



PAStimes

Phoenix Astronomical Society

www.pasaz.org

October 2018

Volume 70 Issue 2

PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Tom Mozdzen to Speak at October 4 Meeting

Cosmic Dawn and the Epoch of Reionization - Gathering information about the onset of the formation of the first stars and galaxies by studying the 21 cm line of neutral hydrogen

Astronomers have studied the birth of the Universe in great detail by measuring the Cosmic Microwave Background (CMB) radiation which is basically the afterglow of the big bang from the age of the universe when it was about 380,000 years old. Observations and theory make strong arguments that the universe at this time was filled with neutral hydrogen and helium. More recently, the Sloan Digital Sky Survey cataloged over a million galaxies, which are mature and relatively old structures. But how did our Universe transition from clouds of neutral (un-ionized) hydrogen to one filled with galaxies and completely ionized intergalactic hydrogen? By studying a perturbation on the CMB temperature caused by the absorption and emis-

sion of 21 cm radiation, which is only possible with neutral hydrogen, we can gather clues about the onset and duration of the transition from a universe without stars to one filled with stars, galaxies, black holes, quasars, and completely ionized intergalactic hydrogen. This transitional stage is called the Epoch of Reionization (EoR). Measuring the perturbation of the CMB (EoR signature) is a difficult measurement because the signature is theorized to be 100,000 fainter than the foreground synchrotron radiation which is emitted by our Galaxy, thus precise instrumentation is required for this type of measurement. He will give background information on the early universe, describe how the EoR signature comes about from the 21 cm line of

See "October 4 Meeting" on page 3.



October Guest Speaker: Tom Mozdzen

PAS Meeting Sept 6

By Terri, Event Manager

Prior to the meeting, seven PAS Members and one PAS Guests and one Guest Speaker met at Chili's for dinner at 4:30pm. Our Guest Speaker Bruce Kosaveach joined us for dinner. We had a guest: Skip Miller. The PAS Members in attendance were William & Terri Finch, Sam Insana, Stuart Brackney, Don Boyd, Mike Marron, and Howard Moneta. It was a wonderful Meet and Greet and dinner. May thanks to our Waitress Kira for taking great care of the group.

This was a very busy meeting. We had a great turnout of about 40 people in attendance. We had 3 Guest Speakers who were fantastic!

Opening the meeting was President Mike Marron who introduced the Officers

of the club (new and leaving), greeted the new visitors to the meeting and then turned the meeting over to our main Guest Speaker Laurence Garvie who presented on Meteorites. This was a fantastic, very informative and fun presentation. Laurence had the floor from 7:45pm to 8:40pm. Thank you so much, Laurence, for the wonderful presentation. Many PAS members asked to have Laurence return for another visit at a future PAS Meeting.

Then we had Bruce Kosaveach present from 8:40 to 9:10pm about some great new things Lowell Observatory is adding to its collection of already wonderful things you can do there. The project Bruce spoke of is called the Giovale Open Deck Observatory and is due for groundbreaking on Sept 29 and to be totally ready for the public to



Laurence Garvie was our amazing Main Guest Speaker for the September meeting. Photo by Terri Finch.

See "Sept 6 Meeting" on page 4.

President	Mike Marron	480-488-3031	President@pasaz.org
Vice President	Paul Facuna	602-246-1554	VicePresident@pasaz.org
Secretary	Rick Cunningham	480-560-1258	darksky.fan@gmail.com
Event Manager	Terri Finch	602-561-5398	Events@pasaz.org
Treasurer			Treasurer@pasaz.org
Newsletter Editor	Don K. Boyd		Editor@pasaz.org
PAS Host	Rodney Fong		
Librarian	Rod Sutter		Librarian@pasaz.org
Member at Large	Jenny Weitz	602-787-6818	Jennifer.Weitz@paradisevalley.edu
Member at Large/Equipment Manager	Bruce Wurst	602-971-3555	Brulipps@yahoo.com
Webmaster	Chris Johnson		Webmaster@pasaz.org
Phoenix Astronomical Society		3039 W Peoria Ave #102-188, Phoenix AZ 85029	

PAS Upcoming October Events

By Terri Finch, Event Manager

Check out these and other fun events on the PAS Calendar:

<http://www.pasaz.org/forums/calendar.php>. RSVP where requested to Events@pasaz.org. 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>

Oct 4: PAS Meeting at PVCC Main Campus in LS-203 at 7pm. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2529&day=2018-10-4&c=1>

Oct 6: NSTS Private Members Only Star Party. RSVP is required at PASaz.org. <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2539&day=2018-10-6&c=1>

Oct 10: ASU West Public Star Party 7pm to 9 pm. <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2540&day=2018-10-10&c=1>

10&c=1 There is a fee to park on the ASU West campus.

Oct 11: Celebrate 70 years that PAS has been an astronomy club at this Huge Activity & Star Party event at BMC 5pm to 10pm. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2541&day=2018-10-11&c=1>

Oct 12: School Star Party (Private) <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2694&day=2018-10-12&c=1>

Oct 18: FREE Telescope Workshop at PVCC Main Campus 7pm to 10pm in G-147. Bring your telescope and accessories. This is an indoor/outdoor event (weather permitting) and RSVP is required with Terri. No public RSVP's could cancel this event. More details are here: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2536&day=2018-10-18&c=1>

Oct 20: Sidewalk Astronomy Event at

Bookmans: 19th Ave & Northern Ave in Phoenix from 7pm to 10pm. It's a Public Star Party, everyone welcome! RSVP highly suggested. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2520&day=2018-10-20&c=1>

Oct 26 & 27: Star Party at Japanese Friendship Garden in Phoenix from 6pm to 9:30pm. There's a fee to get into the Garden. More info: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2612&day=2018-10-26&c=1>

Oct 27: Halloween Party for PAS Members (Private) <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2542&day=2018-10-27&c=1>

At the time of completion of this issue, 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.

Dinner on the Desert at DBG Apr 28

By Terri Finch, Event Manager

This event was set up through Susan Rubin at the Desert Botanical Gardens and she asked that 5 telescopes attend this event. PAS provided scopes managed by Storm Moon 8", Terri Finch 8", Mark Johnston 5.5" refractor, Bruce Wurst 12" and Roger Anzini with his 16" scope. It was a rather warm day leading to a warm evening, but the awesome thing was the super clear skies. However, the 1 day shy of full Moon was in the way of seeing fainter objects. Storm showed the whole Moon in a blue filter. Terri zoomed in on Copernicus

crater and showed the craters at the edge of the Moon in Red. Roger had put his scope on Jupiter with it's 4 fantastic Galilean moons. Bruce had M3 all night. Mark put his scope on the Stargate Cluster for most of the event and then zoomed in on Jupiter (289x) near the end of the viewing event.

Set up was 8pm. The event was from 9pm to 11pm. Once the patrons started coming our way, it was a steady flow. Storm and I made sure everyone passing by would know to look through all 5 tele-

scopes before leaving DBG. The time went so fast. Before we knew it, it was time to pack up and leave.

The weather was forecast to be rather windy, but by the time the Patrons came to see the telescopes, the winds were cooperative and there was only a slight breeze. Many thanks to Susan and DBG for having PAS at this event. Thanks to my Telescope Team as we all had a great time and I believe the event was a success.

October 4 Meeting

Continued from page 1

neutral hydrogen, talk about the research He performed for his PhD thesis, and recap the current state of affairs of research and measurements.

Tom Mozdzen grew up in Chicago and worked as an electrical engineer in the semiconductor industry. He lived in Dallas and Munich, before moving to Chandler where he has been for the last 40 yrs. He became interested in amateur astronomy after moving to Dallas in 1980, and became active in SAC and EVAC in the 90s. He hadn't been active in local clubs since 2001,

but rejoined SAC and EVAC and is now the President of EVAC. He worked for Intel in Chandler for nearly 20 yrs. He had master degrees in Physics and Electrical Engineering, but always wanted to get a PhD of some sorts. 10 yrs ago, he quit Intel and started on an EE PhD, but a talk by Rogier Windhorst at SAC inspired him to switch to Astrophysics after spending 3.5 yrs on the EE PhD. His thesis topic focused on the Epoch of Reionization - the period when the first stars, black holes, quasars, and galaxies began to ionize the main constituent of the early universe, namely neu-

tral hydrogen. He defended his thesis in August of 2017 and is now a Postdoctoral Researcher at ASU working on a variety of very interesting astronomical projects.

At the October PAS Meeting, doors open 7pm for socializing, snacking and setting up the guest speaker. 7:30pm the meeting opens in LS-203 with a few brief announcements and then the guest speaker takes the floor. Bring a snack to share. Bottled water will be provided by Bruce Wurst. Share Space by bringing a Friend to the meeting.

Park After Dark Series at Tonto National Monument

By Terri, Event Manager with data provided to PAS by Christa Sadler

What is Park after Dark? Tonto National Monument is hosting a set of Star Parties with the help of the Phoenix Astronomical Society in Fall 2018 and Spring 2019. These events are open to the public and Free to attend. Please remember all Star Parties are outdoors and so they are Weather Permitting. Here are the dates of these events:

November 3, 2018, will have a star party from 7 pm to 9 pm. Here's the link for additional info about this event and what

you need to do to be able to attend it: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2728&day=2018-11-3>

January 26, 2019, will have a star party for Park after Dark from 7pm to 9pm. This event will have a theme of Meteorites. Please see this link for more details on how you can attend this event: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2713&day=2019-1-26&c=1>

April 27, 2019, will have another Star

Party at Tonto National Monument from 7pm to 9pm. Here's the link with more details for this event: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2714&day=2019-4-27&c=1>

We hope you can attend these events. What Tonto National Park has that other locations closer to Phoenix don't have is Dark Skies. Dark Skies and Telescopes make this event just what you were looking for on a Saturday evening!!!

What's Up For October?

By Don K. Boyd, PAStimes Editor

Name	Date	Rise	Set
Mercury	10-15-18	07:55	18:34
Venus	10-15-18	08:06	20:03
Mars	10-15-18	14:47	01:04
Jupiter	10-15-18	09:50	19:33
Saturn	10-15-18	12:09	22:04
Uranus	10-15-18	18:13	07:20
Neptune	10-15-18	16:10	03:41
Pluto	13-15-18	13:12	23:12

All Times Arizona Time

Bold means the object is "visible" in the evening

October 15 2018

Sunrise: 06:32

Sunset: 17:54



Q3: October 02 and October 31



New: October 08



Q1: October 16



Full: October 24

Sept 6 Meeting

Continued from page 1

experience by Spring 2019. Here's more info about this project <https://lowell.edu/priority-projects/godot-telescopes/>. Many thanks to Bruce for his presentation. Bruce will be at the Oct 11 BMC 70th Anniversary Astronomy Celebration and will present on this same topic. So, if you missed it at this meeting, please come to the Oct 11th event.

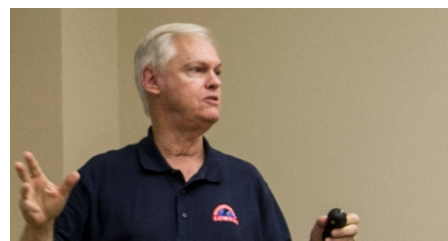
Next, we had John Kundrat provide a photographic tour of the trip we took to Meteor Crater on June 2 as part of the PAS Field Trip and then of his trip to Hawaii the previous summer. Thank you, John, for sharing those wonderful images and stories.

After John did his presentation, Terri went over the upcoming September and up to Oct 11th events and then Sam shared a prototype of a baseball cap designed by Dirk at Infini-tees that has a white light on one side and a red light on the other side for observing and clean up after the event. Sam

also mentioned what we need as far as help and items at the Oct 11th event.

Next, we did the raffles. This time we had 2 raffles. The main raffle was won by Kelli Miller. We also had a few items provided by our Guest Speakers for an additional raffle: Laurence Garvie provided a t-shirt and 2 books. Bruce Kosaveach provided 5 Lowell Observatory baseball caps. These items were won by: Kimberly Holingsworth, Rodney Fong, Bruce Wurst, Paul Facuna, William Finch, Richard Pipkin, Frank Otsuka, and Mike Cawley. A great many thanks to the Guest Speakers for providing these wonderful items, and to the winners of these raffles for their participation at the PAS Meeting.

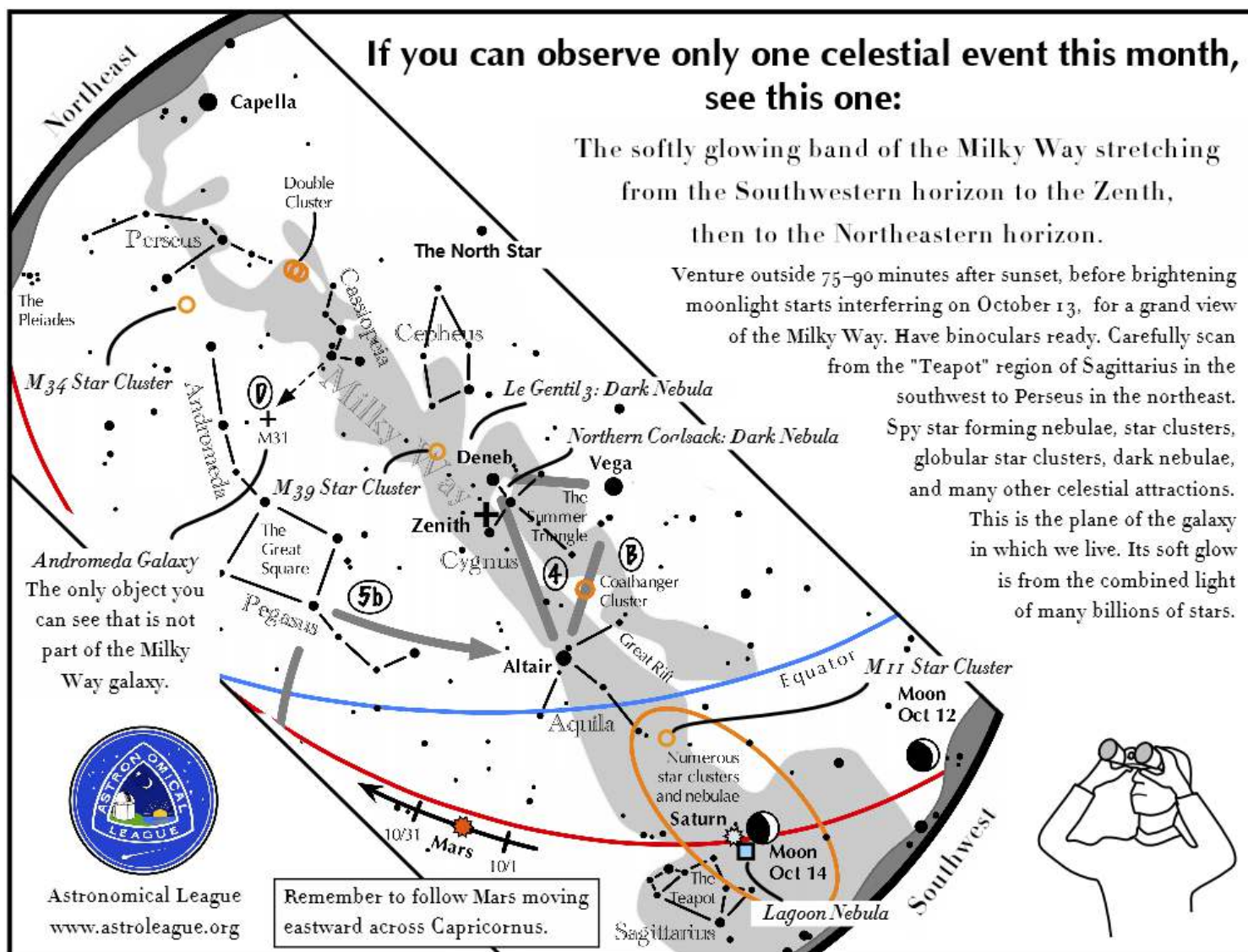
It was a very fun meeting, lots to learn and enjoy. Many thanks to everyone who attended. We hope to see you at the October 4th PAS Meeting where we will have another exciting Guest Speaker.



Bruce Kosaveach was our 2nd Guest Speaker of the evening. He told us all about the new additions to Lowell Observatory. Photo by Don.



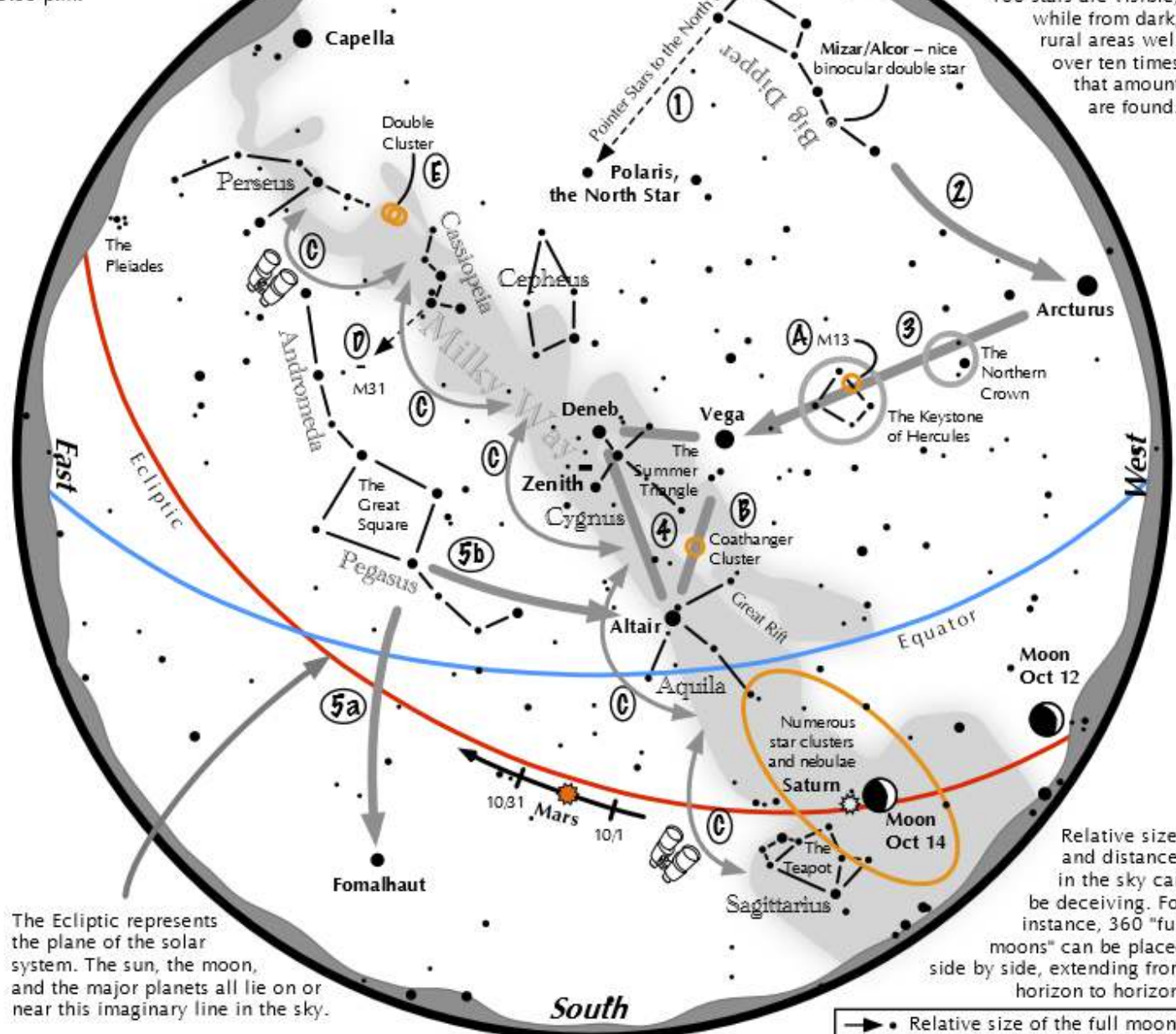
John Kundrat, PAS Member, was our 3rd Guest Speaker of the September PAS Meeting. Photo by Don Boyd.



Navigating the October Night Sky

For observers in the middle northern latitudes, this chart is suitable for early Oct. at 9:00 p.m. and late Oct. at 8:00 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



Navigating the October night sky: Simply start with what you know or with what you can easily find.

- 1 Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2 Follow the arc of the Dipper's handle. It intersects Arcturus, the brightest star in the early October evening sky.
- 3 To the northeast of Arcturus shines another star of the same brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
- 4 Nearly overhead lie the summer triangle stars of Vega, Altair, and Deneb.
- 5 High in the east are the four moderately bright stars of the Great Square. Its two southern stars point west to Altair. Its two western stars point south to Fomalhaut.

Binocular Highlights

A: On the western side of the Keystone glows the Great Hercules Cluster, a ball of 500,000 stars. **B:** 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger. **C:** Sweep along the Milky Way for an astounding number of fuzzy star clusters and nebulae amid many faint glows and dark bays, including the Great Rift. **D:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **E:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster.





Observe the Moon

By Jane Houston Jones and Jessica Stoller-Conrad

This year's International Observe the Moon Night is on Oct. 20. Look for astronomy clubs and science centers in your area inviting you to view the Moon at their star parties that evening!

On Oct. 20, the 11-day-old waxing gibbous Moon will rise in the late afternoon and set before dawn. Sunlight will reveal most of the lunar surface and the Moon will be visible all night long. You can observe the Moon's features whether you're observing with the unaided eye, through binoculars or through a telescope.

Here are a few of the Moon's features you might spot on the evening of October 20:

Sinus Iridum—Latin for “Bay of Rainbows”—is the little half circle visible

on the western side of the Moon near the lunar terminator—the line between light and dark. Another feature, the Jura Mountains, ring the Moon's western edge. You can see them catch the morning Sun.

Just south of the Sinus Iridum you can see a large, flat plain called the Mare Imbrium. This feature is called a mare—Latin for “sea”—because early astronomers mistook it for a sea on Moon's surface. Because the Moon will be approaching full, the large craters Copernicus and Tycho will also take center stage.

Copernicus is 58 miles (93 kilometers) across. Although its impact crater rays—seen as lines leading out from the crater—will be much more visible at Full Moon, you will still be able to see them on October

20. Tycho, on the other hand, lies in a field of craters near the southern edge of the visible surface of the Moon. At 53 miles (85 kilometers) across, it's a little smaller than Copernicus. However, its massive ray system spans more than 932 miles (1500 kilometers)!

And if you're very observant on the 20th, you'll be able to check off all six of the Apollo lunar landing site locations, too!

In addition to the Moon, we'll be able to observe two meteor showers this month: the Orionids and the Southern Taurids. Although both will have low rates of meteors, they'll be visible in the same part of the sky.

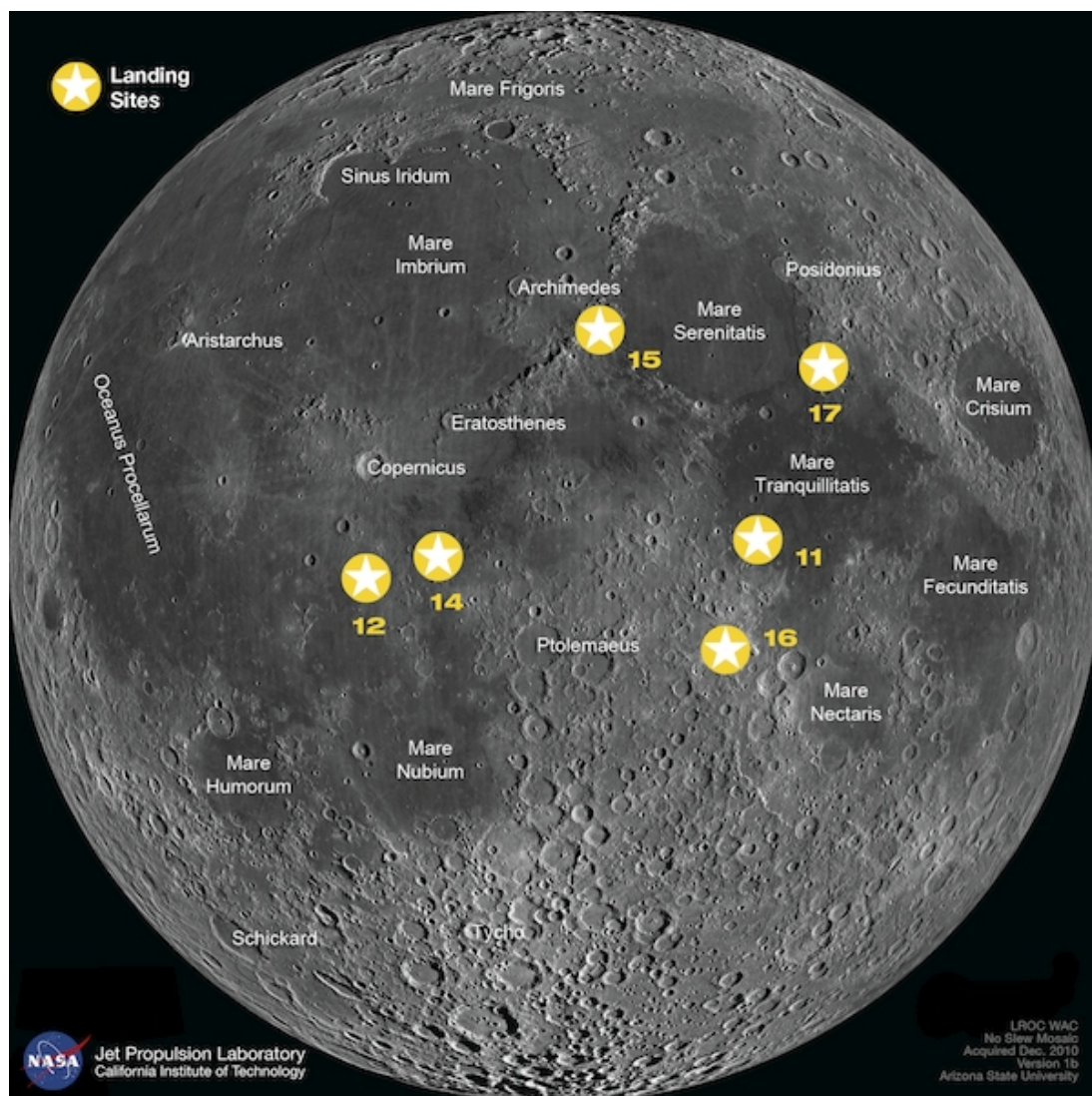
The Orionids peak on Oct. 21, but they are active from Oct. 16 to Oct. 30. Start looking at about 10 p.m. and you can continue to look until 5 a.m. With the bright moonlight you may see only five to 10 swift and faint Orionids per hour.

If you see a slow, bright meteor, that's from the Taurid meteor shower. The Taurids radiate from the nearby constellation Taurus, the Bull. Taurids are active from Sept. 10 through Nov. 20, so you may see both a slow Taurid and a fast Orionid piercing your sky this month. You'll be lucky to see five Taurids per hour on the peak night of Oct. 10.

You can also still catch the great lineup of bright planets in October, with Jupiter, Saturn and Mars lining up with the Moon again this month. And early birds can even catch Venus just before dawn!

You can find out more about International Observe the Moon Night at <https://moon.nasa.gov/observe>.

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This image shows some of the features you might see if you closely observe the Moon. The stars represent the six Apollo landing sites on the Moon. Credit: NASA/GSFC/Arizona State University (modified by NASA/JPL-Caltech)



Let PAS be your portal to the stars!

Join the Phoenix Astronomical Society and PVCC Black Mountain on Thursday, October 11th, from 5PM - 10PM for a FREE community event celebrating PAS' 70th anniversary!

The event will include hands-on activities, astronomy demos, short astronomy lectures, a free raffle, and a chance to explore PVCC's 14 inch Schmidt Cassegrain telescope!

To learn more, visit <https://tinyurl.com/ycc7bjf7>.



Did You Know?

PAS was founded in 1948. That same year, the Palomar Observatory telescope was finished in California.

Activities and Lecture Topics Include:

- LED Paper Airplanes
- Galaxy Playdough
- Lego Pixel Drawings
- Constellation Game
- Light Pollution
- Astrophotography
- History of PAS
- Spectroscopy



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Twilight

By Bill Powell

Sometimes we tend to use astronomical terms loosely. This can cause confusion and possibly a misunderstanding. 'Twilight' is one of those terms. This article describes the term twilight.

Each day has two periods of twilight,

one in the morning and one in the evening. Each period of twilight is divided into three phases: Civil twilight, nautical twilight, and astronomical twilight. Often the morning phases are called dawn, and the evening phases are called dusk.

Although the technical details of the twilight phases are well defined, it is not easy to visually distinguish the phases. However, it may be worthwhile to be aware of the phases for certain observation sessions. See the tables below for details.

Transition from Night to Day

Period Label	Twilight Phase	Center of Sun Location
Night	-	Greater than 18 degrees below horizon
Astronomical Dawn	Astronomical	18 degrees below horizon
Astronomical twilight	Astronomical	Between 12 & 18 degrees below horizon
Nautical dawn	Nautical	12 degrees below horizon
Nautical twilight	Nautical	Between 6 & degrees 12 below horizon
Civil dawn	Civil	6 degrees below horizon
Civil twilight	Civil	Between 0 & 6 degrees below horizon
Sunrise	Civil	On the horizon
Day	-	Above horizon

Transition from Day to Night

Period Label	Twilight Phase	Center of Sun Location
Day	0	Above horizon
Sunset	Civil	On the horizon
Civil twilight	Civil	Between 0 & 6 degrees below horizon
Civil dusk	Civil	6 degrees below horizon
Nautical twilight	Nautical	Between 6 & degrees 12 below horizon
Nautical dusk	Nautical	12 degrees below horizon
Astronomical twilight	Astronomical	Between 12 & 18 degrees below horizon
Astronomical Dusk	Astronomical	18 degrees below horizon
Night	-	More than 18 degrees below horizon

Interesting Twilight Facts:

Civil twilight is the brightest of the three phases.

In civil twilight only the brightest stars and planets are visible with the naked eye.

In nautical twilight both the horizon and brighter stars are visible.

In astronomical twilight most stars and other brighter objects can be seen.

The lengths of twilight phases depend on the latitude and the time of year.

In the summer, at high latitudes, twilight can last from sunset to sunrise.

Rancho Gabriela School Star Party May 11

By Roger Anzini, PAS member

Phoenix Astronomical Society was asked to supply two telescopes for the evening, while Mike Marron brought his wonderful display of rocks that landed on our planet from outer space.

Scopes were supplied by Roger Anzini and Don Boyd with great assistance from

Paul Facuna. High winds whipped local skies into a dust bowl for most of the day leaving us with limited objects for viewing, so targets for most of the evening were Jupiter and Venus. Our lasers did come in handy as we pointed out how to use the Big Dipper as a star-hopping guide.

Finally, late in the evening, the winds calmed enough to allow a brief view of M104 just north of Corvus. Sadly, the day's high winds and other factors contributed to a small turnout. We wish to thank our wonderful contact and hostess Kisha for all her support, assistance and a tasty supper.

Awards Ceremony Apr 26

By Terri, Event Manager

Those of you who missed this party, really missed a fun evening. By 7pm, most of the 13 attendees had arrived and were then socializing while they waited to enjoy the Pizza, paid for by PAS and provided by Sardella's Pizza and Wings. I wish to thank all who brought dessert as it was tasty. And Thanks to Bruce for the bottled water donated to the event. Thanks also to all who donated a little to pay for the pizza. I was able to land a great deal through Sardella's. I put the order in for the pizza's on Wednesday afternoon, and then an email came to me Thursday morning offering 50% off your order if you wear a Red shirt to Sardella's when picking up your order. So, I did. I saved the club some money on the pizza.

Many thanks to Bruce Wurst for printing the beautiful Certificates for this year's event. And I wish to thank those who attended this party, and to do that, I gave each of them a free raffle ticket for the May PAS Meeting Raffle. Many thanks to everyone who provided posters and pictures to decorate the background wall where the photos were to be taken for this party.

I opened the meeting and festivities with some thanks to the very important people who made this event happen: I thanked PAS for providing the pizza and then shared the Red Shirt savings so those who might want Sardella's pizza tomorrow could do so and save money. I mentioned the donation box on the back table, thanked Bruce for the bottled water, thanked everyone for attending and explained the Red Raffle Tickets I gave everyone for attending this night's event and I thanked Bruce for printing the certificates.

This year's Awards Ceremony / Member Appreciation night was a little different than last year's event. We started the evening at about 7:20pm, once I was sure everyone who RSVP'd to attend, was present - with socializing and pizza. Around 8:20pm, we started the ceremonies.

Mike started giving the awards from the Night Sky Network (NSN) which were Certificates and Pins. For this year's event, NSN changed their requirements, and increased the number of public outreach events that had to be attended, in order to receive a Pin. So, what I did was provide Certificates to everyone with 3 or more Public Outreach Events attended in 2017. If you attended 6+ events, which is the requirement made by NSN, then you were given a Certificate and a beautiful 2018 Pin.

Of the attendees of this party, these were the PAS Members who were awarded for Public Outreach through PAS Events (in order from least events attended, to most events attended): Bette Wurst received a Certificate for 3 public outreach events, along with Ed Wurst who also had attended 3 events, Ron Walker got a certificate for 5 public outreach

events attended in 2017. Then the rest of these PAS members received a certificate and a Pin for 6+ events attended: Eric Steinberg, Rick Cunningham, and Paul Facuna each did 6 events; Bruce Wurst had 20 events; Don Boyd attended 25 events; Mike Marron did 32 events; and Sam Insana did 39 events. William Finch did 40 events and Terri Finch did 42 events. For those members who didn't attend this event, but did get a certificate and/ or pin, you will have to see me to pick those up at the next couple events.

Mike then gave the Dart Trophy Award. Hiding under a cover, as not to see what the award looks like or who will receive it, was the beautiful award (a plaque) given to Bruce Wurst for winning this year's Annual PAS Dart game. Bruce paid for the award to be made, and has offered that each year, he will cover the cost of the dart trophy for the winner of the annual dart game. I have next year's dart trophy ready to order.

Then we did a special certificate... some of you may remember that an email went around that said: "Send your name to the Sun." I had sent my parents names and my own name to the Sun and when you sign up for that, they send you a very nice Certificate to print for yourself. So, PAS awarded these certificates to Bette & Ed Wurst with each receiving one certificate with their names on it.



Sam Insana receiving a Member Appreciation Awards from President Mike Marron at the April 26, 2018 Awards Ceremony. Photo by Don Boyd.

Sam then reminded me that he asked the attendees if they would like to talk about what they like about PAS as a club. Mike, Sam, and Paul all gave some great reasons to belong to PAS, as well as reasons why PAS is the club they chose to be involved with. Thank you all for your shared thoughts.

We then came to the Member Appreciation. We did this different this year. In an email to all PAS members, I sent out a request and a page. The page had a list of current PAS members for 2018, who were part of PAS in 2017 (that's the criteria for this award). And the request was to pick 3 PAS members to vote on and then provide reasons why you think they should be honored on this night as the Member to be Appreciated. I took the reasons provided and created a bulleted list of vague ideas of who the winner was. Then, at the party, the fun was to figure out who won before the name was announced by having Mike read the bulleted point and then pause (he called it a pregnant pause) to let everyone wonder who was being talked about. The winner received 2 certificates: 1 certificate was the Main Member Appreciation certificate with an astronomy photo on the page. The 2nd item was a beautifully done certificate, announcing the winner but with a photo of the Winner on the page. And with this the winner was given an envelope to safely carry home their 2 printed photo quality



Bruce Wurst receiving 1st Place Trophy for the 2018 Annual Dart Game at the PAS Social. Mike presents Bruce with this award. Photo by Terri Finch.

Bruce Wurst. So to honor these PAS Members, we first did the bullet points with Mike announcing the list slowly, and everyone guessing it was Sam. The audience was correct. Then I announced that there were actually 3 winners this year, tied for 1st place. Since I also was a winner, I announced my winning and thanked everyone for the votes but I didn't make myself any certificates. Then we guessed on the 3rd winner. The group guessed it was Don until the very end and the last bullet point gave away who the winner was, but there were still some surprised faces in the audience.

After all awards were given,

Kevin Harcey had brought his TV with a VCR built in, so that he could show a newscast of Pierre Schwaar. Pierre was a very active member in PAS and passed away at a young age, quite a few years ago. Pierre was known for his hand build telescopes. The news item only lasted about 8 minutes and we watched it together on the small TV. Thank you, Kevin, for sharing this memory with those of us who remember and miss Pierre.

We concluded the evening of awards and we had quite a few of the members stick around up to 9:45 to chat and social-



Ron Walker receiving his Night Sky Network award from President Mike Marron at the April 26, 2018 PAS Awards ceremony. Photo provided by Don Boyd.

printed certificates plus the printed bulleted list that Mike was reading from. Under the bulleted list on that page was the actual info provided by the PAS Member voting for the Member to be appreciated so that the winner would know why they were being voted for. Here are the voting results (last place to first): We had a bunch of ties - with 1 vote we had Eric Steinberg, and with 2 votes we had Roger Anzini, Don Boyd, Paul Facuna, William Finch and Mike Marron. With 3 votes each and the Winners of this year's Member Appreciation, I'd like to congratulate Terri Finch tied with Sam Insana and

ize. I thought that was a great idea. The cleaning crew showed up and I chatted with the dude doing the cleaning and then I announced to everyone we should depart from the room and we did.

It was a very good event. I appreciate those who attended. I appreciate the additional food items and everyone seemed to enjoy themselves. I'm sorry the attendance wasn't a full house but those who attended were super appreciated. Thank you all for doing such a wonderful time at making PAS the Best Astronomy Club in the world!

Join the Pas 70 Year Celebration October 11

By, Sam Insana, Phoenix Astronomical Society member

Thursday, October 11, 2018, at PVCC Black Mountain Campus, near 60th St and Carefree Highway, the Phoenix Astronomical Society will hold its 70 year celebration. From 5pm to 9:30pm on the hour and half hour, there will be presentations inside the Aguila Building on various astronomy topics such as:

1. Spectroscopy (Bill Powell)
2. Inexpensive Astronomy (Calvin Vance)
3. 70 year history of PAS (Sam Insana)
4. Basic Astronomy (Mike Marron)
5. The Star Barn Planetarium (Ron Walker)
6. Light pollution problems and solutions (Dan Heim)
7. Lowell Observatory expansion

plans (Bruce Kosaveach)

Some of the Speakers will have tables in the classrooms for people to come by and chat or pick up some additional information and answer questions.

Children's activities will involve astronomy crossword puzzles, astronomy coloring, astronomy word games and the Kids Coloring Corner where School-age kids can color a picture and have it hung up on the wall.

There will be dozens of astronomy posters decorating the inside of the Aguila Building.

Free raffles open to everyone, will be held every half hour, and many prizes will be given away including, but not limited, to an Astronomy book by Neil Degrasse Tyson, a ticket to the Arizona Science Center,

a Meteorite, Astronomy Posters, an Astronomy Magazine subscription, a Sky and Telescope magazine subscription, Astronomy tee shirts, admission to Lowell Observatory, admission to Flandrau planetarium, and other exciting items.

From 7pm to 9:30pm there will be many telescopes outside for people to view planets and deep sky objects.

PVCC will also have a STEAM night going on in the Aguila Building with several fun activities for all attendees. These activities and the Guest Speakers can be found in the classrooms.

Come and enjoy a fun and informative evening and help PAS celebrate 70 years as an astronomy club. For more info about this event, please visit this link: <http://www.pasaz.org/forums/showthread.php?t=1299>.

“Strong At PVCC The Force Is”

Black Mountain Campus Star Party May 3

By Terri Finch, Event Manager

This was a wonderful night to have a Star Wars event at PVCC BMC. PAS was at this event with telescopes provided by Mark Johnston, Rick Cunningham, Sam Insana, Don Boyd, Calvin Vance, Mike Cawley, Eric Steinberg, and Ray Adams.

Also in Attendance but not in on the Observation Deck at BMC, with a telescope, was Mike Marron, who set up in the Aquila building with his collection of meteorites and some new items. The other table there was the PAS Table with handouts, info about the club, info about upcoming events, and a Membership Drive of \$5 off your first time joining PAS. William & Terri Finch were at that table. Mike, William & Terri decided to spend the whole night indoors for this event. The usual is to do the indoor portion of the event and then when PVCC students pack up about a half hour after the star party begins, Mike with his meteorites and Terri with the PAS table move outdoors to the top of the Ramp to the Observation deck, in the parking lot. But, this night was so busy indoors, we decided to stay indoors until 9:30pm. We also had Paul Facuna managing the traffic on the Observing Deck ramp for the loading and unloading of the telescopes.

Outdoors, at the Amphitheater just outside of the Aquila building, several PVCC people set up to show “Star Wars - A New Hope” on a big screen. They also had the attending kids making Light Sabers to take home.

This was a very successful star party and event. The weather was decent, the sky was totally clear, and everyone attending had a great time. Thanks to all my Telescope Team members for being there, and for the public who RSVP'd and then checked in with me at the PAS Table in the Aquila Building. I really appreciate meeting all of you! I would guess we had over 200 in attendance.

Rick shares: Last night at BMC I showed a variety of objects since there were short lines with seven telescopes present. I showed M13, M35, M47, M78, M81, M82, Cat Eye Nebula, Mizar, Venus, and Jupiter. It was interesting to see M13 and the Cat's

Eye Nebulae thru Eric's 22" and then my 12" scope. Thou shall not covet thy neighbor's telescope...

Mark adds: I enjoyed sharing the views of Venus, Stargate cluster, Disappearance of Europa behind Jupiter, High power view of Jupiter, Castor triple, M81, and the Iota Cancri double.

Sam writes: I showed Venus, M42 Orion Nebula, M81 and M82 galaxies, M13 Hercules globular cluster, and Jupiter with my 8 inch Newtonian reflector. About 50 people looked throughout the night, from 7:30 to 10:00 pm.

Don writes: I was able to view the Beehive, Venus, and Jupiter.

FREE EVENT

STRONG AT PVCC THE FORCE IS

MAY THE 3rd 7:30 - 10 PM

PARADISE VALLEY COMMUNITY COLLEGE
A MARICOPA COMMUNITY COLLEGE
Black Mountain

Join us for a Star Party!

- Observe the night sky through high-powered telescopes.
- Participate in hands-on Star Wars activities.
- Watch Star Wars, a New Hope, in the PVCC Black Mountain amphitheater.

For more information, contact PVCC Black Mountain at (602) 493-2600.

34250 N. 60 St. Scottsdale, 85266
paradisevalley.edu/black-mountain

May the Force be with you at PVCC on May 3rd. This was the flier for this event created by PVCC.



The photos to the left and right show Sam Insana and Paul Facuna Setting up equipment, checking batteries and other things that need to be done for an occultation. This occultation timing took place February 6 2018. Photos by Don Boyd



PAS Field Trip Summer 2018

By Various Attending PAS Members

Quoted material is borrowed from the Lowell Observatory Campus Map & Visitor Guide

Terri Finch writes: It was a lovely summer morning when PAS Members; Sam Insana, Vera Stiesmeyer, Frank Insna, Pete Turner, Howard Moneta, Don Boyd, Paul Facuna, Bob Ewing, Mike Marron, Ofelia Waters, Terri Finch, William Finch, Jennifer Key, Kevin Harcey, Matt Kohl, John Kundrat, and Matthew Kundrat met in Flagstaff for the PAS Field Trip.

Many thanks to Bruce Kosaveach for a fantastic tour of the NPOI and later that night at Lowell Observatory. Many thanks to Gerard van Belle for the fantastic 2-hour tour of Anderson Mesa. And thank you to Jonathan Depinet, Anderson Mesa Custodian who had great input and stories to share while we were on the tour.

We met at the Anderson Mesa Observatories at 10am. This tour was from 10am to 12 noon. During it we visited the 42 inch and the 72 inch scopes plus the Naval Precision Optical Interferometer (NPOI).

We then went to lunch. Some of the group went to Wendy's and others went to Freddy's Steakhouses. Overall, based on what I got as input from the group, neither location served very good food on this date.



Gerard shares with the group some great info about this part of the tour
Photo by Bruce Kosaveach

Then we went to Meteor Crater meeting there at 2:15pm and staying until about 4pm. This was a super visit. Meteor Crater has definitely improved it's Visitor Center.



Inside the dome for the 69" Perkins telescope, Kevin Harcey grabs this great photo of Gerard sharing info about this telescope. The PAS members listen intently.



The group of PAS Members on this fantastic June 2nd Tour of Anderson Mesa.
Photo provided by Jennifer Key.



While at Anderson Mesa, Bruce Kosaveach hung outside while Gerard van Belle continued the tour inside this dome. Several PAS members wandered out onto the deck and discovered Bruce taking pictures. This photo, one of 3, has Terri, William, Don Frank, Sam and Vera. Thank you Bruce, for taking this photo



William, Terri, Don, Ofelia and Mike pose for a photo while on the Anderson Mesa Tour. Photo by Jennifer Key.



Gerard shows us the new portable telescopes that are stored up on Anderson Mesa and used all around Flagstaff at schools and other locations to provide a planetarium experience. Photo by Jennifer Key.



It's Mine! All Mine!!! Mike Marron and Sam Insana imagine owning this huge Meteorite on display at the Meteorite Crater Visitor Center. Photo provided by Sam.



Ofelia and Mike really like this meteorite! Photo by Don Boyd.

We did an hour long tour in which we walked out on the Rim of Meteor Crater about $\frac{1}{4}$ mile. It was hot but there was a breeze on this day. Many of us got slightly sunburnt and wind burnt. Our tour guide for this walk was awesome. After melting outdoors, we discovered that, upon return indoors, within 5 minutes the Visitor Center Theater was going to have a $\frac{1}{2}$ hour movie about the history of the Crater and other info. So, most of us went in the theater too cool off, rest, and enjoy the presentation. At the end of the presentation, we walked through the rest of the Visitor Center which had some great displays and some were interactive. Then we all ended up in the Gift Shop and some of us left to dinner by 4pm, while others hung out in the Gift Shop a little longer.

Dinner was at Agave Mexican Restaurant. The whole group met there for dinner by 5pm. Since we were a group of 17, it took the Waiter a while to get our group the food, but the nice thing was that it

was relaxing and we enjoyed the food. Plus, we talked about a bunch of things while there. We left dinner about 6:30pm.

Then next part of the field trip was the visit to Lowell Observatory. Howard had landed some Free Tickets and so, with the departing of Matt Kohl and Kevin Harcey on a camping trip up to Idaho, everyone got in for free. Many thanks to Howard. We started out on the Pluto Walk. The group had gotten ahead of William and I, as they got there earlier while we dropped off Matt and Kevin at their vehicle and we were in desperate need of gas before continuing on to Lowell Observatory. We arrived about 20 minutes after everyone else and then caught up to them at the top of the Pluto Walk. "The Pluto Walk is a 350-foot outdoor exhibit that illustrates the scale of the solar system from Sun to Pluto."

Bruce Kosaveach took us on a tour of the inside of the telescope at the end of the Pluto Walk called the Pluto Telescope Dome. This Dome houses the 13-inch astrophotograph used to discover Pluto in 1920. It was recently renovated.

Then we walked the Universe Walk & the Galaxy Walk, which is new. Lowell has done a great job of offering a lot more activities. They have renovated a bunch of areas, added more info, more to look at in the Visitor Center, and it was just a wonderful evening at Lowell. After the Universe walk, we worked our way to the Slipher Building / Rotunda Museum. "The Rotunda Museum originally contained the observatory's science library and today features exhibits." For this night, Inside they had presentations, about one - every hour, so we waited outdoors for the presentation that was happening right then, to conclude. I visited a couple telescopes that were set up outside and manned by Lowell Observatory personnel. There was a 16" that was showing Venus, and a 12" that was showing Jupiter. Then, we went in the Rotunda and looked around. It was getting dark outside, so several of us went to line up to look through the 24" Clark Scope. After about an hour in line, we looked and saw Jupiter. While $\frac{3}{4}$ of the group was at the Clark Scope, Mike, Ofelia, Pete, Paul and Bob were in the Rotunda for more presentations. "The Clark Telescope Dome is the oldest standing building at the observatory. It was constructed by Local bicycle repairmen Godfrey and Stanley Sykes. The Clark Telescope, built in 1896, was used to uncover the first evidence of the expanding nature of the universe. Since the 1970's this refractor has been used exclusively for pub-

lic education.” Then, the McAllister 16” scope was open for viewing and showing M13, so the same bunch of PAS Members went to look through that scope. “The McAllister Telescope is a reflecting telescope with a Cassegrain optical system featuring a 16” primary mirror. This telescope is used exclusively for public education.”

After the scopes, it was 9:30pm so we wandered back to the Steele Visitor Center so we would have time in the Gift Shop. William and I walked out of Lowell about 10pm. “The Steele Visitor Center opened



This is the PAS Members who went on this fantastic Field Trip to Meteor Crater: Kevin Harcey, Matt Kohl, Bob Ewing, John Kundrat, Don Boyd, Howard Moneta, William Finch, Paul Facuna, Mike Marron, Pete Turner, Ofelia Waters, Matthew Kundrat, Sam Insana, Vera Stiesmeyer, Frank Insana, Jennifer Key & Terri Finch. Photo taken by our tour guide on this hike with John Kundrats phone.



At the Meteor Crater Visitor Center, Terri Finch is seen at the bottom of Meteor Crater. Photo by William Finch.



3D wood carvings on the back of chairs at Agave Restaurant in Flagstaff. They are made by the people in a small village in Guadalajara, Mexico. Photo by Pete Turner.



At Lowell Observatory, a few of the volunteers at Lowell had set up 2 very nice telescopes to show Jupiter and Venus. It was warm on this night and so Jupiter wasn't the clearest of views as it was really close to the Eastern horizon. Photo taken by Terri Finch.

in 1994 and is the public's gateway to the Lowell Observatory campus, programs, telescopes, exhibits and gift shop.”

As we were getting into our car to leave, the stars caught my attention and we stood there enjoying the dark night sky for about 5 minutes. Then we drove down the hill part way to the Overlook and spent another 10 minutes enjoying the view of the lit up city and the stars overhead. That was a most awesome way to conclude our visit to Lowell Observatory on this night.

Sam Insana writes: SPECTACULAR PAS FIELD TRIP: On June 2nd, 17 PAS members took a great field trip to Northern Arizona. The weather was perfect, very little wind, temperatures in the 70's and 80's and no clouds.

We started out visiting Anderson Mesa Observatories and the Naval Optical Interferometer. The

facility is normally closed to the public, however Howard Moneta set up a fantastic 2 hour tour for us. The next stop was Meteor Crater. We all enjoyed a walk on the crater rim, with a very good tour guide. A movie was then shown inside and we ended by enjoying the hands on museum and extensive gift shop. Matt Kohl made reservations at the Agave Mexican food restaurant on historic Route 66. It was a feast. Finally, to cap off the whirlwind day, we toured Lowell Observatory. Some of us did the Pluto walk, some the Galaxy walk, others the Rotunda with lectures and historic items on display. Howard arranged a private tour of the Astrograph used by Clyde Tombaugh to discover the PLANET Pluto. The newly restored 24 inch Clark refractor telescope was then open at 8:30 pm for us to see Jupiter.

There was also another telescope open showing M13 Hercules globular cluster.

I want to thank all who participated for enduring a marathon event and making the road trip so enjoyable. We thank Howard for donating his Lowell Observatory free

passes to us so we could each have free admission.

Jennifer Key writes: I had such a great time on this field trip. It was a truly fun day.

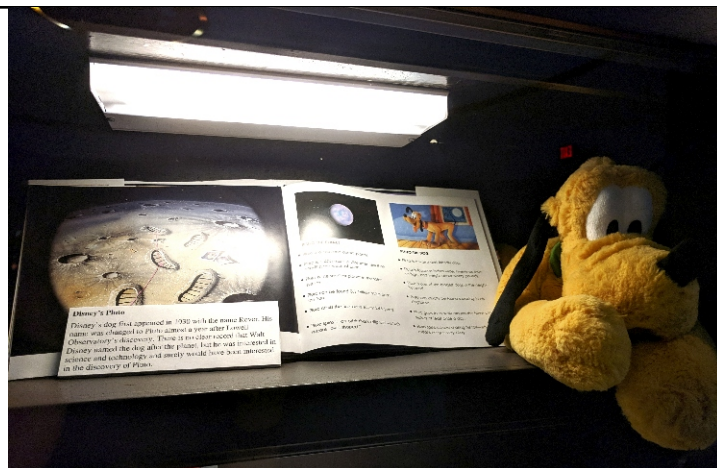
Bruce Kosaveach writes: "To PAS, Thank you again for coming up to NPOI for a tour and then later to Mars Hill! I think everyone had an enjoyable visit!!" Bruce is the Philanthropy Manager at Lowell Observatory.

John Kundrat writes (referring to himself and his son Matthew): We both think the trip was well worth the effort.



Inside the Lowell Observatory Gift Shop is so many really cool things including plushies of the planets: Jupiter & Saturn.

Photo by Terri.



The Story of Pluto. This fun info is found in the Rotunda at Lowell Observatory. Photo by Terri.



Inside the dome of the telescope that Percival Lowell spent many hours studying Mars: the 24" Clark Scope. Photo by Terri.

Upcoming BMC Star Parties 2018/2019

By Terri Finch, Event Manager

PAS hosts a bunch of public star parties during the school year (Sept to end of May), each year. Some of our Public Attendees attend only certain events, so I have here the list of Upcoming Black Mountain Campus (of PVCC) Public Star Parties you will not want to miss (Weather Permitting).

November 8, 2018: Indoors will have some activities, Mike Marron with his Hands on Meteorites from 6pm to 9:45pm, and outdoors will be a Huge Public Star Party from 6:30pm to 9:45pm. More details:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2544&day=2018-11-8&c=1>

January 31, 2019: Indoors will have some activities, Mike Marron with his Hands on Meteorites from 6pm to 9:45pm, and outdoors will be a Huge Public Star Party from 6:30pm to 9:45pm. More details:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2715&day=2019-1-31>

February 28, 2019: Indoors will have some activities, Mike Marron with his Hands on Meteorites from 6pm to 9:45pm, and outdoors will be a Huge Public Star Party from 6:30pm to 9:45pm. More details:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2716&day=2019-2-28>

March 7, 2019: This is one of two huge star parties this school year. From 6pm to 9:30pm, indoors, in the Aquila Building, will be many hands-on activities for all ages, plus demos, and presentations. This event is totally Free and open to the public. Along with the indoor portion will be a Public Star Party from 6:30pm to 9:45pm. Bring the whole family. There is something at this event for everyone to enjoy! More details are here:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2717&day=2019-3-7>

March 28, 2019: Indoors will have some activities, Mike Marron with his Hands on Meteorites from 6pm to 9:45pm,

and outdoors will be a Huge Public Star Party from 6:30pm to 9:45pm. More details:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2718&day=2019-3-28>

April 25, 2019: Indoors will have some activities, Mike Marron with his Hands on Meteorites from 6pm to 9:45pm, and outdoors will be a Huge Public Star Party from 6:30pm to 9:45pm. More details:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2719&day=2019-4-25>

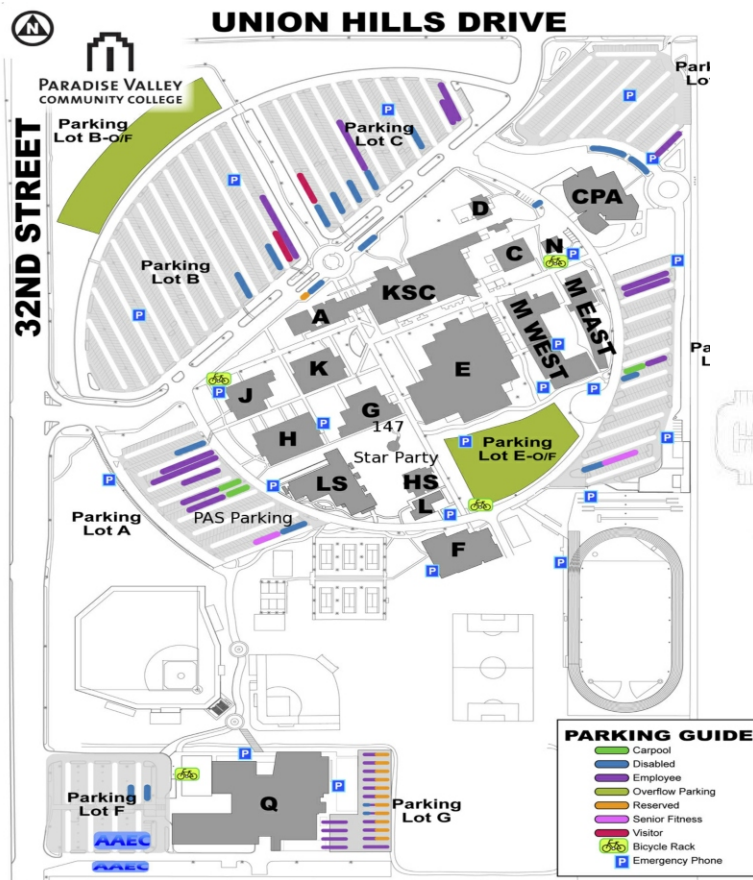
May 2, 2019: Indoors will have some activities, Mike Marron with his Hands on Meteorites from 6pm to 9:45pm, and outdoors will be a Huge Public Star Party from 6:30pm to 9:45pm. More details:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2720&day=2019-5-2>

We would love for you to join us at all of these Public Star Parties. Please drop me an RSVP in case Weather cancels the event.

Map of PVCC Main Location

18401 N. 32nd Street | Phoenix, AZ 85032



Map of PVCC Black Mountain

34250 N. 60th Street | Scottsdale, AZ 85266



2018-2019 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 the details. Here are the next scheduled guest speakers at PAS:

Nov 1: Ted Blank "New Horizons"

Dec 6: Vincenzo Cataldo, Topic: Planetary Volcanism

Jan 17: Mark Johnston, Topic: Exoplanets More information at:

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

October 2018

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4 <i>PAS Meeting</i>	5	6 <i>NSTS (Private) Star Party</i>
7	8	9	10 <i>ASU West Star Party</i>	11 <i>BMC Star Party</i>	12 <i>School Star Party (Private)</i>	13
14	15	16	17	18 <i>Telescope Workshop</i>	19	20 <i>Bookmans Sidewalk Astronomy</i>
21 <i>Telescope Workshop</i>	22	23	24	25	26 <i>Japanese Garden Star Party</i>	27 <i>Japanese Garden Star Party Halloween Party (Private)</i>
28	29	30	31			