandwich and ate it before 6:30pm, as he heard from me about how Sam had no time to eat from the start of the event to the conclusion. This night, the event ended about 9:30pm, but people were hanging around at the telescope until about 10:10pm, and that's when Don and I started packing up, and then Mike was talking with people until about 11:30pm. William had helped Don get his equipment back to Paul's car, while I kept an eye on the meteorites for Mike as he chatted. It wasn't until William and I said we were leaving now, that Mike packed up and we headed home at about 11:50pm.

They were two wonderful, fun evenings, that were very exhausting. Before we left, I stopped by to talk to Shayna and she wants PAS back again next year. William and I enjoyed the food trucks that were there, but spent way too much on food this year. Many thanks to Shayna for providing a case of water and a bucket of ice for the Telescope Team to enjoy during the event. The water, by the time we talked to thousands of people, was very appreciated.

Many attendees mentioned they had been hoping PAS would be there again this year. Several of them said they went out of their way to find out if a telescope was set up and what it was viewing, earlier in the evening, to make sure they got the chance to view through it at least once that night. Many thanks to Shayna for having PAS at this event. And many thanks to Raina Schlick, last year's JFG Event Coordinator of this event, for getting PAS a parking spot at the Irish Cultural Center for Don to park and not have to walk the distance that Mike, William and I had to for loading and unloading at this event. I also appreciated meeting Shayna's and Raina's families at this event. It was awesome and I look forward to doing it again next year!

By **Sam Insana**, PAS Member

I showed Jupiter for 1 hour, Saturn for 1 hour, and the Moon for 1 1/2 hours. There was always a line of people looking through the scope. The hundreds of people enjoyed these show-piece objects and also asked several astronomy questions.

It was a beautiful night with no wind or clouds. The Japanese Gardens were wonderful with lanterns, koi ponds, sculptured trees, dancers, musicians, and fine food. When the large drums were beating, Saturn did a dance in the eyepiece from the vibrations, an extra added attraction.

Don adds: I showed Jupiter until it set behind the trees. Then I showed the moon until the end. Paul was very helpful and prepared people to look through my scope.



Mike Marron's meteorite table at the Japanese Friendship Garden event of Oct 11th with William Finch on the right. Photo by Terri



Mike sharing his meteorite collection with attendees at the Otsukimi Moon Viewing Festival of Oct 11. Photo by Terri.



Mike and William during set up of the Oct 12th Otsukimi event. Photo by Terri.



On Oct 12th, I brought my flatbed wheels for Don to use, and then used it to put up the PAS banner by the PAS table on this night. Photo by Terri.



Attendees enjoying a view through Sam's telescope on Oct 11th at the Japanese Friendship Garden of Phoenix. Photo taken by Sam Insana.



Mike & William at Mike's meteorite table and the PAS table all lit up on the right side of this photo. This year, since the Telescope was set up down the path from the PAS table, the PAS table was more than red, it was colorful. Photo by Terri on Oct 11th.



Mike and his meteorites with a crowd around his table. The show in the background this year had a bright light pointed towards Mike's table. That light made for a nice silhouette of the group around the table. Photo by Terri on Oct 12th.

Observe the Moon Night at Roadrunner Park

By Terri, Event Manager

The evening of October 5th was a Saturday and we had a super turnout at this event. PAS provided Mike Marron with his meteorites as well as William and Terri Finch who ran the PAS table of handouts. PAS had 4 telescopes at this event: Sam Insana brought his 8" scope and showed the Apollo Moon Landing Site, Sea of Tranquility; Paul Facuna assisted Don Boyd with Don's 8 inch scope, providing a view of the Whole Moon and there were a lot of great compliments about the view through Don's telescope; Frank Otsuka brought a wonderful binocular viewer 5 inch scope and put it on Saturn and I heard a lot of "Wow's" behind me at Frank's scope; then we had Calvin Vance who brought his 6 inch Dobsonian. An additional helper from PAS was Stu Brackney. We also had a few PAS members attend to enjoy the views:

Kim Hollingsworth and her daughter Melody McClure, as well as Nancy Anaker.

Some other guests present I had invited were: Cathy, Eddie, Orion and Isis Delph (Isis is my Piano and Flute student), and a Pokemon game friend Yvonne also attended.

William and I got there to set up about 6:30pm and 3 of the 4 telescopes were already set up, as set up was for 6pm. The event was 7:00pm to 9:30pm with just about the whole group packing up about 9:20pm. I would say we had over 100 people stop by to look through the telescopes. The night was a perfect temperature. The telescopes showed the Moon, Jupiter and Saturn. The only issue on this night was the bright Volleyball Court lights that were aimed straight at the telescopes. This was awesome for Mike and the PAS table, but

terrible for the telescopes, as the three main objects were in view beyond those lights. We were set up on the South East side of the lake at the park.

I would like to thank the telescope team for attending, showing such great views, and helping out at this event. And thanks to everyone who looked through our tele-

scopes and visited Mike's meteorite table and me at the PAS table. It was a very pleasant, exhausting, but fun evening.

Many thanks to Stu and Sam for the wonderful photos they took during this event.

Sam Insana, PAS Member adds: PAS had 11 members attend the festivities at Roadrunner Park in Phoenix. Mike Marron did his Meteorite presentation and Terri and William Finch did handouts for the crowds.

It was a beautiful night with no winds or clouds. Over 100 people showed up for the 2.5 hour star party which was set up just south of the lake at Roadrunner Park.

Cal Vance had his 6 inch Dobsonian telescope, Frank Otsuka had his 8 inch Schmidt Cassegrain with binocular viewer (which gave a 3 dimensional look to the objects shown), Don Boyd and Paul Facuna had the 8 inch Astrograph, and I had my 8 inch Newtonian reflector.

We took turns showing the 50% Moon, which looked great with its terminator line and shadows on the craters and mountains.

Jupiter and Saturn were a favorite of the crowds.

Although the park had bright lights on for the volleyball, basketball, and softball games, the three objects we showed were so bright that it didn't matter. Stu Brackney stayed the entire time, explaining astronomy to the crowds and answering questions in English and in Spanish. Kim and Mel Hollingsworth from PAS also attended this event.

The children loved the telescopes so much that they came back for seconds and



Many visitors to the Roadrunner Park on Oct 5th were thrilled to look at the Moon, Jupiter and Saturn through PAS telescopes. Sam's telescope (in this photo) was very busy for the whole event. Photo provided by Sam Insana.



This wonderful young gal may grow up to be an astronaut after seeing a spectacular view of the Moon through Don's telescope. Photo by Kim Hollingsworth.

thirds to see the planets and the moon.

Rick Cunningham, our outgoing Secretary, is to be complimented on getting press releases out for PAS about this event.

People said they read about it in the newspaper and some saw and heard them mention it on television on Channel 12 and on Facebook. We have done this event at Roadrunner park for four years and this was the best turnout ever.

Stu Brackney, PAS Member adds: I attended the International Observe the Moon Night at Road Runner Park and was very impressed with our club's presentations, allowing the public to see and learn. The tables with string lights is a very nice effect and made it easy for me to find. By the way, I was told by a few of our visitors they either read about the event in the paper or saw it on local tv news. Nice publicity,

by golly! The various telescopes set up gave some sky watchers a chance to not only learn about what's up in the sky, but also what types of telescopes can be used to view them. Our club can be very proud of conducting such events.

What a nice event, stimulating the interests of young and old in the heavens above, nice job everyone, made my day.



Frank Otsoku was enjoying showing a binocular view through his telescope of Saturn & the Moon. The people who looked through Frank's scope and then came to talk to Terri at the PAS table were super thrilled with the view!!!

Photo by Stu.



Sam shared the view in his telescope with these two fine young boys. Photo by Stu.



Looking to the heavens, upward on Sam's telescope towards the Moon, one can see how bright the Volleyball Court lights were on this night. But, the Moon was a wonderful sight to enjoy! Photo by Stu Brackney.



Don Boyd was sharing the whole image of the moon in his telescope in this photo. Photo by Stu.



Mike Marron is in his preferred habitat enjoying the sharing of his Meteorites with the kids at his table. Natalie was Mike's helper this evening. Photo by Kim.



Kim took this wonderful red lit image of Terri Finch. In the background, we can see Don's scope on the left, and Frank's scope on the right.



Spot the Young Stars of the Hyades and Pleiades

David Prosper

Orion is the last of a trio of striking star patterns to rise during the late fall and early winter months, preceded by the diminutive Pleiades and larger Hyades in Taurus. All three are easily spotted rising in the east in early January evenings, and are textbook examples of stars in different stages of development.

As discussed in last month's Notes, the famous Orion Nebula (M42), found in Orion's "Sword," is a celestial nursery full of newly-born "baby stars" and still-incubating "protostars," surrounded by the gas from which they were born. Next to Orion we find the Hyades, in Taurus, with their distinctive "V" shape. The Hyades are young but mature stars, hundreds of millions of years old and widely dispersed. Imagine them as "young adult" stars venturing out from their hometown into their new galactic apartments. Bright orange Aldebaran stands out in this group, but is not actually a member; it just happens to be in

between us and the Hyades. Traveling from Orion to the Hyades we then find the small, almost dipper-shaped Pleiades star cluster (M45). These are "teenage stars," younger than the Hyades, but older than the newborn stars of the Orion Nebula. These bright young stars are still relatively close together, but have dispersed their birth cocoon of stellar gas, like teenagers venturing around the neighborhood with friends and wearing their own clothes, but still remaining close to home - for now. Astronomers have studied this trio in great detail in order to learn more about stellar evolution.

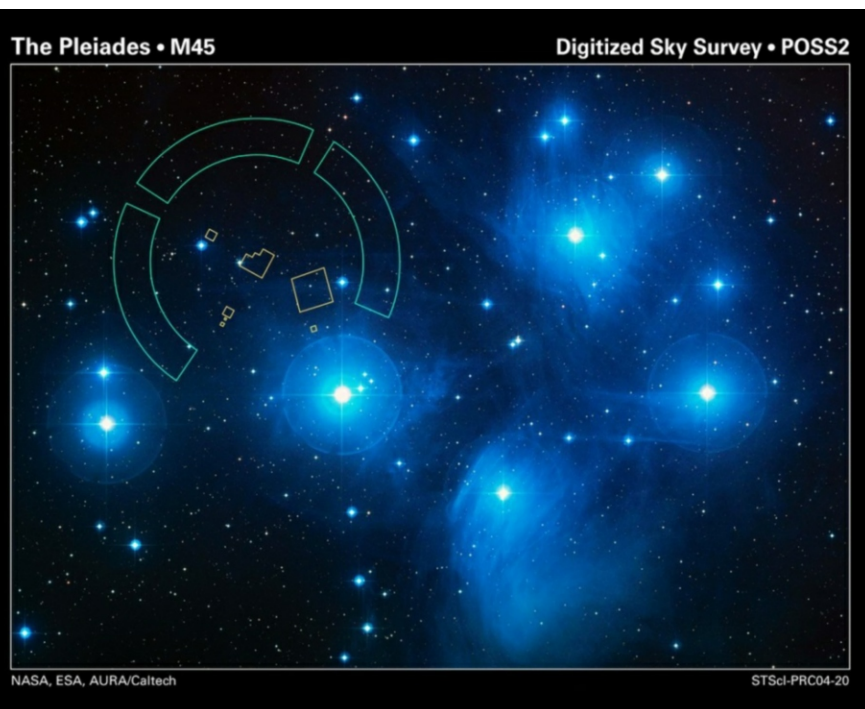
Figuring the exact distance of the Pleiades from Earth is an interesting problem in astrometry, the study of the exact positions of stars in space. Knowing their exact distance away is a necessary step in determining many other facts about the Pleiades. The European Space Agency's Hipparcos satellite determined their distance to about 392 light years away, around 43 light years closer than previous estimates. However,

subsequent measurements by NASA's Hubble Space Telescope indicated a distance of 440 light years, much closer to pre-Hipparcos estimates. Then, using a powerful technique called Very Long Baseline Interferometry (VLBI), which combines the power of radio telescopes from around the world, the distance of the Pleiades was calculated to 443 light years. The ESA's Gaia satellite, a successor to Hipparcos, recently released its first two sets of data, which among other findings show the distance close to the values found by Hubble and VLBI, possibly settling the long-running "Pleiades Controversy" and helping firm up the foundation for follow-up studies about the nature of the stars of the Pleiades.

You can learn more about the Pleiades in the Universe Discovery Guide at bit.ly/UDGMarch, and find out about missions helping to measure our universe at nasa.gov.



Locate Orion rising in the east after sunset to find the Orion Nebula in the "Sword," below the famous "Belt" of three bright stars. Then, look above Orion to find both the Hyades and the Pleiades. Binoculars will bring out lots of extra stars and details in all three objects, but you can even spot them with your unaided eye!



Close-up of the Pleiades, with the field of view of Hubble's Fine Guidance Sensors overlaid in the top left, which helped refine the distance to the cluster. The circumference of the field of view of these sensors is roughly the size of the full Moon. (Credit: NASA, ESA and AURA/Caltech)

Tonto

National Park Service
U.S. Department of the Interior
National Monument
Arizona



PARK AFTER DARK NIGHT SKY SERIES

FREE SATURDAY EVENING EVENTS!

November 23, 2019 – **Scorpions: From the Desert to the Sky** – 7:00-9:00 p.m.
December 14, 2019 – **Annual Luminary Event with Night Hike** – 6:00-9:00 p.m.
January 11, 2020 – **Stories of the Sky: Night Hike** – 7:00-9:00 p.m.
January 25, 2020 – **Celestial Celebration with Night Hike** – 6:00-10:00 p.m.
February 8, 2020 – **The Beautiful Moon** – 7:00-9:00 p.m.
February 22, 2020 – **Milky Way Photography 101** – 7:00-9:00 p.m.
March 21, 2020 – **Meteorites in Ancient Cultures** – 7:00-9:00 p.m.
April 4, 2020 – **Nocturnal Neighbors: Night Hike** – 8:00-10:00 p.m.
April 25, 2020 – **Our Future in Space Exploration** – 8:00-10:00 p.m.

Please bring water and snacks, a flashlight or headlamp, warm clothing, and closed-toed shoes.

Explore the wonders of the night at Tonto National Monument. Night sky events will include star gazing, astronomy programs, telescope viewing with astronomers from the Phoenix Astronomical Society, and Junior Ranger Night Explorer activities for kids! Night Hike events will include a guided interpretive hike to the Lower Cliff Dwelling after dark.

Tonto National Monument
Visitor Center : 928-467-2241
26260 N. AZ HWY 188
Roosevelt, AZ 85545

www.nps.gov/tont

Park Meadows School Star Party Oct 24

By Roger Anzini, PAS Member

On Wednesday, October 23rd I visited Park Meadows School to confirm times and setup location with the main office staff.

My contact was Kathi, a warm and friendly administrator. Kathi and the school chief engineer walked me out to the basketball courts where our viewing was to take place in 24 hours.

A smooth basketball surface with a panoramic view of the sky seemed just the

ticket for Pete and I to share our two scopes and stars with 300 kids and parents.

Just after sundown on October 24th, Pete Turner and I readied our equipment for an exciting night of stargazing. Little did we know that as the Sun went down the adjoining baseball field would light up nixing any chance of finding and showing any deep sky objects. In order to view Jupiter and Saturn, Pete and I held up large poster boards to make enough shade for each of our 300 guests at the eyepiece.

What is it they say.....when you are handed lemons.....make lemonade.

Kathi promised to have us return in the spring with NO Little League baseball disrupting our next event.

Pete adds: Had several hundred observe. We viewed Jupiter and Saturn because of the lights from the baseball field next door. Our contact said she will schedule the next event on a date when she can ensure the lights are turned off.

Solar Event at PVCC Oct 15

Mark Johnston, PAS Member

Oct 15th I set up my HA solar scope for Lori Prause and her astronomy class at the main campus of PVCC. We were treated to a nice solar prominence but the surface was relatively featureless. I discussed the Parker Space Probe and the solar cycle and other basics. Everyone had a good time.

Mesa Academy School Nov 1

By Roger Anzini

PAS had provided scopes to be set up in a parking lot close to the school gym where the indoor activity was being held.

I arrived at about 4:15pm, made contact and setup my 16 inch DOB in a sectioned off area of the parking lot. Pete Turner arrived with his 12 inch DOB. We watched Mark Johnston setup his new mount topped with his large refractor.

Mike Marron pulled in with his space rocks along with a broken shoulder. We

helped Mike get setup inside the gym and began to show the Moon, Jupiter and Saturn before 6pm.

As Mark said, "the good tasting cheese burgers" arrived after 7pm, so we ate on the run as we continued showing objects.

Mark's new GoTo nailed over a dozen great objects while Pete and I continued on the Moon and Saturn. It was a fun event for all.

Solar Viewing at BMC Nov 4

By Mark Johnston, PAS Member

On Nov 4, I did a solar event for Lori Prause's astronomy class at the Black Mountain facility. The Sun was quiet, no sunspots and only one tiny prominence. But lots of granulation on the surface. I talked about the NASA Parker Solar probe, as well as general information on the Sun and how it works, how it will die etc. About 20 students attended.



Mark Johnston provided views of the Sun's surface through his amazing telescope on November 4th at a private event for one of the instructors at BMC. Photo provided by Mark.

Tonto National Park Star Party Nov 10

By Ted Blank, PAS Member

I set up two telescopes tonight due to the number of people (22+) and it worked out well. At 8 o'clock they invited us over to sample the food, so we could rave about it, which I will do because it's five star. And they also asked for some pictures of the moon to put on their website, which I gave them. It was a successful, fun event!

Pinnacle Peak Star Party Nov 16

By Mark Johnston

Sunday Nov 16th had a great star party at Pinnacle Peak Park. Had at least one attending who learned about the event from the PAS website. Had a full house of 30 participants with 10 on the waiting list. Had great views of Jupiter, Saturn, Albireo, Uranus, Neptune, Eta Cass, Owl Cluster, and then with night vision: Crescent nebula, M31/32/110, M13, Veil Nebula, and the Ring nebula. M31 was barely visible naked eye with averted vision. Had lots of good questions too.



Mark Johnston provided this awesome photo taken from Pinnacle Peak Park on Nov 16, 2019.

Country Meadows School Nov 14

Terri Finch writes: Attending this school star party was Mike Marron with his awesome collection of meteorites and Ted Blank who brought a telescope in order to share views of the night sky.

Ted Blank writes: At Country Meadows school Ted set up a 9.25" SCT in the usual place, the basketball court, and Mike and Ophelia were inside with meteorites. Ted had over 100 students and parents over the course of the night. We started with Saturn because it was higher in the sky and the teacher had promised her students they would see Saturn. It did not disappoint, but there were so many students that he spent the entire night on Saturn, with about a 5-minute session on Jupiter. It went in and out of clouds but was there 95% of the time. Two wheelchair-bound visitors were able to see Saturn after the eyepiece and diagonal were turned horizontal. The teacher (6th grade Math and Science) stayed out with Ted all night to handle the crowd.

Sarah Tekulve writes: PAS, THANK YOU all so much for coming out last night!! I sent this email to our staff about last night so you can see our numbers and such, but we GREATLY appreciate each of you for giving your evening to engage our families!!! You all are amazing!

Subject: Science Night Success!

Hello All,

Thank you to everyone who helped promote our family science night. Wow!

What a night full of fun! We had all organizations show up! We had about 367 people in attendance including 2 of our PUSD school board members (Mrs. Underhill and Mr. Sandoval-THANK YOU!). This number does not include our 14 Kellis high school volunteers, our own STUCO volunteers, the 3 admin, 15 teacher workers, and the approximately 17 organizations, many of which came with quite a crew! Factor in all of that and we had over 450 tonight :)

If you attended, be sure to ask your kids what their favorite part was. Maybe it was seeing Saturn and its rings through the telescope, seeing a piece of Mars on display, a live skunk, a very large lizard taking a stroll via leash around the cafeteria, dancing and using code.org, crashing giant high school robots into the wall (not on purpose lol), seeing animal pelts and skulls, building and making all sorts of things, programming robots made of Legos, winning free toothbrushes, playing with the lights and sirens in the cop car etc. the list could go on!

Thank you to all admin for showing your support! Thank you to

the teacher workers and to the many other teachers who came out just to check it out or who brought their own families!

Thank you Lisa Lamoreaux for helping us get those NHS volunteers from Kellis, they were great! And we miss you btw!

Thank you 6th grade for bringing in most of our donations for tonight as well! Thank you to everyone else who helped with donations or sent money for a Safeway gift card in order to feed the crocs/gators! Much appreciated!

You all rock!! Just 6 more days and you finally get the week off you all deserve and for sure need!



The hard core future astronomers from this school were back for 2nd and 3rd looks through the telescope. Photo by Ted.



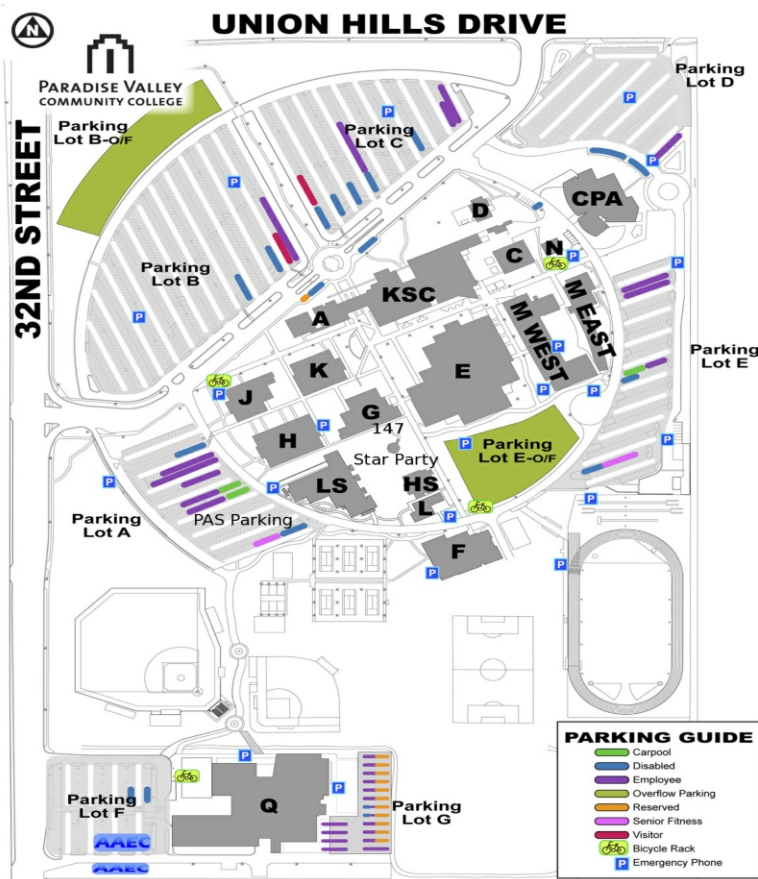
Even the adults were amazed at the wonders of the night sky. Photo by Ted.



Many children from the Country Meadows school enjoyed a view through Ted's 8" telescope on Nov 14, 2019. Photo provided by Ted Blank.

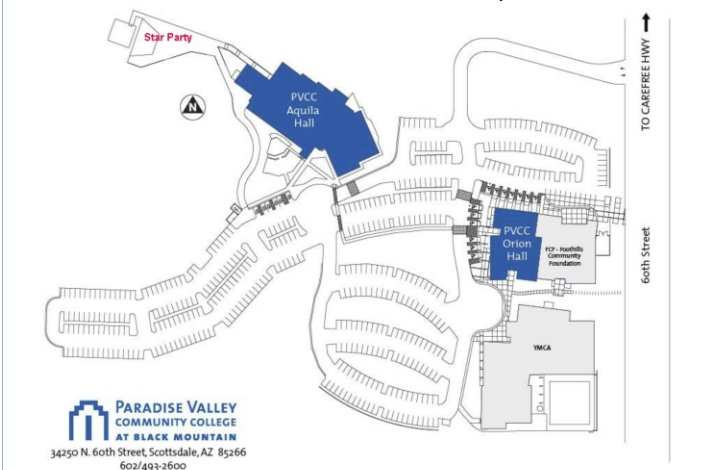
Map of PVCC Main Location

18401 N. 32nd Street | Phoenix, AZ 85032



Map of PVCC Black Mountain

34250 N. 60th Street | Scottsdale, AZ 85266



2020 PAS GUEST SPEAKER LINE-UP

By Terri Finch, Event Manager Events@pasaz.org

PAS Meetings are held at PVCC Main Campus on the first Thursday of the month in Room: LS-203 unless otherwise noted. Do you have an idea for a guest speaker? Email Terri Finch, Paul Facuna, or Mike Marron for the details (their email addresses are at the top of page 2 in this newsletter).

Here are the next scheduled guest speakers at PAS:

Feb 6: Lauren Edgar, Topic: Mars Rover Science

Mar 4: Michael Line, Topic: The Diversity of Extra-Solar Worlds

Apr 2: Eric Steinberg, Topic: The Physics of Chernobyl

More information at:

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

PVCC Telescope Workshop Nov 14

By Terri, Event Manager

It was a beautiful evening for a star party. William Finch and I arrived a little later than we had wanted to and so I requested that Sam Insana get everyone into G-147 since I was going to be late. Sam did a great job of getting security to open the room and let the class in. Calvin Vance also attended this workshop along with Bruce Wurst.

We had two friends of PAS from the public RSVP, and that's how many class members we helped. Jennifer Alvarez came with her Orion Starmax 127mm EQ Mak. That was a nice scope. Cal and Bruce assisted Jennifer for most of the evening. Patricia Miller and Scott Bell came with their Celestron Astromaster 130 and Sam helped them. By 8:30pm, Cal had decided to set up his 6" Dob outdoors to show what could be seen that night. Bruce helped Jennifer move her scope outdoors. That's when we discovered that the evening was so overcast with a thin cloud cover that seeing anything well was not going to happen, but we made do with what we could see. For some reason Pat and Scott never

made it outdoors with their scope, but instead packed up, and joined PAS and then left for the evening. Congrats to Scott Bell and Pat Miller for becoming New Members of PAS!

About 9pm Jennifer and Cal gave up on the sky and we called it a night. Many thanks to Jenny Neujoy for lending us PVCC G-147 to have our class in. It was successful and a great time for everyone. I do wish to apologize for the cloud cover, but PAS can

not control the weather, even though we wish we could. Hope for clearer skies for the next Telescope Workshop.



Bruce helps Jennifer with her telescope at the FREE Telescope Workshop of Nov 14, 2019. Photo by Terri Finch.