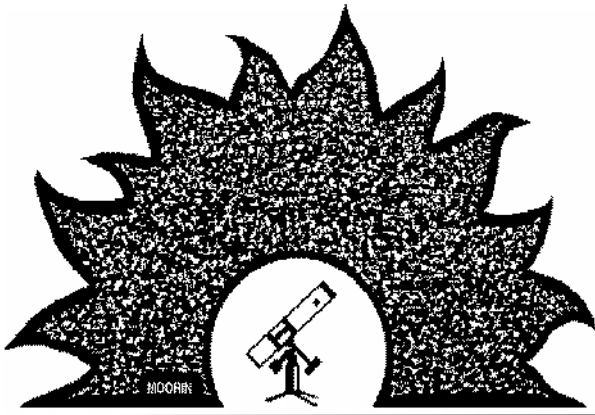




PAStimes

Phoenix Astronomical Society

www.pasaz.org

September 2018

Volume 70 Issue 1

PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Laurence Garvie to Speak at Sept 6th Meeting

Did you find a meteorite? Probably not. A practical guide to meteorite identification

Laurence Garvie is the curator for the Center for Meteorites and Research Professor in the School of Earth and Space Exploration at Arizona State University. His research and interests are varied, ranging from the extraterrestrial including the classification of new meteorites, to the terrestrial such as revealing the mechanisms of biogenic calcite precipitation. His meteoritic research involves in-depth mineralogical and petrological analyses and observations of meteorites, with the view of understanding their formation in the early Solar System. These observations are used to classify new meteorites like the 2 June 2016 fall from Arizona called Dishchii'bikoh Ts'itsqqsé Tsee. This meteorite is classified as an L7 ordinary chondrite, shock stage S3 and weathering grade of W0. These classification terms and their importance will be explained by studying a range of recent meteorite falls. This presentation will focus

on meteorite identification from the practical and visual analysis in the field to the comprehensive laboratory analysis and classification.

Following Professor Garvie's presentation, we will have a short break before welcoming our second guest speaker of the night, Bruce Kosaveach from Lowell Observatory who will do a 15 minute presentation entitled "The Future looks Bright at Lowell Observatory."

If you ordered a PAS name badge recently and it has come in, you will receive an email letting you know I have it ready for pick up at the September meeting. Those emails will go out about the same time this newsletter is ready for download.

Please bring a snack to share at this meeting. Bottled water will be provided by Bruce Wurst. Donations to the Snack Fund for future snacks and water at the PAS Meetings, are greatly appreciated. Bring a Friend!



Bruce Kosaveach to Speak at Sept 6 Meeting



Laurence Garvie will be speaking about Meteorites.

PAS Meeting May 10

By Terri, Event Manager

After a Meet & Greet dinner with guest speaker Tom Polakis, the meeting began at 7:35 in room LS-203 on the PVCC Campus.

President Mike opened the meeting with announcements and gave the floor to our speaker about 7:45pm. Tom did an excellent presentation on photometry that ran until about 8:30pm.

After Tom completed his presentation, Mike made some more announcements including congratulating Rodney for 20 public outreach events in 2017 for which Rodney was awarded a certificate from the Night Sky Network certificate and pin. Mike then read a letter and certificate from

NASA congratulating PAS for the public outreach we provided for the 2017 total solar eclipse of August 21st. Following that, we had our annual elections of officers for PAS, for the 2018/2019 PAS year; officers begin their terms at the September PAS Meeting. Here are the results: Rodney Fong will continue as PAS Meeting Host, Mike Marron was re-elected as President, Paul Falcuna will continue as Vice President, and Don Boyd will



*Tom Polakis was our Fantastic May Guest Speaker.
Photo provided by Don Boyd.*

See May 10 Meeting on page 5

President	Mike Marron	480-488-3031	President@pasaz.org
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PAS Upcoming September Events

By Terri Finch, Event Manager

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

Aug 31 to Sept 3: PAS will be at Cokocon which will be held at the Double-Tree at Metro Center Mall. PAS will have an indoor table during the day, and star party (weather permitting) in the evenings 7pm to 11pm. See this link for more details if you wish to attend: <http://www.cokocon.org/2018/programmin.html>

Sept 6: PAS Meeting at PVCC Main Campus in LS-203 at 7pm. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2528&day=2018-9-6&c=1>

Dinner before the meeting for a meet and greet of the guest speaker at Chili's 4:30pm. RSVP required by day before. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2722&day=2018-9-6&c=1>

Sept 8: Public Event: Binocular Star Party. Bring your binos and join PAS for a fun class to learn what objects can be enjoyed through your binoculars. Everyone welcome. Highlights of this night will be Venus, Jupiter, Saturn and Mars. RSVP is Required with Terri. More Details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2534&day=2018-9-8&c=1>

Sept 13: 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=2535&day=2018-9-13&c=1>

[13&c=1](#)

Sept 14: Public Star Party at South Mountain 7pm to 9pm. More details: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2696&day=2018-9-14&c=1>

Sept 23: Free Telescope Workshop at Bookmans 3:30 to 5:30pm. RSVP required with Terri. More details at this link: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2524&day=2018-9-23&c=1>

Sept 27: PAS Business Meeting. More details can be found in the PAS online calendar: <http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2533&day=2018-9-20&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.

Park After Dark Series of Spring 2018

Tonto National Monument Star Parties

Data provided by Christa Sadler

Hello Sam and PAS!

I would like to start throwing around some ideas for dates for programs for our 2018-2019 Park After Dark series. We are hoping to partner with PAS for one event per month for the months of November 2018, January 2019, February, and April. Would there be any dates that you think would work best with the schedule of PAS and the night skies?

Below are our final statistics from this

last series. Our events were a HUGE success! Thank you to all who were able to help us make these events happen. They have made a true impact on our local community and visitors alike, and will help us as we move forward with our mission to becoming an International Dark Sky Park with IDA. It wouldn't be possible without all of your help!

Saturday, January 13 - Stellar Stars - 63 visitors

Saturday, February 3 - Night Hike: Nocturnal Neighbors - 54 visitors

Saturday, February 17 - Ancient Skies - 52 visitors

Saturday, April 14 - Our Solar System and Beyond - 100 visitors

Saturday, April 28 - Night Hike: Bats - 74 visitors

Total series attendance: 343 visitors

Planning the 70th Anniversary of PAS Astronomy Celebration

By Terri Finch, Event Manager

Six PAS members and four PVCC personnel met at 1pm on July 3rd at Black Mountain Campus of PVCC to discuss this upcoming event.

At this time, four classrooms at BMC in the Aquila Hall will be utilized for this event, as well as the open hallway areas within the building. The plan is to have mini 20 minute lectures, back to back, as well as tables set up for people to meet and talk with the attending guest speakers and other invited guests from the astronomy community.

PAS will be seeking guest speakers and donations from various astronomy companies for the free raffle items. We will also have hands-on activities for kids of all

ages, as well as demos, info about PVCC, PAS and other organizations who wish to take part in this celebration. In the evening, there will be a huge public star party for all to attend and enjoy. Thanks to Don Boyd, Paul Facuna, Sam Insana, Mike Marron and Ofelia Waters for attending from PAS. I especially wish to thank Jenny Weitz, Loretta Mondragon, Courtney Banach and Daren Dorm for the walk through and discussion of the plans for this October 11th event at BMC from 5pm to 10pm. With their assistance, volunteers and expertise it should be fantastic!

More details will be announced on the PAS Website at this link: [http://www.pasaz.org/forums/calendar.php](http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2541&day=2018-10-11)

[?do=getinfo&e=2541&day=2018-10-11](http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2541&day=2018-10-11).

This link will be updated as more information becomes available. I hope to have a schedule posted at this link closer to the date, once the guest speakers and activities are set up. To follow along with the progress, please visit the Public Calendar at this link:

<http://www.pasaz.org/forums/calendar.php?do=getinfo&e=2541&day=2018-10-11&c=1>. You will find a Private Forum Link for PAS members only, and a Public Forum Link with the Speaker Schedule and more details. Please visit these links to see what PAS has planned for this date for your astronomical enjoyment. Hope to see you there!

Help Us Congratulate the 2018/2019 PAS Officers

By Terri, Event Manager

At the September meeting, we will be welcoming the newly elected and returning officers of PAS for the next PAS year (September to May).

Meeting Host: Rodney Fong will take this position again. Thank you Rodney.

President: Mike Marron will continue with his 2nd term as President of PAS.

Vice President: Paul Facuna will con-

tinue as Vice President for a 2nd term.

Editor: Don Boyd has been the Editor of the PAStimes Newsletter for many years and has offered to take that position again for this year.

Treasurer: Position is open.

Secretary: The new Secretary of PAS will be Rick Cunningham. Congrats Rick!

The two Members at Large will continue for another year: Congratulations to Jenny Weitz and Bruce Wurst.

Event Manager: This position will be held by Terri Finch for another exciting year.

Come to the September meeting and help PAS congratulate these Officers.

What's Up For September?

By Don K. Boyd, PAStimes Editor

<u>Planets</u>			
Name	Date	Rise	Set
Mercury	09-15-18	05:50	18:27
Venus	09-15-18	09:36	20:03
Mars	09-15-18	16:13	10:59
Jupiter	09-15-18	20:50	21:13
Saturn	09-15-18	14:01	12:01
Uranus	09-15-18	20:14	09:24
Neptune	09-15-18	06:09	05:41
Pluto	09-15-18	15:10	01:14

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.

September 15 2018

Sunrise: 06:11

Sunset: 18:34



Q3: September 02



New: September 09



Q1: September 16



Full: September 24

Dinner Before the Sept 6 Meeting

PAS members will be enjoying a dinner prior to the September Meeting. Dr Garvie has mentioned that due to time constraints, he will not be able to attend, however our second guest speaker, Bruce, would love to

do a meet and greet at Chili's beforehand. If you would like to attend, please be sure to RSVP by the day before the meeting. Dinner arrival time is 4:30pm to 5pm. We are only there until 6:30pm when we all leave

to go to the PAS Meeting. It's a "buy your own" dinner, but we have a great time at these events.

Bookmans Telescope Workshop Aug 19

By Terri Finch, Event Manager

PAS had 3 RSVP's lined up to attend this Free Telescope Workshop, however, only 1 showed up. But, Dave Leet was a super patient and awesome gentleman who waited for Bruce Wurst to arrive. Bruce was driving down from Flagstaff with Ed & Bette Wurst and the traffic was terrible, and so Bruce arrived about 4:10pm. But Dave enjoyed the company of Sam Insana, Rick Cunningham, William & Terri Finch. We chatted about all sorts of really awesome things while Dave waited for Bruce's advice

. Dave came to this event from Maricopa and he brought with him his Mak Cassegrain 6" scope. It was a very nice looking telescope.

We had 6 walkins during this event. Each one left with a copy of the PAS Flier giving them info about the club and an August Star Chart on the back side. I wish to thank Ethan at Bookmans for helping with the physical set up for this event. He was amazing and quick to grab 2 thin tables

and as many chairs as he could, from the back room and get them to me to set up for the event. I also wish to thank Rick, Sam and Bruce for attending this event.

After the event, William, Terri, Bruce, Donna, Helen, Bette and Ed went to Carlos O'Briens for dinner. Our favorite waiter, Daniel, was amazing. Looking forward to the upcoming Telescope Workshops at Bookmans on Sept 23, Oct 21, and Nov 18, 2018.

PAS Social Jan 27

By Terri, Event Manager

It was a pleasant day to have our annual social at Mike's home in Carefree with the 17 PAS Members who enjoyed the potluck, a dart board game, bean bag toss and the Annual White Dwarf Gift Exchange.

Members began to arrive around 4:30 and we began the potluck dinner a little before 5; the games began at 6pm with the Bean Bag Toss, run by Sam Insana and the Dart game outside, both running about an hour and a half. The Bean Bag Toss finished with Howard Moneta in 2nd place with 46 points and Ed Wurst taking first with 51 points. Thank you Sam for running this game. Sam brought a collection of bookmarks to give to the winner - Ed chose one from Star Trek.

The Dart game was very close this year with some great competition. In 3rd Place with a score of 14 was Ed Wurst. 2nd place was taken by Pete Turner with a score of 15 and Bruce Wurst took 1st place with a score of 16. Since the Dart Trophy

is usually given at the Awards Ceremony in April, Bruce received a Night Sky deck of cards which was originally donated to the PAS Social last year by Alex Vrenios. Thanks to Bruce and Ed for bringing the 5 dart boards this year, and running the game.

The White Dwarf game had 10 participants who received some very nice gifts this year. Many thanks to everyone playing the game, which concluded about 9pm. The main door prize, donated by Kevin Harcey, was a Rubiks cube. After the games various members stayed and watched the movie "Prometheus."

Thanks to all who attended, and especially to Mike for hosting this event. I'm looking forward to next year's PAS Social in January of 2019. See you there!



Rodney is seen at the dart game. There were 5 dart boards set up this year to have a continuous game. We played for about 1.5 hours. Many thanks to Bruce & Ed who helped run the game.



Sunset happens just as everyone is gathering outdoors to enjoy the annual game of PAS Darts. It's a stiff competition this year. Photo by Terri.

FOR SALE:

Brand new in box with 2 year warranty, Celestron Astromaster 114 EQ Telescope <https://www.celestron.com/products/astromaster-114eq-telescope> with motor drive <https://www.celestron.com/products/astromaster-powerseeker-motor-drive> Asking \$200, Contact: Jordan 602-881-0607 or papagator96@yahoo.com.



A Trip Through the Milky Way

By Jane Houston Jones and Jessica Stoller-Conrad

Feeling like you missed out on planning a last vacation of summer? Don't worry—you can still take a late summertime road trip along the Milky Way!

The waning days of summer are upon us, and that means the Sun is setting earlier now. These earlier sunsets reveal a starry sky bisected by the Milky Way. Want to see this view of our home galaxy? Head out to your favorite dark sky getaway or to the darkest city park or urban open space you can find.

While you're out there waiting for a peek at the Milky Way, you'll also have a great view of the planets in our solar system. Keep an eye out right after sunset and you can catch a look at Venus. If you have binoculars or a telescope, you'll see Venus's phase change dramatically during September—from nearly half phase to a larger, thinner crescent.

Jupiter, Saturn and reddish Mars are

next in the sky, as they continue their brilliant appearances this month. To see them, look southwest after sunset. If you're in a dark sky and you look above and below Saturn, you can't miss the summer Milky Way spanning the sky from southwest to northeast.

You can also use the summer constellations to help you trace a path across the Milky Way. For example, there's Sagittarius, where stars and some brighter clumps appear as steam from a teapot. Then there is Aquila, where the Eagle's bright Star Altair combined with Cygnus's Deneb and Lyra's Vega mark what's called the "summer triangle." The familiar W-shaped constellation Cassiopeia completes the constellation trail through the summer Milky Way. Binoculars will reveal double stars, clusters and nebulae all along the Milky Way.

Between Sept. 12 and 20, watch the Moon pass from near Venus, above Jupiter,

to the left of Saturn and finally above Mars!

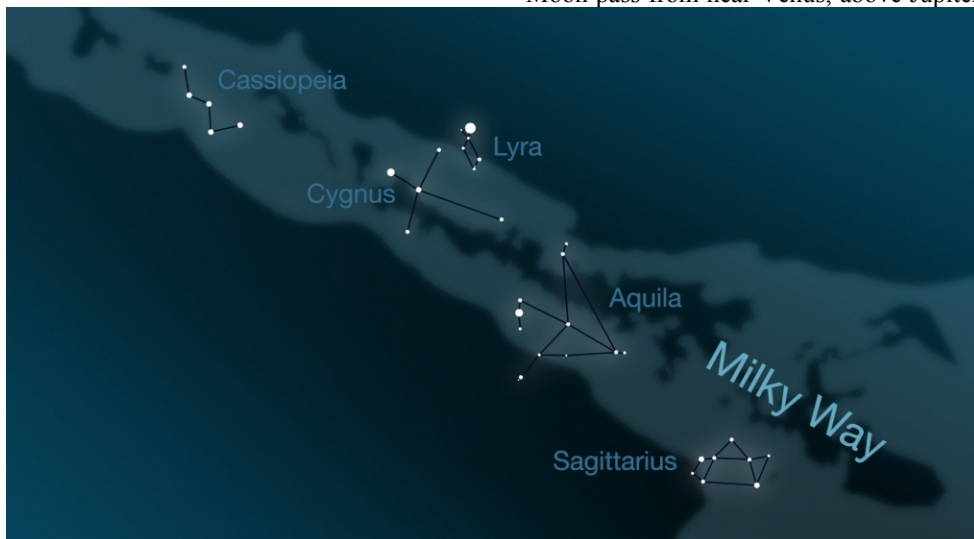
This month, both Neptune and brighter Uranus can also be spotted with some help from a telescope. To see them, look in the southeastern sky at 1 a.m. or later. If you stay awake, you can also find Mercury just above Earth's eastern horizon shortly before sunrise. Use the Moon as a guide on Sept. 7 and 8.

Although there are no major meteor showers in August, cometary dust appears in another late summer sight, the morning zodiacal light. Zodiacal light looks like a cone of soft light in the night sky. It is produced when sunlight is scattered by dust in our solar system. Try looking for it in the east right before sunrise on the moonless mornings of Sept. 8 through Sept. 23.

You can catch up on all of NASA's current—and future—missions at www.nasa.gov

This illustration shows how the summer constellations trace a path across the Milky Way. To get the best views, head out to the darkest sky you can find.

Credit: NASA/JPL-Caltech



Fall Guest Speaker Line up

By Terri, Event Manager

Many thanks to Paul Facuna, PAS's Vice President, for setting up the Fall 2018 Guest Speakers. We have a great lineup of speakers and topics - we'd love to see everyone attend:

On September 6th we will have Laurence Garvie, who comes to us from ASU Tempe, sharing the topic of Meteorites.

On October 4th PAS will have Tom Mozdzen, also from ASU Tempe who will speak with us about the EDGES Project.

On November 1, PAS's own Ted Blank will provide a talk about what's new with the New Horizons mission.

Lastly on December 6, we will have Vincenzo Cataldo from ASU Tempe presenting his topic of Planetary Volcanism.

This is an exciting lineup of guest speakers and topics that you will not want to miss. See you there.

May 10 Meeting

Continued from page 1

remain Editor of our PAStimes Newsletter for another year. Since Eric Steinberg is stepping down from the role of Treasurer, that position will be open as of September. Due to other obligations Pete Turner also gave up his position as Secretary. Rick Cunningham was voted in his place as club Secretary. The Members at Large, Jenny Weitz and Bruce Wurst will stay the same for this next year and Terri Finch will continue as Event Manager. Congratulations to all the Officers, new and old; thanks for your service to PAS!



At the May Meeting, Rodney Fong was awarded for his attendance and help with many Public Outreach events. President Mike Marron gave the award. Photo by Don Boyd.

Mike's Universe

By Mike Marron

The views expressed herein are Mike's alone.

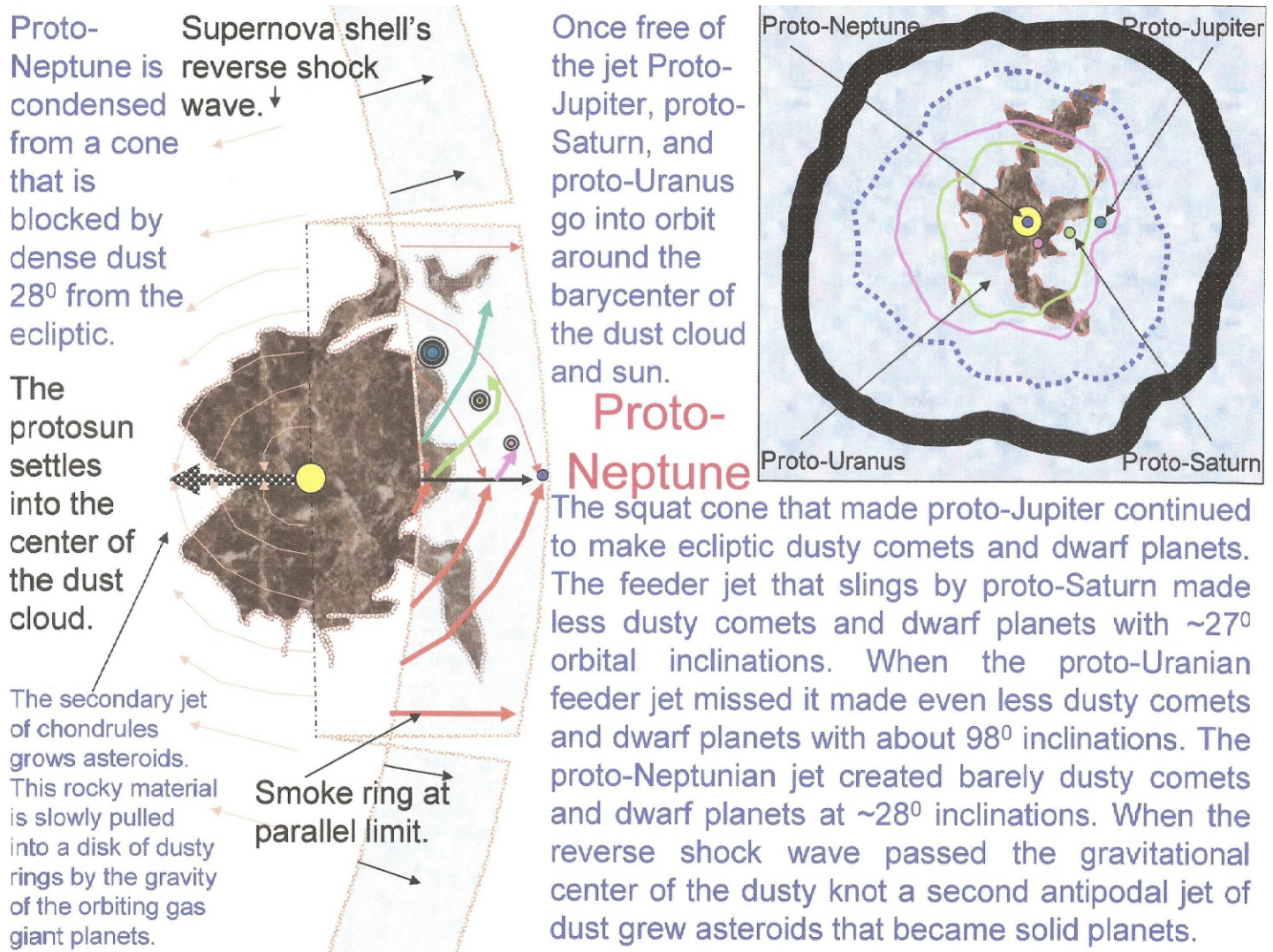
The June issue of Scientific American had an article on the Secret Life of the Sun about finding some of the other stars that were born with the Sun. I have been independently teaching those very concepts to the public for decades. I will change one thing. Where I would say siblings to the Sun have not been found, I can now say a few nearby solar siblings have now been identified that had to have been seeded with the same 4.6 to 6 billion year old amino acids found in carbonaceous chondrite meteorites and had the same 4.6 billion years to evolve life. Allow me to elucidate the events that led to the creation of our solar system and the other exoplanets.

The Scorpius-Centaurus Association of O and B supermassive stars (Sco

OB2), that is less than 15 million years old and only ~470 ly away, has already had seven supernovas as it slipped past our solar system after becoming a new open cluster. The isotopic rain ~2 mya from the last supernova shell to impact us is recorded in oceanic magnesium nodules. That radiation changed many land based lifeforms on Earth like our lineage. We will come to know supernova shells intimately as in about six thousand years the next shell to impact us will be the Loop I shell from a supernova that was less than 470 ly away. Unfortunately the faster ballistic portions leading this shell have already shifted the direction of our local interstellar winds by six degrees which means that fresh isotopes began lightly dusting the solar system ~45 years ago. How these supernova shells interact-

ed with the nearby giant molecular cloud (GMC) complexes helps illustrate how our own solar system was made. Generations of massive stars lived and died and their scattered heavy isotopes organized into GMC complexes that slowly grew dust in cold radiation protected interiors. Magnetic flakes stacked, ices and minerals grew crystals, and sticky carbon compounds accumulated everything injected into the gas clouds by the previous novas and supernovas which slowly accumulated into larger dust grains.

Our mother star was extraordinarily massive to be able to burn nearly all the hydrogen, nearly all the helium, and then enter into a stable carbon-nitrogen-oxygen (CNO) cycle. While alive the mother star made heavy elements up to iron and



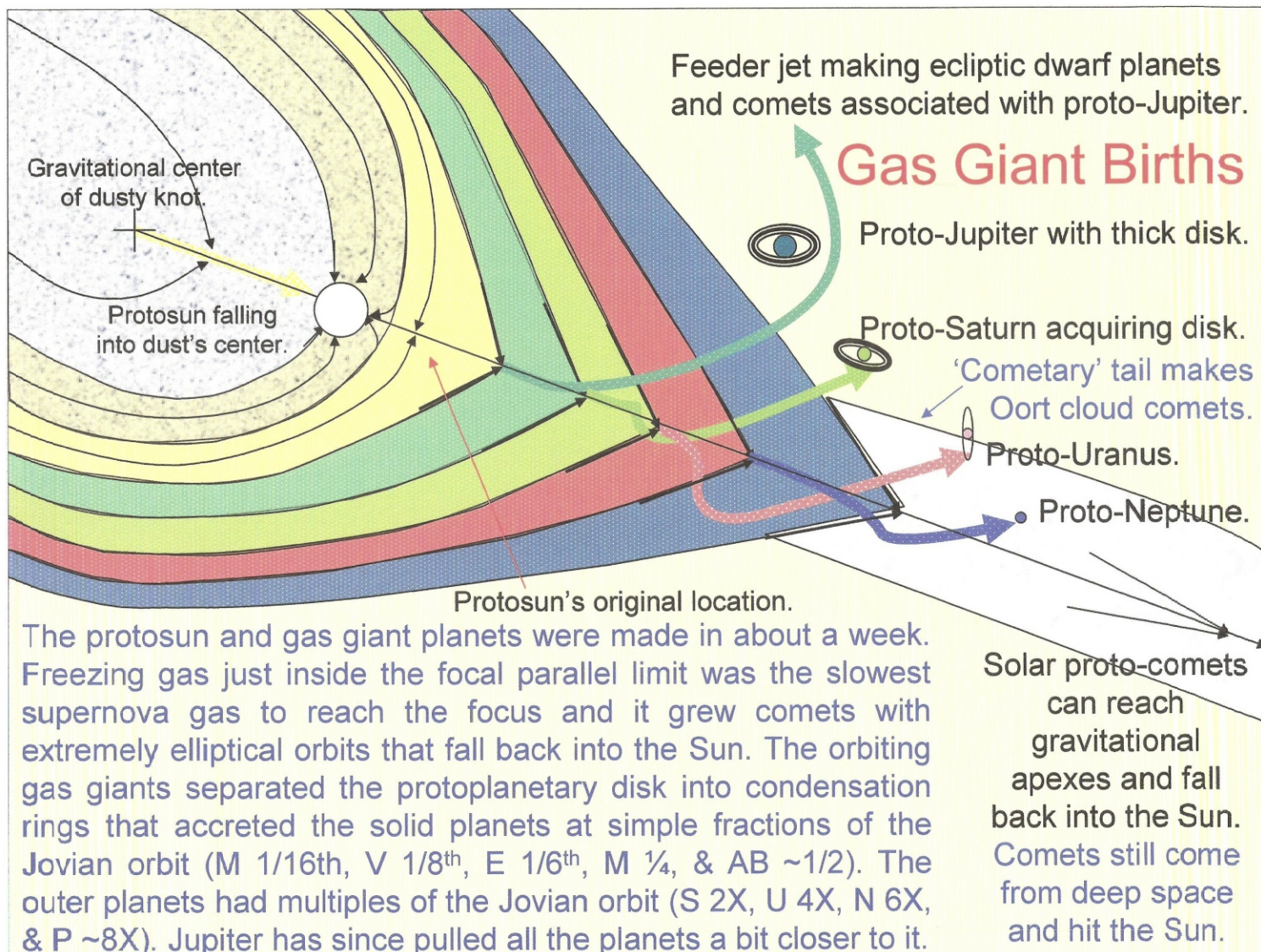
nickel that settled at the core while fast carbon rich stellar winds blew many solar masses of organic compounds, such as amino acids, into the nearby GMC. During the Type II supernova death of the mother star the massive core collapsed and for an instant the iron at the core reached the temperatures and pressures needed to fuse into the heaviest elements, then the core blew itself completely apart. The dusty knot that became our solar system was only ~50 ly from our supergiant mother star when it died. The supernova shell first swept up the mother star's previously emitted organic winds, then the shell swept up the surrounding interstellar gas. The supernova shell isotopes were only about a million years decayed when the impact hit our dirty cloudlet.

When the gas isotopes, the hot presolar grains, and iron mist of the supernova shell impacted the much more massive cold dust grains of the cloud the dust grains became coated, spun up, and

melted but gained little forward momentum. Our impacted Bok Globule type dust cloud was not swept up by the passing supernova shell but fell through the blast with more mass than the solar system has today. The impacting shell made our dusty knot into a gravitational object with a gravitational center when the dusty knot was separated from the rest of the GMC. At a certain radius from this gravitational center the trajectories of the passing spherically expanding shell were bent into parallel paths that made a type of cloudy tube (or smoke ring). Outside this smoke tube the supernova shell continued to expanded normally. Inside the smoke ring the shell divot became focused into a type of dust and gas jet which when currently seen are variously called the Pillars of Creation, protostellar columns, or the 'comet' like tails that are found trailing today's shell impacted protostars. The bottom of a protostellar jet can be defined as the point in the focal line where the

passing shell gas was orbitally captured into mostly circular orbits by the dusty knot's gravitational center. Like the hemisphere of an umbrella coming to a tip the orbitally captured shell gas poured onto a single spot that rapidly grew our protosun. Most of the gas and dust within this hemisphere eventually became the protosun so in the very beginning the protosun was a short distance from our dusty knot's center of gravity. The dust cloud's irregularities weren't enough take the protosun out of the jet but it did move the protosun just off the focal center and these off center accretions aligned the solar spin axis and added angular spin momentum.

Just outside of the hemisphere of passing shell gas that built the protosun the shell material that was bent into parabolic orbits reached the focus as a squat cone with newborn protoJupiter at the tip. Only minutes after the birth of the protosun protoJupiter was born from the tip of its squat cone. The net vector of this cone



directs the growing protoJupiter down the jet and away from protosun which was held in its birthplace by the collapsing central hemisphere. Irregularities in the density of the dusty knot more effectively block certain directions over the others. It was the net vectors of the most massive accretions that determined the direction that would become the Jovian orbital plane. The jet quickly pushed protoJupiter outward, away from the protosun and the gravitational center of the dust, while the new orbital vector slowly took protoJupiter out of the center of this jet. This made the jet impact protoJupiter off center which imparted a fast spin nearly aligned with the protosun's spin axis. Today the Jovian axial tilt is 3° and its orbital plane is only 6° off the Sun's equatorial plane. After a few days the nearly completed Jupiter pulled out of the jet but the jet continued to pour material into an orbiting disk that would become Jovian moons. When Jupiter exited the jet the broken umbilical cord spewed out both transneptunium objects (TNO's) and comets into the distant heliocentric plane.

The next cone of focused shell material was less squat and birthed protoSaturn only a few minutes after the birth of the protosun and protoJupiter. The protoSaturn cone made a faster downstream jet than the protoJupiter jet but the dominate orbital vector was $\sim 30^\circ$ away from the heliocentric plane so the initial Saturnian orbital plane wanted to be $\sim 30^\circ$. This gave Saturn an $\sim 30^\circ$ spin axis as it pulled out of the jet and an equatorial disk of material that would become moons. While the nearly complete Saturn broke free of the jet's influence with an initial $\sim 30^\circ$ orbital tilt Saturn found itself right beside gravitationally massive Jupiter, inside the cold outer atmosphere of the growing protosun, and near the dust's gravitational center, all of which gravitationally levered the Saturnian orbit back into the heliocentric plane. Today the Saturnian orbital plane is only $\sim 6^\circ$ away from the current solar equatorial plane.

The next cone focused by the dusty knot's gravitational center made a faster protoUranus next to protoSaturn but Uranus came out of the jet at $\sim 100^\circ$ to the heliocentric plane. Once free Uranus found itself very close to Saturn, Jupiter, the surface of the protosun, and our dirty

cloud's gravitational center, all of which brought the orbit of Uranus back into the heliocentric plane. Today the Uranian orbital plane is also $\sim 6^\circ$ away from the current heliocentric plane.

ProtoNeptune spent the longest time in the jet before initially exiting with an $\sim 30^\circ$ orbital plane that imparted an $\sim 30^\circ$ axial tilt before the nearby neighboring planets and protosun corrected the orbital plane. The current Neptunian orbital plane is also $\sim 6^\circ$ away from the solar plane. While the Jovian umbilical jet made comets and TNOs in the initial Jovian plane of 3° Saturnian and Neptunian umbilical jets made comets and TNO's with $\sim 30^\circ$ orbital tilts. The Neptunian umbilical jet made the comets and TNOs with $\sim 100^\circ$ orbital planes.

It appears that the next cone had encountered almost uniform density in the outer regions of the dusty knot which became focused into the Oort Cloud comets with large but random orbits that lie beyond the TNOs. The last cone was just inside the smoke tube parallel limit and was barely gravitationally bent into the focal line so it took thousand of years for the condensing ice flakes to reach this cold focus. Only the outward direction of the cold jet dominated so comets made in the cold jet had such extremely elliptical orbits that even today some are destroyed by the Sun's chromosphere on their first plunge from deep space.

The supernova shell had mostly cleared the newborn solar system of gas before a weaker reverse shock wave from the passed supernova shell began to dominate our local space. The reverse shock wave became focused into a weaker secondary jet aimed back at the original location of the supernova blast and antipodal to the primary jet that made the gas giants. The minerals and metals of the original solar dust cloud were coated with carbon rich, highly radioactive, presolar grains which melted the dust into the mineralized chondrule droplets seen in ancient meteorites. Chondrules that gained enough impact momentum to go into solar orbit first reached the focal line after the gassy supernova shell had mostly passed which gave the dust a chance to accrete other minerals and metals without the gas and ice that was previously focused into the primary jet. Half an orbit after encountering the primary

focus the dust passed through a secondary focus before a full orbit later it reentered the primary focus. Collisions, mostly at the two focal lines, grew rapidly melting asteroids and hot solid planetesimals with solar orbits or added to the protosun's growth.

When the gas giants settled into their first orbits they continued to be influenced by massive Jupiter so the Saturnian orbit became twice as far as the Jovian orbit, while Uranus became four times as distant, and Neptune ended up at six times the distance. As the gas giant planets first orbited they flattened the original ball of randomly orbiting dust into rings that grew planetesimals or asteroids such as the ones found in the asteroid belt that now have orbits only about half as distant as the Jovian orbit. A vast multitude of asteroids and proto-planets grew at simple fractions of the Jovian orbit but Mars at a quarter of the distance dominated and cleared the Martian orbit as it grew. At one sixth of the Jovian orbit Earth grew large enough to eventually capture the surrounding material. Venus dominated the one eighth orbit and Mercury grew at one sixteenth the distance. The TNO's settled into simple multiples of the Jovian orbit such as Pluto at eight times and the other TNO's average $\sim 9X$, $\sim 10X$, $\sim 11X$, $\sim 12X$, $\sim 13X$, etc. Of course after 4.6 billion years Jupiter has pulled everything closer to it so objects orbiting inside of Jupiter are slightly more than the simple fractions of the Jovian orbit and beyond Jupiter objects have orbits that are a fraction less than simple multiples of Jovian distances from the Sun. This gravitational effect of Jupiter is best seen in Quetzalcoatl's ever changing orbital resonances with Jupiter. After tens of thousands of years enough material deorbited into the protosun that pinched polar magnetic field lines sputteringly ignited polar fusion events in the birthing Sun and this ejected polar Herbig-Haro jets. As a fully functioning newborn star the solar wind cleared the solar system of the remaining gas and debris smaller than a micron and the solar system emerged from its dusty cocoon. The complicated 4.6 billion year impact history of the solid planets and moons can be covered in the rest of my Earth Shattering Evolution lecture.

Astronomy Day Apr 21

By Sam Insana PAS officer & Board of Director Member

On Astronomy Day, April 21st, 5 PAS members joined in Fountain Hills Celebration as a Dark Sky Community. Ted Blank, Sam Insana, Rick Cunningham, and Calvin Vance took part in telescope viewing at the community center and Mike Marron brought his meteorite display. Solar viewing showed sunspots and solar flares, and at night the hundreds of people were thrilled with viewing the Moon, Venus, Jupiter, Orion Nebula, and other objects. Many astronomy clubs took part in the event and brought telescopes including Fountain Hills, East Valley, SAC, Verde Valley, PAS and others. There was a mobile plan-

etarium set up by the AZ Science Center, astronomy lectures, astronomy photos, astronomy art work, a display on light pollution and how to combat it and many other activities in the Community Center. Ted Blank was a major organizer and should be proud of the work he did and the fantastic event.



Mike with his meteorites at Fountain Hills Community Center for Astronomy Day Apr 21. Photo provided by Sam Insana.

South Mountain Star Party May 5

By Sam Insana

For Cinco de Mayo, PAS was contacted by Lisa Hermann from the Environmental Center at South Mountain Park who asked us to do a star party that night. Don Boyd and Sam Insana came to her rescue and showed up with our telescopes. We showed Venus, Jupiter, Orion Nebula, M3 globular cluster, and a double star in Ursa Major. About 50 people showed up and there was a nice diversity from South Phoenix. It was a very pleasant evening.



Setting up for the Star Party at South Mountain. Sam's scope is the white scope at the front of this photo and Don Boyd is setting up his scope, the black scope. Photo provided by Sam Insana.

Bookmans Telescope Workshop May 6

By Terri Finch, Event Manager

For this Free Telescope Workshop, we had 5 RSVP's, but only 3 who attended. We had Jordan Eisgrou (a PAS member) bring his scope to get help aligning it. Bruce and Rick assisted Jordan for a about an hour. Timothy Potratz attended to find out what telescope to purchase as did Julia

Wiley and her husband Emerson. The three of them spoke with us for about an hour and a half discussing what telescope to purchase and what PAS does. Welcome Julia and Emerson as our newest PAS Members

Attending this event from PAS were William and Terri Finch, Rick and Tree

Cunningham, Jordan (listed above), Bruce, Ed and Bette Wurst, and Rodney Fong. Many thanks to the telescope teachers, as they were most helpful.

We then had a party of 10 enjoy Carlos O'Brien's after the workshop. It was a successful, fun, interesting event.

Mars Viewing in Cave Creek July 31

By Ron Walker

I would like to thank Mark Johnston and Sam Insana of PAS who brought out their telescopes for viewing after the star show about Mars. They went beyond the call of duty to provide views of Venus, Jupiter, Saturn, and Mars,

as well as some deep sky wonders. Thanks to Don Boyd and Frank Insana as well for keeping questions answered. Without them, this double outreach would not have gone over as good as it did. Many thanks to all.



What do Astronomers do on a Cloudy Night? On May 1, 2018, Paul Facuna, Rick Cunningham, Don Boyd, and Sam Insana saw the Dbacks beat the Dodgers 4 to 3 and become the top team in the national league with a 21 and 8 record.

Photo provided by Sam Insana.

Adventures in Occultation Timing: The Asteroid Penelope Occultation of May 21, 2018

By Sam Insana, Paul Facuna, Don Boyd, and Ted Blank

At 7 pm on a Monday night, Sam Insana, Don Boyd and Paul Facuna of PAS arrived in the desert near Maricopa to time an asteroid-star occultation. The weather was iffy with winds and clouds. A 10th magnitude star was to have the asteroid Penelope occult it around 10:29 pm. The place had wild horses, including a very young colt. After unloading all the equipment, we were told we were on Native American land and could be fined \$5000 for trespassing. We called the Native American police department to try to get a permit, but they said it was too late. We then loaded up 2 telescopes, gps, time insertion device, video cameras, monitors, camcorders, charts, binos, tables chairs, batteries, etc.... back into our vehicle and looked for another spot.

We called Ted Blank who then suggested Pecos Rd West of the I-10. By the time we found a suitable location, it was 9 pm. We had to hurry up since the last prepoint star was 10:04 pm and the target star was at 10:29 pm. By 10:00 pm, after a frantic setup, we were ready to proceed with only 4 minutes to spare. We found the last prepoint star, thanks to Paul F purchasing black construction paper and covering half of Don's 8 inch astrograph Newtonian reflector at the opening. This kept the glare of a 50% moon out of the telescope event though we were looking in Leo which is where the Moon and the prepoint and target stars were all located. Through the Moon's glare, Sam barely spotted the prepoint star with his binos and pointed a green laser at it so Don could aim his 8 inch astrograph at the object. This was accomplished at 10:04 pm exactly when we had to start having the telescope objects drift so we could hit the target star at 10:29 pm. Paul kept track of the time so we would not miss the prepoint star and the occultation event. We used Time the Sat app and Atomic Clock app, and a KIWI time insertion device to record everything. A few minutes before 10:29 pm we started recording the event with a camcorder. To our dismay, it looked like we had a miss because we couldn't see a star blink out (which would have been the occultation).

To drown our sorrows we went to IHOP for a very early breakfast at 12:30 am. After telling jokes, we then discussed the strange oval cloud in the west we had

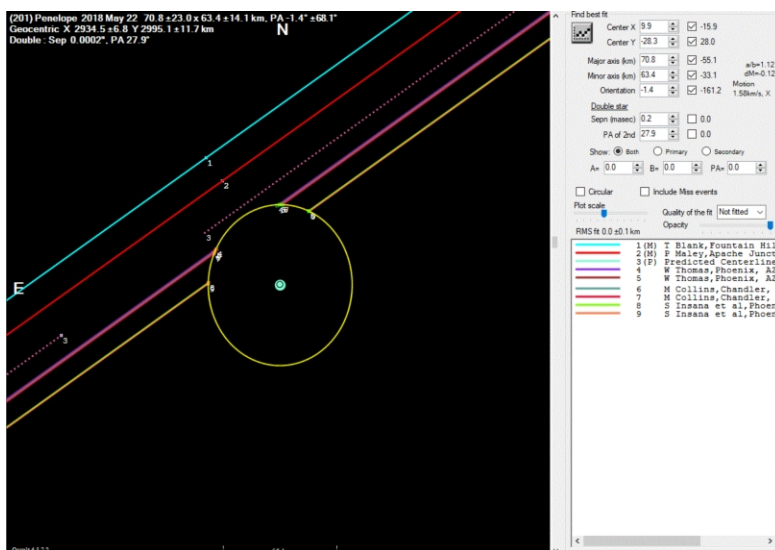
seen for 2 straight hours, not drifting or changing shape. It appeared as if it were a brush stroke cloud on a canvas. It was strange enough to be covering a mother ship of aliens watching and laughing at our exhausting occultation attempt. We also wondered about the fact that everything we touched during the occultation timing vibrated: the telescope, binos, table, chairs.... Could it be the mysterious cloud hiding the mother ship? It actually was the high tension electrical wires we inadvertently set up under. We never noticed them in the dark until we started pointing the green laser. By then it was too late to move to another spot. Luckily the wires didn't block the stars in Leo so didn't affect the occultation.

Success!!! The next morning Sam went over the tape again, with a bright light and larger magnifying glass. This time he saw the faint 10th magnitude star blink out at 10:30:12 pm. He saw it reappear 36 seconds later, below some numbers on the monitor. The next day however, Ted Blank went over the video frame by frame and observed that the star actually reappeared 28 seconds later (it was partially covered by the timing numbers on the monitor).

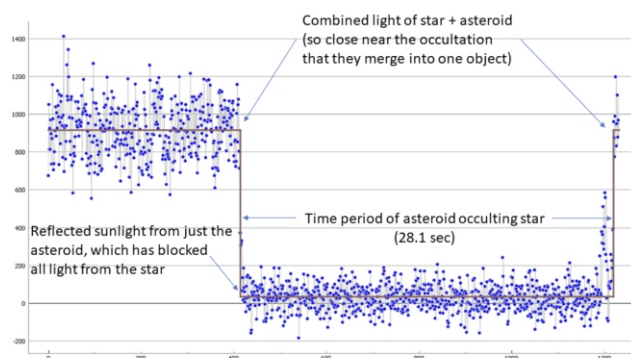
Ted Blank and Paul Maley also of PAS did occultation timings in other locations on May 21st along with several other people. Only about half were successful. One was rained out, some had electrical or mechanical problems. Some were right on the expected target but there had been a southern shift of the asteroid shadow of about one half path width from the predicted path, so no observers north of

the predicted center line saw the occultation. Observer Wayne Thomas had the northern-most positive, a 17 second occultation at 9.3 km south of the predicted center line. Mike Collins saw a 19 second occultation at 10.1 km south of the center line. Our 28 second occultation 25 km south of the center line was closest to the center of the asteroid. Attached is a diagram showing the approximate shape of the asteroid and all of the chords (positives and misses).

It was an exhausting and frantic night for Paul, Don and Sam, but eventually a very successful one. Oh, by the way, the frame by frame analysis by Ted Blank also



demonstrated that the successful occultation timing Paul, Don, and Sam recorded on May 21st discovered that our target star TYC 0278-00748-1 was a double star, a previously unknown fact!!! This was confirmed by 2 other successful timings May 21st, one by Wayne Thomas and another by Mike Collins.



Public Lecture in Carefree July 21

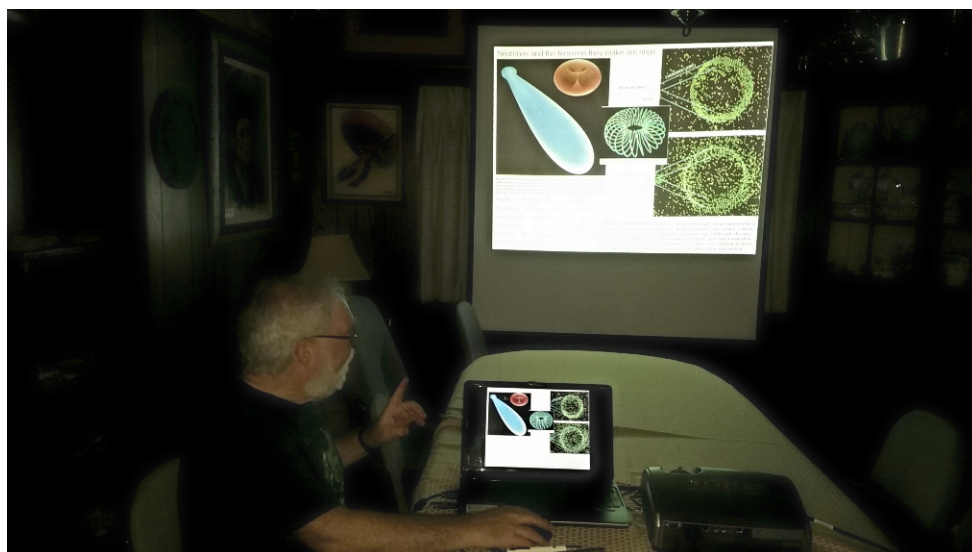
By Sam Insana, Officer and member of the PAS Board of Director

Seven members of PAS attended the event at Mike's home in Carefree Saturday night, July 21st. Mike Marron, Ophelia Waters, Frank Insana, Sam Insana, Don Boyd, Pete Turner, and Ron Walker enjoyed the 6 pm pot luck. Everyone brought items to eat, but I would like to especially thank Ophelia for making a delicious chocolate cake.

Some of the members of the committee for the 70th Anniversary event for PAS met after dinner for about 15 minutes to discuss progress to date and what still needs to be done. It appears that we have about nine speakers, three telescopes, activities planned for children, meteorite displays, free raffles of astronomy items, astronomy posters to put up in a room and other activities and exhibits. Pete will work with Rick Cunningham on sending out numerous press releases for our October 11th event. We can use more help from PAS members, especially more telescopes for night viewing from the PVCC BMC observation deck. Also we can use some small astronomy related items to raffle off, like astronomy books, pictures, holographic stickers, small meteorite fragments, etc...

We are also asking PAS members to bring a couple of their favorite astronomy posters to the event to put on the walls in the Aquila building.

Pete then set up his 12 inch dobsonian telescope and we looked at great views of a 50% phase of Venus, a first quarter view of the Moon, and a full view of Saturn



The Public Lecture of July 21 at Mike's home in Carefree was a fun event for all.
Photo by Sam Insana.

complete with Cassini ring division. We all tried to look at Mercury, but for some reason none of us could find it!!!

Mike spent many hours preparing for his lecture on quantum physics. He came up with very interesting theories showing how neutrinos are the building blocks to just about all things. His in depth look into quantum physics was fascinating and the 7 of us who were lucky enough to attend appreciate the hard work Mike has done on this project.

Afterwards, we all went outside and looked at Mars, which is about the closest to Earth in 15 years. We saw a

beautiful large orange globe through Pete's telescope at 214 magnification. The unfortunate thing was that Mars was in the grips of a dust storm that only appears every 4 or 5 years, and the dust wiped out any features like mountains or polar ice caps.

We stayed until midnight enjoying conversations outside. Most of us were lucky enough to see a giant fireball meteor. It blazed blue and green and had a special effect by passing through a cloud.

Although some clouds hung around, the weather was better than expected and it was very pleasant considering we are in the midst of monsoon season.

Bookmans Free Telescope Workshop July 22

By Terri Finch, Event Manager

It was a very hot afternoon, but we had a good public turnout. Attending from PAS were William and Terri Finch, Bruce Wurst, Sam Insana, Mark Johnston, Rodney Fong and Kevin Harcey. We had 6 RSVP's for the event, 3 of whom attended. They were: Emilie and Jacob Beatty with their Celestron 127 EQ Power Seeker (assisted by Sam), Geoff Eichel and his wife and baby, who attended to find out what telescope to purchase and finally a wonderful lady, Cheryl White who also came to find out what telescope to purchase and then joined PAS. Welcome New Member Cheryl! We also had two walk-ins who took PAS info.

It was a decent turnout and everyone

seemed to enjoy it. I wish to thank all the telescope teachers for attending and of course, Bookmans Phoenix for lending us the front window of the store for our telescope workshops. I am looking forward to the next free telescope workshop. If you'd like to find the next workshop like this one, visit the PAS Online Calendar at

<http://www.pasaz.org/forums/calendar.php>. We hold 1 or 2 Telescope Workshops each month on Thursdays and Sundays. Hope to see you there!



At the Bookmans Telescope Workshop of July 22 we see 3 attending public on the left side of the table, and on the right is Mark Johnston at the head of the table, then Terri & William Finch. Behind Terri is Sam Insana with the white hat and Rodney Fong assisting another attendee of this event.
Photo by Bruce Wurst.

Double Astronomical Event Success in Australia

By Paul D. Maley

Since last year I planned to observe the July 14 partial solar eclipse from Melbourne, Australia. I was invited by friends to stay at their farm about an hour southeast of town where we planned to use a 12 inch reflector to photograph the eclipse. From Melbourne barely 2.3% of the Sun would be covered. But that did not deter me since I turned 71 this year and this would also be my 71st solar eclipse. The night after that, there would be an eclipse of a 9.7 magnitude star by an asteroid from just west of Melbourne; I brought a 80mm refractor and video gear in an attempt to capture it.



Paul Stewart's observatory with a 12-inch reflector inside.

Weather in that region is not good in July as this is their winter period. On the morning of July 14 the sky dawned mostly overcast. I decided we should drive west toward the city where within an hour of the start of the eclipse, the sky had cleared up. We set up at a church in the city and watched as patchy clouds at first stayed away, then started to drift across the Sun.



The author photographing the partial solar eclipse. P. Stewart photo.



Clouds begin to gather.

However, as the eclipse began, the Sun was clearly visible with only a few puffy clouds blocking the Sun for seconds at a time. I was able to get clear shots.



Photo with Takahashi FC60 and ND5 filter

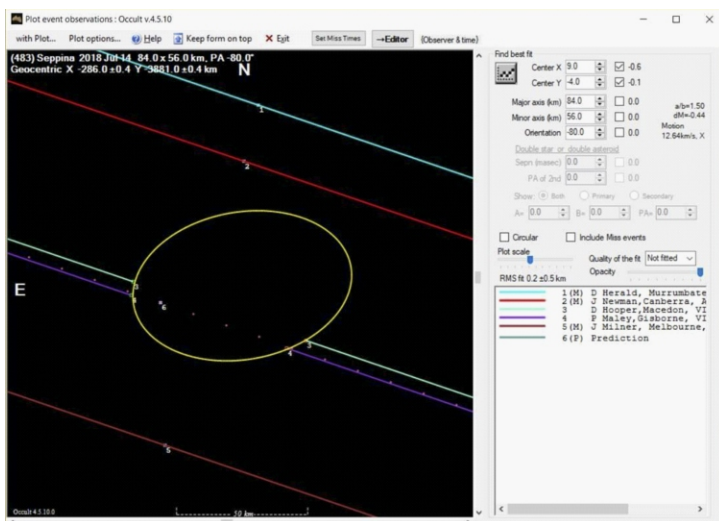
After the Sun recovered its original brightness the clouds rolled in and the sky was covered completely. This was a major stroke of good luck.

The next day was the occultation of this moderately faint star by the 42 mile wide asteroid Seppina. I chose a site near Gisborne, Victoria and we headed out to see if we could find a good clear spot. The wind was blowing about 20 mph and it was around 39 deg F. We set up in a clear sky area and waited. I had to place the car such that it would block the oncoming wind and this proved a big help.



Paul Stewart, Ann Bullen, Paul Maley, Lynn Palmer
at the occultation site

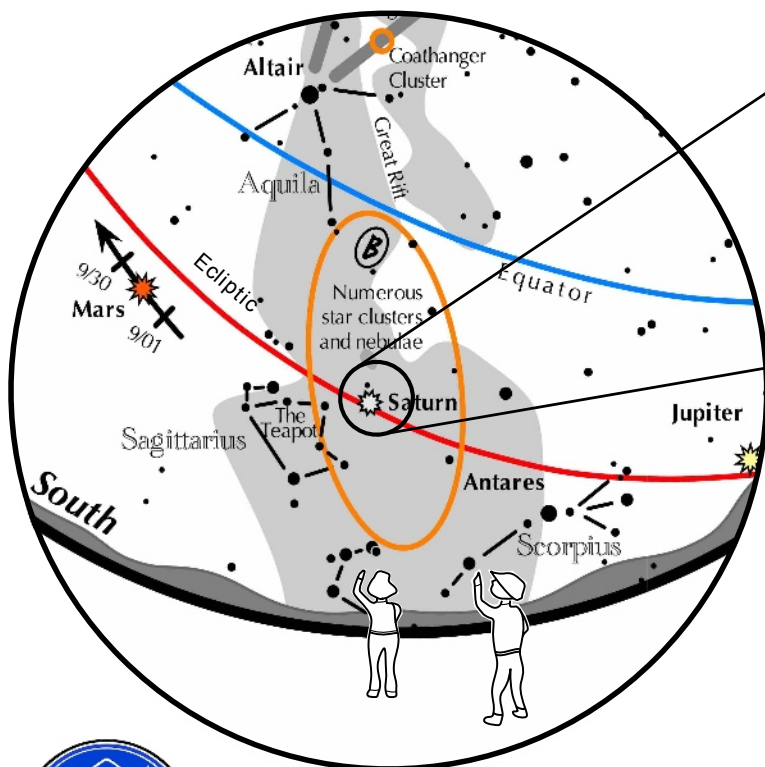
captured it. The results are shown in the figure below.



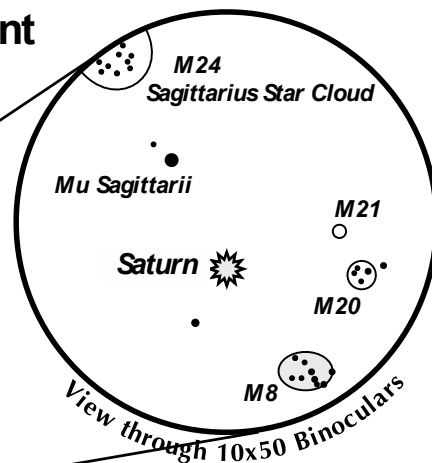
Asteroid Seppina profile of a 2-dimensional ellipsoid based on my observation (in blue) and David Hooper's data (green). Three other lines represent misses where the observer did not see the star disappear.

This represents the 6th continent on which I have now recorded successful minor planet occultations.

If you can observe only one evening celestial event this month, consider this one:



**South-southwest
75 minutes after sunset
before Sept. 13.**



Saturn reveals celestial treasures

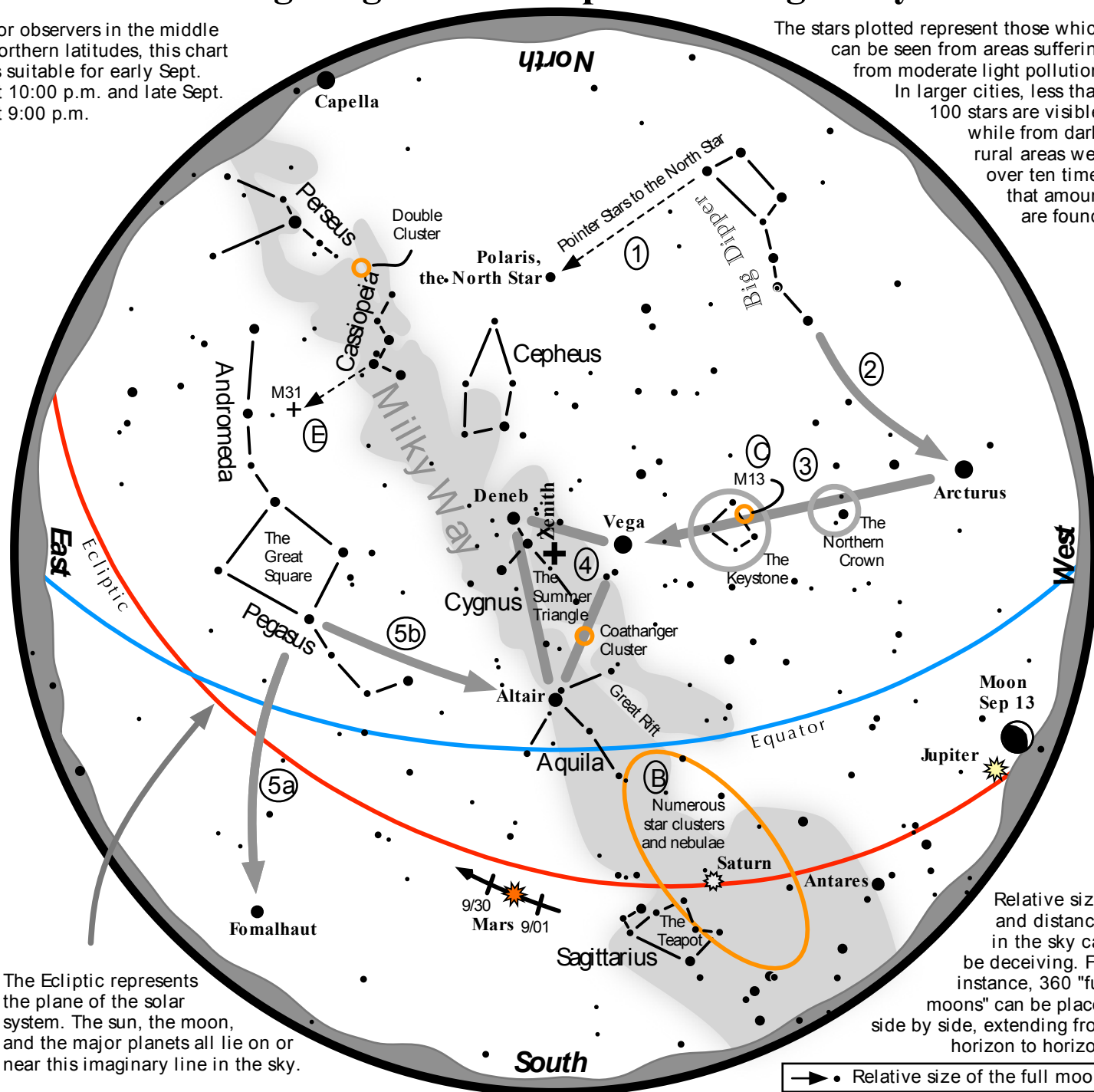
Look to the south-southwest 75–90 minutes after sunset.

- Before the moon brightens significantly after September 13, look for Saturn low in the south-southwest. It will be the brightest star-like object in the area, and will lie about 40% between bright red Mars in the southeast and Jupiter low in the southwest.
- Use binoculars to view Saturn. In the lower right of the field will be a nebulous star cluster, M8, nicknamed "the Lagoon Nebula" (4100 L-Y distant). On the field's right side will dimly glow another star forming nebula and cluster, M20, also called "the Trifid Nebula" (5200 L-Y distant). Just above M20 twinkles the star cluster M21.
- To the upper left of Saturn is the very large Sagittarius Star Cloud, M24, forming the "steam" rising out of the Teapot of Sagittarius.

Navigating the mid September Night Sky

For observers in the middle northern latitudes, this chart is suitable for early Sept. at 10:00 p.m. and late Sept. at 9:00 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.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→ • Relative size of the full moon.

Navigating the mid September 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 September evening sky.
- 3 Nearly overhead shines a star of similar brightness as Arcturus, 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 The stars of the summer triangle, Vega, Altair, and Deneb, shine overhead.
- 5 The westernmost two stars of the Great Square, which lies high in the east, point south to Fomalhaut. The southernmost two

Binocular Highlights

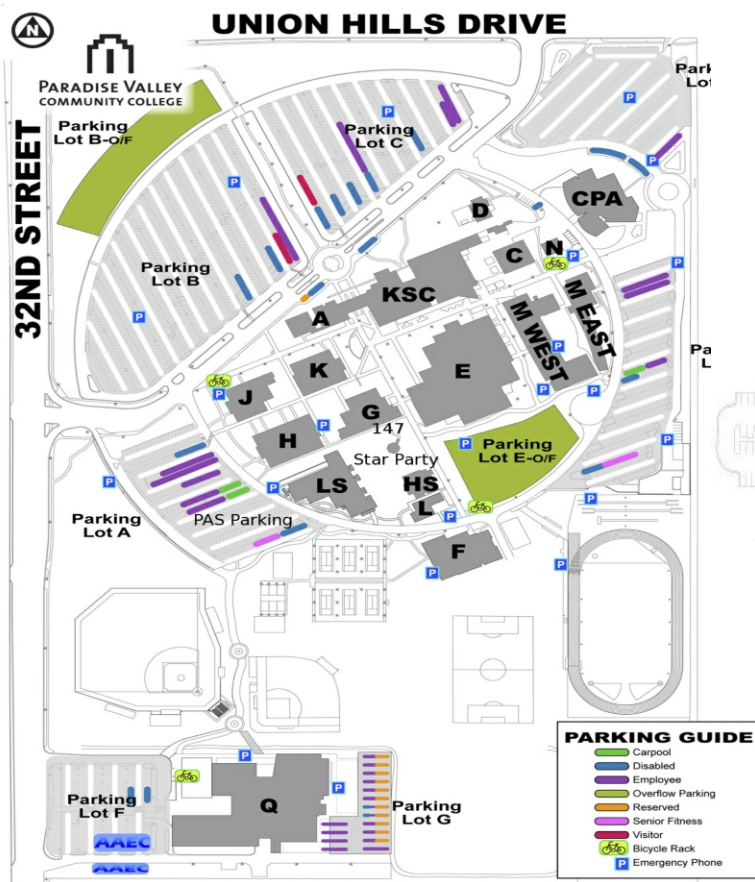
- A: On the western side of the Keystone glows the Great Hercules Cluster.
 B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
 C: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
 D: Sweep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

Astronomical League www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.



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 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:

Oct 4: Tom Mozdzen, Topic: EDGES project (Experiment to Detect the Global Epoch of Reionization Signature)

Nov 1: Ted Blank "New Horizons"

Dec 6: Vincenzo Cataldo, Topic: Planetary Volcanism

More information at:

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

September 2018

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1 <i>Cokocon Star Party</i>
2 <i>Cokocon Star Party</i>	3 <i>Labor day</i>	4	5	6 <i>PAS Meeting</i>	7	8 <i>Public Bino Class</i>
9	10	11	12	13 <i>Free Telescope Workshop</i>	14 <i>Public Star Party</i>	15
16	17	18	19	20	21	22
23 <i>Free Telescope Workshop</i>	24	25	26	27 <i>Private Meeting of the Minds</i>	28	29
30						