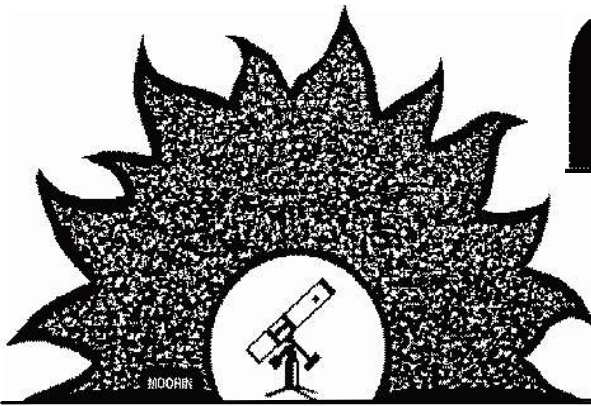




PAStimes

Phoenix Astronomical Society

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November 2022

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PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

TED BLANK TO PRESENT AT NOV 3RD MEETING

“Zero Gravity Pizza!”

A fun look at how astronauts on the International Space Station prepare and eat their meals in zero gravity, with a short history of “space food.”

November 3rd PAS Meeting

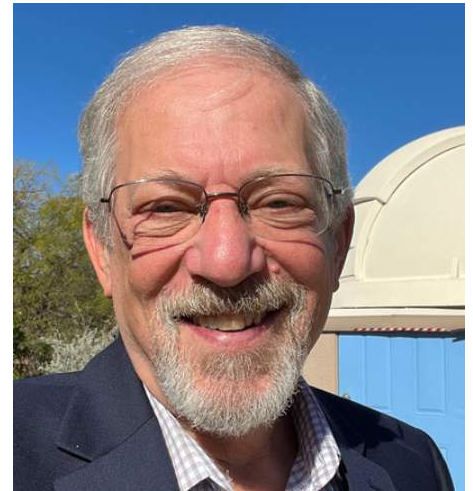
By Terri Finch, Event Manager

We have the honor of having Ted Blank, a Solar System Ambassador, do a presentation on “Zero Gravity Pizza” for us at the Nov 3rd PAS Meeting. Ted will be at the meeting, in person. If you wish to attend in person, please meet at PVCC Main Campus in LS-205. Doors open about 7pm, and the meeting begins at 7:30pm. There will be a few short announcements by President Stu, and then Ted will take the floor about about 7:35 to

7:40pm.

For those of you who may wish to attend the Nov 3rd meeting via Zoom, the link to this meeting is: <https://us02web.zoom.us/j/81193628193?pwd=NLBZN2LLU204VN VySk5SZXhtZWc2UT09> The Zoom meeting shall open shortly after 7pm. We hope you can join us for an exciting, informative meeting. No matter how you attend, you are welcome.

Ted did a previous presentation for PAS about Mars Ingenuity. You can find a recording of this presentation from May 5, 2022 at this link: <https://www.pasaz.org/pas-monthly-meetings/videos-of-speaker-presentations>. This was an amazing presentation with so much really fun information. Check it out!



TED BLANK, SOLAR SYSTEM AMBASSADOR, COMES BACK TO US FOR ANOTHER AMAZING PRESENTATION ON NOV 3RD. PLEASE JOIN US IN WELCOMING HIM BACK! PHOTO PROVIDED BY TED.

“A HALF-CENTURY OF ASTRONOMICAL PHOTOGRAPHY” A PRESENTATION BY KLAUS BRASCH

A BRIEF REVIEW BY STU BRACKNEY,
PRESIDENT OF PAS

Klaus, as he is preferred to be called, is no stranger to PAS. He has been gracious enough to make various presentations to PAS over the years. His most recent via ZOOM to our Hybrid meeting on October 6th, kept our eyes and ears open as he took us on a time travel trip of his personal experiences with astrophotography. What was so unique about his presentation was his sharing of his original photos of objects, like the moon when he first started his photography experience and his more recent images which show how his skills improved through the years and the now more sophisticated equipment that can catch high-resolution images.

Klaus Brasch is a retired biomedical scientist with a life-long interest in astronomy. He served as a volunteer in the public program at Lowell Observatory and has made

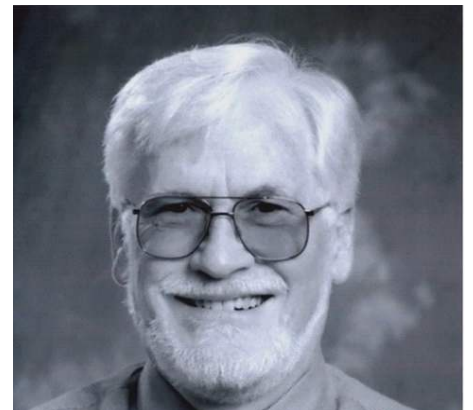
presentations ranging from astrophotography to life in the universe. He has authored and co-authored numerous articles, most recently in Sky & Telescope (Nov. 2022) and Astronomy magazine. Asteroid 25226 Brasch –1998 was named for his work at Lowell Observatory.

Klaus is a natural when it comes to teaching and connecting with his audience. He gave us a visual history lesson of original telescopes used in astrophotography as well as a review of the technological design and improvements in lenses as they play a critical role in high resolution images. He reminded us of the famous French photographer Louis Daguerre and his camera back in the 1800’s which led to the first photo of the moon in 1840 by J. W. Draper.

Astrophotography has come a long way since then and Klaus has traveled the entire way with scope and camera by his side. On behalf of PAS, Klaus, you have once again

inspired us to look closer at the sky’s objects.

If you missed this presentation, please visit <https://www.pasaz.org/pas-monthly-meetings/videos-of-speaker-presentations> & look for the Oct 6, 2022 recording of this meeting. It will be well worth your time & enjoyment!



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PAST PAS RECORDED PRESENTATIONS

By Terri Finch, Event Manager

Did you miss a PAS Meeting and wish you could see it? You can get to the link of Past Recorded PAS Meetings with Guest Speakers any time by going to the left hand navigation tool on the PASaz.org website and clicking on "PAS Monthly Meetings." From there a drop down item will appear and please click on "Videos of Speaker Presentations." You will then find recordings of Past PAS Meetings for your viewing pleasure. The collection is in oldest to newest order. Please work your way to the bottom of the collection to find the most recently recorded PAS Guest Speaker Presentation.

As long as PAS can record the PAS Meetings, PAS will continue to add more recordings to this page. Here is the direct link to the recorded PAS Meetings collection: <https://www.pasaz.org/pas-monthly-meetings/videos-of-speaker-presentations>. Enjoy!

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WHAT'S UP FOR NOVEMBER

BY DON K. BOYD, PASTIMES EDITOR

Name	Date	Rise	Set
Mercury	11-15-22	07:24	17:35
Venus	11-15-22	07:31	17:45
Mars	11-15-22	19:07	09:35
Jupiter	11-15-22	16:57	05:00
Saturn	11-15-22	12:58	23:47
Uranus	11-15-22	16:58	06:35
Neptune	11-15-21	14:32	02:18
Pluto	11-15-22	11:48	21:42

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 the 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.

NOVEMBER 15, 2022

Sunrise: 07:00

Sunset: 17:26



Q1: October 31,
November 30



Full: November 08



Q3: November 16



New: November 23

2022-2023 PAS GUEST SPEAKERS AT HYBRID MEETINGS

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

PAS has decided to do In-Person Meetings! All PAS Meetings with a Guest Speaker held at PVCC can be attended in-person as well as via Zoom at the same time in a hybrid meeting. Those of you wishing to attend the meeting in person, please meet in LS-205 at PVCC Main Campus (map to left of this article). If you wish to watch the meeting via Zoom, that option is available. For the 2022-2023 school year, PAS is using the same Zoom link for every meeting. Here is the monthly Zoom Meeting Link: <https://us02web.zoom.us/j/81193628193?pwd=NLBZN2LLU204VNvYSk5SSZlZWc2UT09> Please visit the PAS calendar at www.PASaz.org to find out more about these upcoming meetings and guest speakers. For a complete list of guest speakers visit: <https://docs.google.com/document/d/1OO-UPAYNvw3p7JCRXCKSJDCBSK60DnvWOoIFBQPrNp8/EDIT?usp=SHARING>

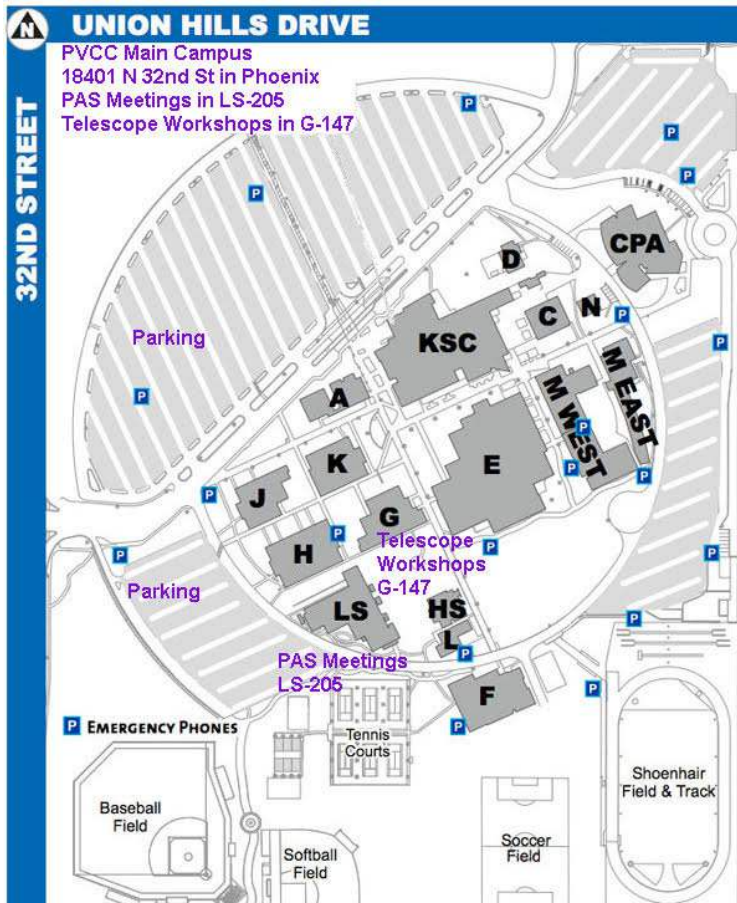
Do you have an idea for a guest speaker? Email the details and contact info for the possible guest speaker to Paul Facuna at VicePresident@pasaz.org.

Here are the next scheduled guest speakers at PAS:

Dec 1: Dr. David Williams, "New Visions, New Voyages: Planetary Exploration in the Next Decade 2023-2032"

Jan 19, 2023: Rogier Windhorst, Topic: TBA

Feb 2: Dr. Alex Vrenios, "Astro League Observing Program"



SO NOW WHAT?

BY ALEX VRENIOS, PAS SECRETARY

COVID is pretty much a thing of the past, so now what?

It may be a bit overdramatic, perhaps, but consider this: the whole universe awaits you! To prepare yourself, some light reading might be in order. My advice? Start local and spread outward at a comfortable pace.

The Moon is a wonderful object. It's literally pock-marked with interesting features. Before investigating at that level of detail, consider that its apparent rise and set is just an illusion. The Moon orbits the Earth, but not quite as fast as the Earth turns on its axis - the Moon is a bit further east at the same time each night. The Moon is said to be "tidally locked" to the Earth, so it always shows the same "face" to us. (Well, almost always: look up "lunar libration" for an interesting bit of knowledge.)

The geometry of the Earth, Moon, and Sun cause the Moon to be lit from a range of angles, from not at all (New Moon), to fully lit (Full Moon). During its partially lit phases, there is a distinct line, called the terminator, that separates the lit from the dark areas. THIS is where to look to get the most enjoyment from your Lunar explorations: This is the time of sunrise/sunset on the Moon's surface, when the shadows are the longest, just as they are here on Earth at those times. Start at one end of the terminator or the other and examine each feature along that line. They will appear to be in 3D relief because of those long shadows. And be sure to scan the dark areas near the terminator for light spots - peaks of the lunar mountains still lit by the setting Sun!

Of even more interest are the anomalies caused by these shadows and lit peaks. The "Straight Wall" (Rupes Recta) looks like how the Mogollon Ridge might appear from the Moon. A truly fascinating object is the "Lunar X" (also known as the

Werner X).

From the Moon you can head toward the Sun (Venus, Mercury, and maybe the Sun itself), or away from it (Mars, Jupiter, Saturn, Uranus, and Neptune. Include Pluto, if you are so inclined.) Next you might investigate some of our solar system's visitors, like comets and asteroids.



ALEX VRENIOS, OUR CLUB'S SECRETARY, SUGGESTS THAT WHILE YOU ARE DOING ALL THIS ASTRONOMICAL EXPLORATION, A STRUCTURED APPROACH COULD LEAD TO SOME RECOGNITION BY THE ASTRONOMICAL LEAGUE. BE SURE TO CATCH HIS PRESENTATION, COMING THURSDAY, FEBRUARY 2ND!

Once you exit our Solar System, the Sky's the Limit. Take time to learn the constellations so you can find your way around the night sky. Backyard astronomers might want to look for open clusters, binary stars, bright nebulae, and the Messier Objects. Dark Sky enthusiasts might enjoy reading about deep sky objects such as those cataloged by Herschel. (The Herschel 400 is a good-sized list.) Finally, there is a special thrill from observing transient phenomena, like transits of the Sun, by Venus or Mercury. Experience a Lunar and, if you are really lucky, a Solar eclipse - some say this is a life-changing experience!

I probably left a few things off my list, but you get the idea: fortune favors the prepared mind.

STU'S VIEWS



BY PRESIDENT STUART BRACKNEY
Hi everyone. Once again, the Fall

season is upon us and PAS is gearing up for our activities schedule, from monthly meetings/lectures, to star parties and telescope workshops. Keep an eye on the public calendar for our latest updates. Speaking of updates, we have TWO.

We are in critical need of two volunteers to assist with the operation of this fine organization. For years we have depended on just a few PAS Members to do everything. Let's change that by getting more people involved.

Membership Chairperson: someone who has some very basic computer skills

to review and administer new membership sign-in rosters.

Events Chairperson: Someone who can arrange and coordinate PAS public and private events. If you are willing to jump in and lend a hand for these volunteer positions, contact me for more details via email, at president@pasaz.org.

Finally, this organization is all about sharing information about our cosmos, telescopes, science of the solar system, and the sheer joy of viewing. Tell a friend about our website www.pasaz.org, our fabulous newsletter the PASTimes and our free monthly lectures.

MEET YOUR PAS BOARD MEMBERS

Richard Sauerbrun is our PAS Treasurer. He joined us three years ago and has been a very busy member of our Board of Directors since his election to the position this past May. His computer skills and energy have enabled us to create an online membership procedure for PAS. Born in Warren Ohio, he grew up in Birmingham, Michigan, a northern suburb of Detroit.

In 1973 he relocated to Arizona to

complete his PhD at ASU. He's an Information Technology Executive with forty years of experience in software development, data center operations and management of various technical services. He is the founder and President of LevEdge Technologies. Besides golf and model trains, astronomy has caught his attention. He says "While still very much a beginner, my primary interests lie in astrophotography, telescope automation, and Electronically Assisted Astronomy."

served as CTO of DSRLab, the Distributed Systems Research Lab. I am a Life Senior Member of the IEEE, a professional engineering society. I taught computer and math courses part-time until I fully retired."

His love of the cosmos started when his older brother bought him a Newtonian telescope when he was about twelve. He recalls "It had a cardboard tube, a 3-inch polished metal mirror, a rickety tripod, and a single eyepiece. First light was a street lamp, and then the Moon."



RICHARD SAUERBRUN, PAS TREASURER, AND A VERY GOOD ASTROPHOTOGRAPHER.

Alex Vrenios is our PAS Secretary. Because of him our meeting notices are disseminated via press releases, and our meeting minutes are being recorded and archived. No stranger to PAS, Alex has been involved with PAS since 2008. He was born and raised in Chicago, Illinois (north side), and of course, he's a Cubs fan.

"Professionally, I have been involved in software development of communications systems on large scale IBM mainframes. I later switched to distributed systems design and development on Linux. I was a full-time employee and a part-time student for most of my adult life, finally achieving my goal of a doctorate in computer science. I founded a small consulting firm and



ALEX VRENIOS, PAS SECRETARY AND LONG TIME MEMBER OF PAS.

PLAN FOR THE DECEMBER SWAP MEET

BY TERRI, EVENT MANAGER

The December PAS Meeting, prior to Covid, featured PAS's Annual Swap Meet. I'd like to make this happen again this year. So, in preparation for this event, here's what you need to do.

Do you have something to sell that is astronomy related that you are no longer

using or enjoying? This is your chance to sell it and use the money to purchase other astronomy equipment you are wanting for your telescope accessories.

If you plan to bring items to the December 1st PAS Meeting, please consider letting me run your ad in the December newsletter for free. Your

deadline is Nov 1st to get your ad in the December newsletter. Submit your items for sale to Editor@pasaz.org.

Watch for the announcement in the December newsletter of how we will do our Swap Meet this year. Hope to see you there.

BY ALEX VRENIOS, PAS SECRETARY

I lived through the original Apollo missions and was amazed at the accuracy with which they fired a multi-staged rocket at the Moon, orbited it, and then landed on it. As if that wasn't enough, they launched that lander back off the lunar surface, reattached it to the lunar orbiter, and then flew back to Earth to land here without incident. The Apollo 13 mission gave us a scare, but NASA successfully landed people on the Moon SIX times and brought them back - without the loss of a single life!

Recently, I watched in wonder as the DART spacecraft searched for, found, aimed and fired a projectile that

SKY-HIGH MATH

ACTUALLY HIT an asteroid named Dimorphos, seven million miles from Earth. Not only was Dimorphos in orbit around the Sun, but it was also in orbit around another asteroid, named Didymos - an orbit around an asteroid that was in orbit around our Sun - quite a complex flight path!

And this is not the first time anyone has done this. In June of 2010, Japan sent the Hayabusa mission to track a small asteroid named 25143 Itokawa, and land an unmanned shuttlecraft on it. The robot took a soil sample from the asteroid and returned it for analysis back here on Earth.

I have a book titled Adventures in Celestial Mechanics: A First Course in the

Theory of Orbits, by V. G. Szebehely (University of Texas Press, 1989). The book is dedicated to Sir Isaac Newton, with an emphasis on his childlike enthusiasm for the search for knowledge. With such a wonderful title and such a thoughtful forward, how could I not buy it? The text starts amicably enough at a high school algebra level, but it accelerates quickly through trigonometry and calculus, and hits differential equations head-on by page 23!

One day I plan to make careful notes of several positions of a bright comet against the background stars, calculate its orbit, then check my result against that of Starry Night software. One day.

STAR PARTY AT ROYAL PALMS SEPT 20

BY PETE TURNER

Skies were completely clouded over during the event, but we did get to view Jupiter and Saturn prior to the event. Each of us talked about our telescopes to the few people that came up. Mike was the busiest of all of us, but not as busy as he normally is at an event. We packed up about 15 minutes early with Susannah's permission. Many thanks to Susannah for having PAS at her event.

Susannah writes: Hi Pete, Thank you so much for all of your help on Tuesday. Your advice about the weather was most appreciated but we were convinced that it would be worth taking the chance. The fact that the weather did not cooperate was unfortunate but everyone was fascinated with the telescopes and they all enjoyed the evening.

BY SUSANNAH SMITH

Hello Terri,

Thank you so very much for your help facilitating the stargazing event at the Royal Palms last Tuesday evening. Although the weather was not cooperative, our group loved Meteor Mike and enjoyed talking to Pete and the other astronomers. They were particularly taken with the "mirror" telescopes as most had never seen those before. All in all, it was a great event and we are most appreciative of PAS and your help making it happen. My best.

PLACE YOUR ASTRONOMY EQUIPMENT AD IN THIS NEWSLETTER

Do you have some astronomy-related items you'd like to sell? Prepare an ad and send it my way so that Don and I can help you sell it through the club newsletter. Items you may wish to sell: Books, Star Charts, Telescopes, Eyepieces, Finder Scopes, and more. As long as it is astronomy-related, I will happily add it to the newsletter. Please include all items you wish to sell, and what is included with those items. Price them, and provide contact info for the way you wish to be notified, such as email or phone number. I await your submissions. Send them to Editor@pasaz.org.

Ads for items for sale listed in PASTimes Newsletter are written by the seller. PAS is not responsible for the ads and does not guarantee the quality of the

items for sale. PAS reminds everyone, you purchase at your own risk, so do your research beforehand.

Ads in PASTimes run for one month and may be renewed on a month-to-month basis, space permitting, as long as the request to run the ad again is submitted by deadline (10th of month). Ads in PASTimes are FREE for PAS members. Non-members are asked to make a small donation to PAS. Non-members may email Terri, Assistant Editor at Starstuff@gmail.com to place their ad and get details on where to send a donation, via check or money order, made out to Phoenix Astronomical Society.

The deadline for the next issue will be the 10th of the month. These items and more can also be seen with photos on the

PASaz.org website here: <https://www.pasaz.org/items-for-sale>

* Brand new, unused, (Cost \$249 preTax currently, online.) Celestron 24mm Ultra Flat Field eyepiece \$150, 1.25" eyepiece mounting barrel is able to accept standard 1.25" filters and adapters and is compatible with 1.25" star diagonals and focusers. Beautiful 65 degree field of view, Multi-coated 8-element lens design for enhanced light transmission, 29mm eye relief and fold-down rubber eyeguard. Huetech IDAS LPS-D1 Light Pollution clip-in Filter for Canon EOS APC, I'll sell for \$100, another good deal. Hardly used, as I bought a QHY 268 camera. Contact Greg gmeyer28@cox.net.

FIRST BACK-TO-NORMAL FREE TELESCOPE WORKSHOP SEPT 22

BY TERRI FINCH, EVENT MANAGER

It was a cloudy, rainy day leading to more clouds in the evening. PAS almost canceled the event due to clouds, but the attending Telescope Teachers said we should have the event. We arrived at the event around 7pm. There were a few holes through the clouds and one star made an appearance.

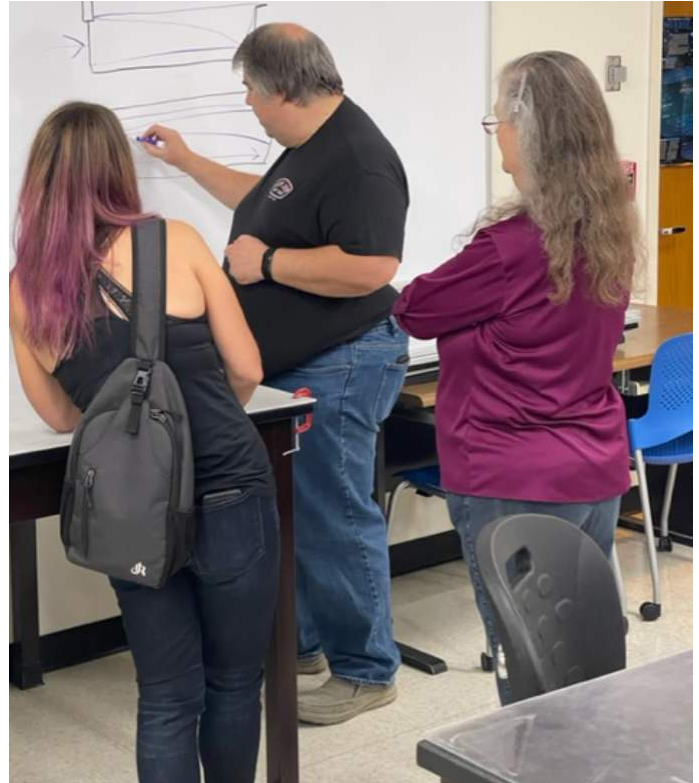
Many thanks goes to the wonderful Telescope Teachers for attending and helping at this event: PAS Treasurer Richard Sauerbrun, Calvin Vance, a previous member of PAS who is looking to rejoin the club, Bruce Wurst, President Stu Brackney, William Finch, and myself.

The class students were preassigned to a teacher prior to meeting at G-147 at PVCC Main Campus. Attending with their telescopes were three wonderful students: Enrich with his wife Cindy and their daughter Faine, James and his Gal (his words) Sina, and Trenton, a current PAS member and significant other, Christine. There were to be two attendees to find out what telescope to purchase but they didn't show up, cancel or anything. I don't know what happened to them.

The class opened with me introducing our Telescope Teachers for the evening. Through email, I had paired up Enrich with Calvin, James with Richard, and Trenton with Bruce. This worked out very well. The three telescopes were set up, the Telescope Teachers were actively involved, and in fact, the class ran till 9:30pm when the security guy at PVCC came inside to tell us it was time to depart. I wish to thank that security guy as he was fantastic. So, polite, patient, understanding. I hope he is there more often this semester to unlock G-147 for us again.

Many thanks goes to the attending students. Without them, this type of class won't happen. And I'm so glad we did not cancel

the event due to the clouds, although no telescopes were taken outdoors for finding objects this time. It was an all-indoor class. Everyone who attended seemed to be pleased with the help they received, and my Telescope Team was fantastic! Thanks to everyone for a successful, enjoyable event last night!



WILLIAM EXPLAINING HOW TELESCOPES WORK TO SINA. TERRI IS STANDING THERE ASSISTING, NOW AND THEN. PHOTO BY STU.



BRUCE ASSISTING TRENTON AT THE SEPT 22ND FREE TELESCOPE WORKSHOP. PHOTO BY STU BRACKNEY.



RICHARD ASSISTING JAMES. THIS IS THE PLACE TO COME FIND OUT WHAT TELESCOPE TO PURCHASE, OR TO GET HELP WITH ONE YOU ALREADY OWN. PHOTO BY STU.

1ST BACK-TO-NORMAL, IN PERSON, PAS MEMBERS ONLY PRIVATE STAR PARTY OF SEPT 24TH

BY TERRI FINCH, EVENT MANAGER

The evening began with a few members arriving early to the location PAS chose for this event. The skies looked cloudy, with a thin haze while the sun was setting. Some of the haze stayed with us for the first part of the evening, but the temperature for the event and the attendance was awesome!

We had fifteen PAS members attend and those folks were brought in by nine vehicles. Why am I counting vehicles? Because this location is somewhat limited on parking. I counted twenty-two actual parking spots, and one other by the dumpsters at the entrance. There were two families that visited the area during dusk, not PAS Members, but left shortly before the telescopes were set up and before it became dark enough to look through them. Mike was able to share his Meteorites with them and get a PAS Business card into their hands before they left.

Many thanks to those who attended this event: Evan with his wife Terry and son Logan doing Astrophotography; Richard doing astrophotography; Stu who brought his orange Celestron 8" telescope and I heard he viewed Saturn, Jupiter, and one other object (I didn't get a chance to look through his telescope); Pete and Andi showed up but left a short time later... no scope; Frank brought his telescope and provided delightful views of Saturn, Jupiter, and the Andromeda Galaxy, and searched for objects in the area of the Teapot's spout; Kay brought her family of Astra and Kitt; William and Terri attended without a scope; Mike was there with his meteorites; and Todd attended without a scope.

This was a Bortle 4 location, we could see the Milky Way overhead, but not all the way to the Southern horizon. So many stars were in the night sky! It was amazing. Thanks to everyone who attended and PAS may possibly utilize this

location again in the future.

Evan Drew, PAS Member writes: Thanks for a great event last night! It was really nice meeting everyone and getting out to see more stars than I've seen in years! I've attached the result of my imaging last night of the Iris Nebula. This is 33 four-minute exposures (2 hours and 12 minutes stacked) and with the dark skies, I was able to draw out quite a bit of detail. Feel free to share with other attendees, or if you prefer, I can use it in the article (or both). Thanks again for a great event!

I used this equipment to get the Iris Nebula image: Scope: Explore Scientific ED102CF, Guider: SVBony 60mm Guide, Scope with QHY 5-II Camera, Mount: Sky-Watcher HEQ5 Pro, Imaging Camera: Nikon D5300 with Full Spectrum Astromod. Software: N.I.N.A., PHD2, 33 x four-minute exposures, stacked using DSS, post processing through Photoshop



RICHARD SETTING UP HIS ASTROPHOTOGRAPHY FOR THE EVENING. IT WAS BEAUTIFUL WEATHER FOR OBSERVING AND PHOTOGRAPHY. PHOTO BY TERRI.



EVAN PROVIDED US THIS PROCESSED, AWESOME IMAGE OF THE IRIS NEBULA, WHICH IS WHAT HE IMAGED ON THIS NIGHT TO INCLUDE WITH THIS ARTICLE.



MIKE SHOWING HIS METEORITE COLLECTION TO A LOVELY LADY WHO WAS AT THE PARK WHEN HE ARRIVED. PHOTO BY TERRI FINCH.



EVAN DREW, NEW PAS MEMBER, THIS IS HIS SET-UP FOR DOING ASTROPHOTOGRAPHY ON THIS NIGHT. PHOTO PROVIDED BY EVAN.

ASTRONOMY WEEKEND AT ARIZONA SCIENCE CENTER

SEPT 30-OCT 2

By TERRI FINCH, EVENT MANAGER

The Arizona Science Center (ASC) invited PAS members to come with their telescopes and handouts to promote their club as well as provide views through Telescopes in the evening and Solar Scopes in the daytime. The Schedule was set up as:

Sept 30, Friday 6:30pm to 9:30pm: Telescopes outdoors in Heritage Square showing Saturn, Jupiter, and the Moon. On this day of the event, Don Boyd brought his telescope and showed the Moon and Jupiter. Mike Marron brought meteorites and drew in the crowd, William and Terri Finch ran the PAS handouts table, Ted and Peggy Blank brought Ted's awesome new telescope and showed the Moon, Jupiter, and Saturn.

Along with the PAS activities, ASC had a bunch of really cool activities such as: Rocket Making, Space Shuttle contest, and Nebula Creation. They had space music playing over a speaker, and they invited Preston, who works at ASC, to show his Astrophotos. Blue Origin was there providing post cards for everyone to fill out. Once filled out, the cards would go to space and back, and if you provided a stamp (I didn't know this until the next day), then the post card would be sent to the address you provided once it came back from space.

The weather was humid, sticky, and still... hardly a breeze. I think it was close to 97 degrees most of the evening. We had many people stop by from the restaurant next door. I estimate possibly fifteen ASC employees running this event, the six PAS Members mentioned above, and about 250 people from the public, all ages. It was a very successful event and a lot of fun.

Oct 1st, Saturday, the event ran from 10:30am to 4pm. William and I got there about 9am to help set up the tables, table cloths, and chairs before the ASC Members started coming in at 10am. The public didn't have access until 10:30am.

On this day of the event, Mike drew in the crowds with his meteorites and Don sat with him at his table to help watch the meteorites, and William and I had a table three tables down from Mike, sharing PAS info. Between our two tables there was Preston with his astrophotography, and the National Space Society, and on the other side of the PAS table, Bernard Miller had a table with his Astrophotography, and then down on the end was Blue Origin. The National Space Society provided a fun Astronaut cutout for people to take pictures of themselves in. And all of this was inside the Science Center in their foyer.

Outside, Mark Johnston was providing Solar Viewing and was able to catch a super awesome M-class flare that happened for a few moments and since Mark text messaged me about it, I sent everyone who was at the tables mentioned above in the foyer with me, to go see it while I watched over their tables. It only lasted a short while, but I heard it was spectacular!

By Mark Johnston, Solar System Ambassador

Oct 1st, I set up at the entrance to the Arizona Science Center and showed the Sun to over 100 guests. A few lucky guests got to witness a brief and very fast M-class flare. Lots of 'wows' and 'cool' comments. In addition I brought models of rockets and explained SpaceX vs Artemis vs Delta IV Heavy differences. I ran my event from 11am to 2pm, when I

was very happy to pack up and cool down!

By Stu Brackney, President of PAS

Mark, your professional outreach efforts continue to amaze members of the public and this organization. Truly exceptional what you share.

By Richard Sauerbrun, PAS Treasurer

Mark is by far the most professional presenter I have seen ... he is incredibly knowledgeable about all things astronomical, but also makes it understandable and fun for the visitors. Excellent, as always!

By Terri Finch, PAS Event Manager

I wish to thank the awesome PAS Team we had doing this event. I didn't expect so many PAS Members in attendance but I am sure glad they were there. I wish to thank ASC for inviting us. Laine Seaton invited PAS to be involved in this event and Evelyn Madden was a marvelous "Show Runner" for the activities that were going on outside on Friday night for the attending public. Evelyn is the newest Planetarium Show writer for ASC. And the whole Blue Team at ASC was marvelous! Noah and William were a pleasure to talk with as well as many of the other Blue Team members. Please enjoy the many photos that were taken at ASC on both these days.

Sunday was another part of the Astronomy Weekend at ASC but the PAS Team opted to not do Sunday as we were so exhausted from late night on Friday and all day Saturday. Plus, on Saturday I assisted with cleanup after the event, putting away tables, table cloths, chairs, etc., to help them pack up. William, Don, Mike, and I didn't leave ASC until 4:45pm after helping with cleanup.



PHOTO OF PAS TABLE SET UP, TAKEN BY DON BOYD.



THE LONG ROW OF TABLES, FROM LEFT TO RIGHT: BLUE HORIZONS FOR THE FIRST 2 TABLES, THEN BERNARD AZSTARMAN.NET AT THE 3RD TABLE, PAS WITH WILLIAM AND DON TALKING ABOUT THE CLUB AT THE 4TH TABLE, PRESTON WITH HIS ASTROPHOTOGRAPHY AT THE 5TH TABLE, NATIONAL SPACE SCIENCE WAS AT THE 6TH TABLE, AND AT THE 7TH TABLE WAS MIKE WITH HIS MANY METEORITES. IT WAS A FUN, BUT EXHAUSTING EVENT (IT WAS 2 DAYS IN A ROW) BECAUSE MOST SET UP ON OCT 1ST. MANY THANKS TO THE ASC FOR HAVING PAS AT THIS EVENT.

PHOTO BY TERRI.



MARK'S SOLAR VIEWING SET-UP AT THE ARIZONA SCIENCE CENTER ON OCT 1ST. IT WAS A FAIRLY HOT DAY OUTSIDE, BUT A LOT OF FOLKS VISITED MARK'S SCOPE TO SEE SOME GREAT ACTIVITY ON THE SURFACE OF THE SUN. PHOTO BY MARK.



THE NATIONAL SPACE SOCIETY SET UP THIS CARDBOARD ASTRONAUT. I WASN'T THE ONLY ONE TO GRAB A SELFIE WITH IT. THIS WAS A BUSY PART OF THE DAY FOR MOST. THERE WAS A LITTLE STEP STOOL PLACED BEHIND THE ASTRONAUT SO THAT THE KIDS COULD GET UP BEHIND THERE AND "BE" THE ASTRONAUT. THIS WAS AT THE FAR LEFT OF THE TABLES, WHEN YOU FIRST WALK INTO THE SCIENCE CENTER. PHOTO BY WILLIAM FINCH.



MIKE WAS THE ATTRACTION OF THIS DAY'S ACTIVITIES. THAT'S WHY I POSITIONED HIM DOWN THE END OF THE ROW OF TABLES SO THAT HE WOULD BE THE ONE WHO DRAWS THE CROWD AS THE PEOPLE CAME INTO THE SCIENCE CENTER. MIKE'S TABLE HAD THE MOST PEOPLE VISIT DURING THIS DAY WITH EVERYONE CHECKING HIS METEORITES.

PHOTO BY TERRI.



MIKE SHARING HIS METEORITES WITH THE ASC WORKERS. THIS WAS AFTER THE PUBLIC HAD LEFT AND MIKE WAS ENJOYING MORE SHARING. PHOTO BY TERRI.

THE EXCITING PAS SPEAKER LINEUP FOR THIS YEAR!

BY TERRI FINCH, EVENT MANAGER

Vice President Paul Facuna has been busy getting a Guest Speaker lineup for our club's general meetings, and he has been very successful with such wonderful Guest Speakers for us to enjoy. You can join in the fun either in person at PVCC Main Campus in LS-205 or you can pop in and enjoy the meeting through this Zoom link, for the rest of this 2022-2023 School Year: <https://us02web.zoom.us/j/81193628193?pwd=NLBZN2LLU204VNySk5SZXhtZWc2UT09>.

Just look at the schedule of Guest Speakers you will NOT want to miss:

December 1, 2022: Dr. David Williams will share with us his research at ASU Tempe. Dr. William's talks are always full of information about the various missions NASA has and will be doing.

Jan 19th, 2023: Roger Windhorst returns to PAS with another well planned presentation. Dr. Windhorst is also from ASU Tempe.

Then on Feb 2, 2023: we have our very own Secretary Alex Vrenios who will tell us all about the awards, pins, certificates you can earn for working through the Astronomical League Observing Programs. This is a presentation well worth your time. Most of the observations do not require quick results, meaning, you can take your time, do your observations, make notes and when you complete the project, turn it into the Astronomical League and be rewarded. These are, by no means, easy and quick. But, it is a learning experience that everyone can do and enjoy.

Mar 2 2023: we have Tom Klare who will share with us "Photographing Stars

Using a Digital Camera." Astrophotography has evolved from the SLR 35mm film using camera to the digital camera. Its abilities to capture the night sky digitally are much better than with film.

On Apr 6, 2023: we have Mark Johnston, PAS Member and Solar System Ambassador, who will be sharing a very well received presentation he calls, "My Journey in Astronomy Outreach." This is a presentation that many PAS members are eager to hear about and enjoy.

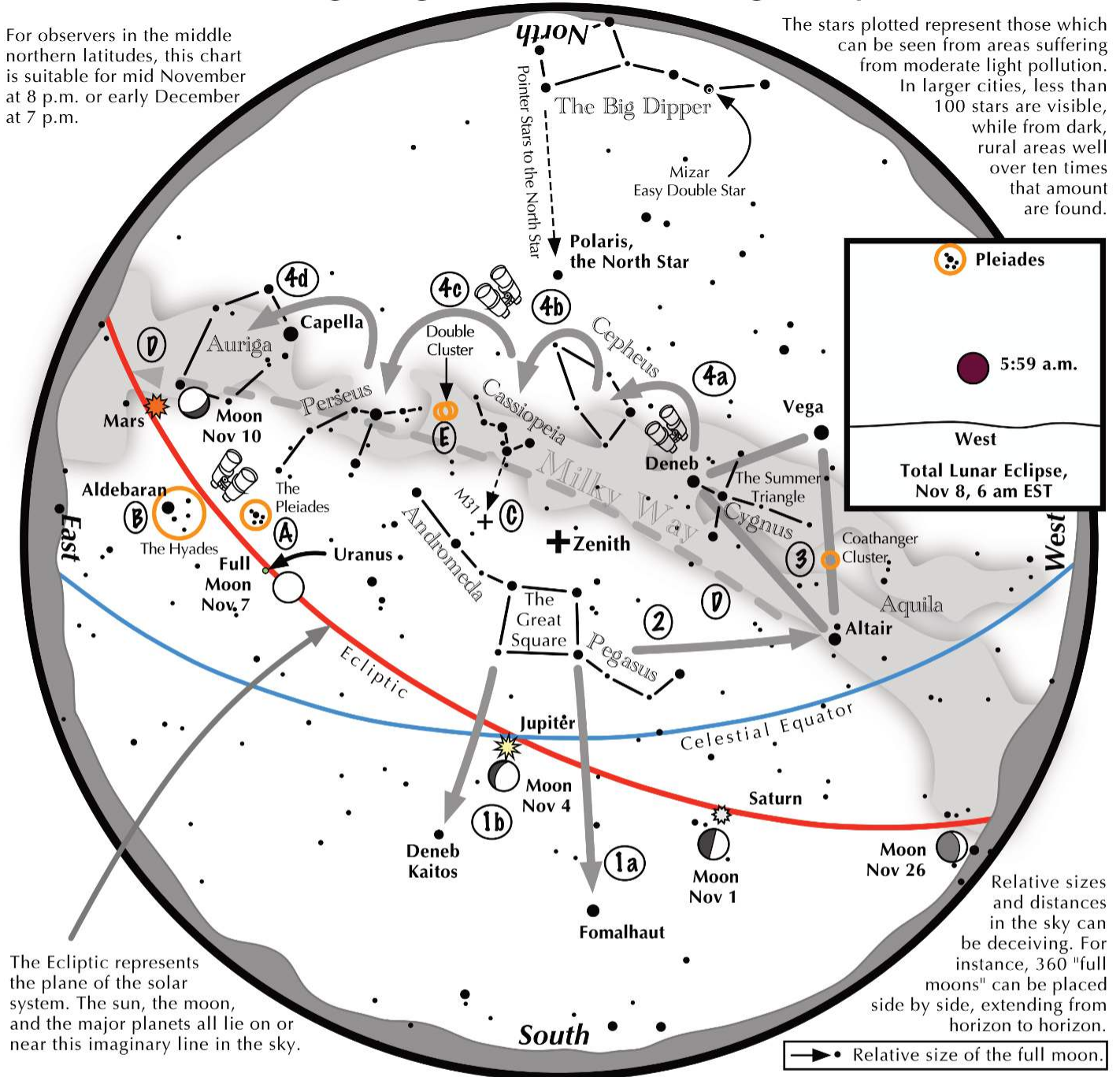
For the May 4th, 2023: PAS Meeting, there will be a Guest Speaker, but one hasn't been scheduled as yet. There will also be the annual Club Officer Elections. Come elect your new set of Leaders of PAS!

Do you have an idea for the last speaker of the year? Email Paul directly at PaulFacuna@pasaz.org. Thank you.

Navigating the November Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid November at 8 p.m. or early December at 7 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 November night sky: Simply start with what you know or with what you can easily find.

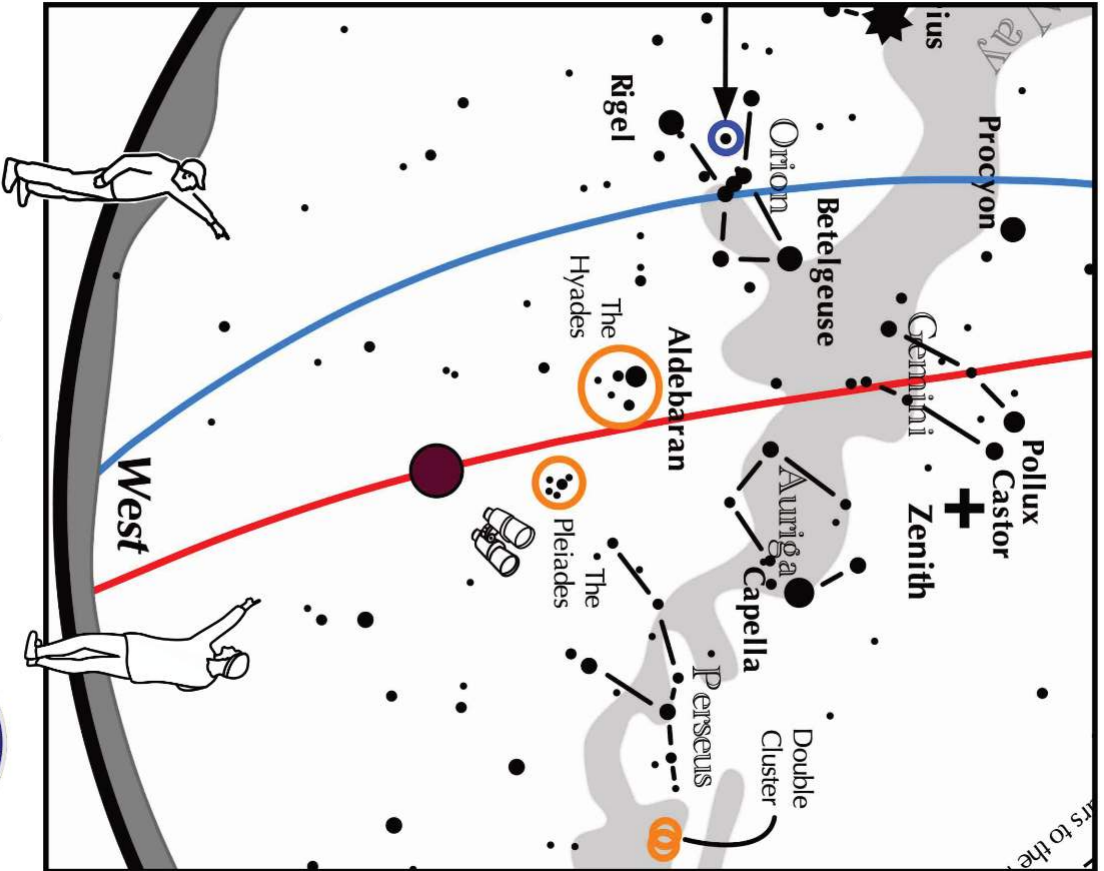
- 1 Face south. Almost overhead lies the "Great Square" with four stars about the same brightness as those of the Big Dipper. Extend a line southward following the Square's two westernmost stars. The line strikes Fomalhaut, the brightest star in the south. A line extending southward from the two easternmost stars, passes Deneb Kaitos, the second brightest star in the south.
- 2 Draw a line westward following the southern edge of the Square until it strikes Altair, part of the "Summer Triangle."
- 3 Locate Vega and Deneb, the other two stars of the Summer Triangle. Vega is its brightest member, while Deneb sits in the middle of the Milky Way.
- 4 Jump along the Milky Way from Deneb to Cepheus, which resembles the outline of a house. Continue jumping to the "W" of Cassiopeia, then to Perseus, and finally to Auriga with its bright star Capella.

Binocular Highlights

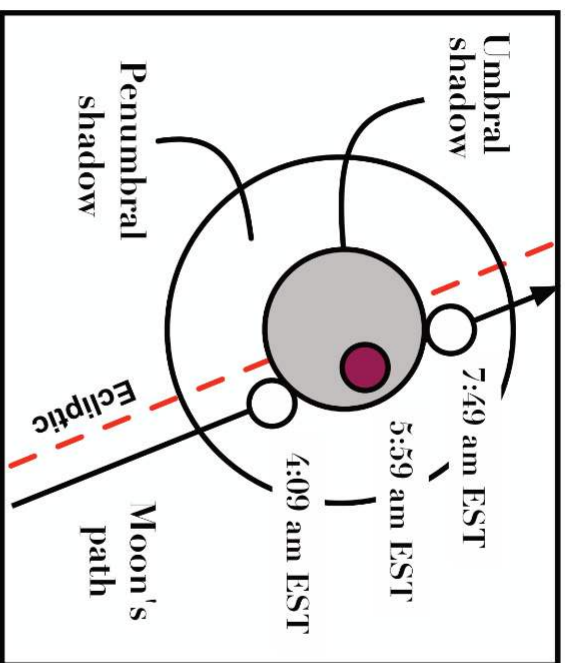
A and B: Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **C:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **D:** Sweep along the Milky Way from Altair, past Deneb, through Cepheus, Cassiopeia and Perseus, then to Auriga for many intriguing star clusters and nebulous areas. **E:** The Double Cluster.



In the early morning of November 8, try this challenge:



View to the west
on November 8
from 1:09 a.m. PST
to 4:49 a.m. PST



The Moon slides through a total eclipse

In the early morning hours of Nov. 8, the brilliant full moon slides into Earth's shadow. East coast viewers can view until mid eclipse before the morning twilight becomes too bright. Viewers farther west in the US can witness the complete total and partial phases.

- Even though the partial umbral eclipse begins at 4:09 EST, darkening may not be noticed for another 5 minutes.
- At mid eclipse, what color is the moon? How dark is it?
- Before the eclipse begins, the moon's sky glow blocks viewing the Pleiades star cluster and many other sky objects. During totality, though, the Pleiades, the Double Cluster, and M42 will all be visible. Now you can say that you've seen these celestial wonders during a full moon!



CEPHEUS: A HOUSE FIT FOR A KING

By David Prosper

Sometimes constellations look like their namesake, and sometimes these starry patterns look like something else entirely. That's the case for many stargazers upon identifying the constellation of Cepheus for the first time. These stars represent Cepheus, the King of Ethiopia, sitting on his throne. However, many present-day observers see the outline of a simple house, complete with peaked roof, instead – quite a difference! Astronomers have another association with this northern constellation; inside its borders lies the namesake of one of the most important types of stars in modern astronomy: Delta Cephei, the original Cepheid Variable.

Cepheus is a circumpolar constellation for most observers located in mid-northern latitudes and above, meaning it does not set, or dip below the horizon. This means Cepheus is visible all night long and can be observed to swing around the northern celestial pole, anchored by Polaris, the current North Star. Other circumpolar constellations include Cassiopeia, Ursa Major, Ursa Minor, Draco, and Camelopardalis. Its all-night position for many stargazers brings with it some interesting objects to observe. Among them: the “Garnet Star” Mu Cephei, a supergiant star with an

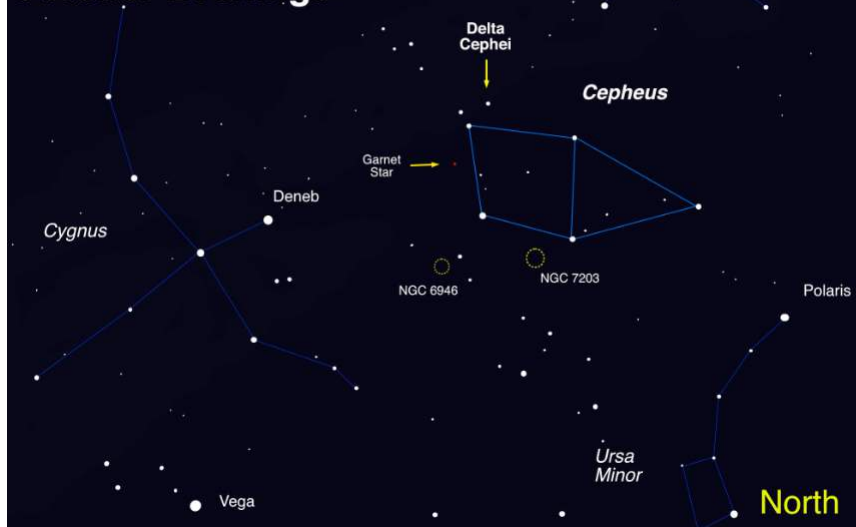
especially deep red hue; several binary stars; several nebulae, including the notable reflection nebula NGC 7023; and the “Fireworks Galaxy” NGC 6946, known for a surprising amount of supernovae.

Perhaps the most famous, and certainly the most notable object in Cepheus, is the star Delta Cephei. Its variable nature was first discovered by John Goodricke, whose observations of the star began in October 1784. Slightly more than a century later, Henrietta Leavitt studied the variable stars found in the Magellanic Clouds in 1908 and discovered that the type of variable stars represented by Delta Cephei possessed very consistent relationships between their luminosity (total amount of light emitted), and their pulsation period (generally, the length of time in which the star goes through a cycle of where it dims and then brightens). Once the period for a Cepheid Variable (or Cepheid) is known, its luminosity can be calculated by using the scale originally developed by Henrietta Leavitt, now called “Leavitt’s Law.” So, if a star is found to be a Cepheid, its actual brightness can be calculated versus its observed brightness. From that difference, the Cepheid’s distance can then be estimated with a great deal of precision. This revolutionary

discovery unlocked a key to measuring vast distances across the cosmos, and in 1924 observations of Cepheids by Edwin Hubble in what was then called the Andromeda Nebula proved that this “nebula” was actually another galaxy outside of our own Milky Way! You may now know this object as the “Andromeda Galaxy” or M31. Further observations of Cepheids in other galaxies gave rise to another astounding discovery: that our universe is not static, but expanding!

Because of their importance as a “standard candle” in measuring cosmic distances, astronomers continue to study the nature of Cepheids. Their studies revealed that there are two distinct types of Cepheids: Classical and Type II. Delta Cephei is the second closest Cepheid to Earth after Polaris, and was even studied in detail by Edwin Hubble’s namesake telescope, NASA’s Hubble Space Telescope, in 2008. These studies, along with others performed by the ESA’s Hipparcos mission and other observatories, help to further refine the accuracy of distance measurements derived from observations of Cepheids. What will further observations of Delta Cephei and other Cepheids reveal about our universe? Follow NASA’s latest observations of stars and galaxies across our universe at nasa.gov.

Facing North October Evenings



THE STARS OF CEPHEUS ARE VISIBLE ALL YEAR ROUND FOR MANY IN THE NORTHERN HEMISPHERE, BUT FALL MONTHS OFFER SOME OF THE BEST VIEWS OF THIS CIRCUMPOLAR CONSTELLATION TO WARMLY-DRESSED OBSERVERS. JUST LOOK NORTHWARDS! IMAGE CREATED WITH ASSISTANCE FROM STELLARIUM:

[STELLARIUM.ORG](https://stellarium.org).

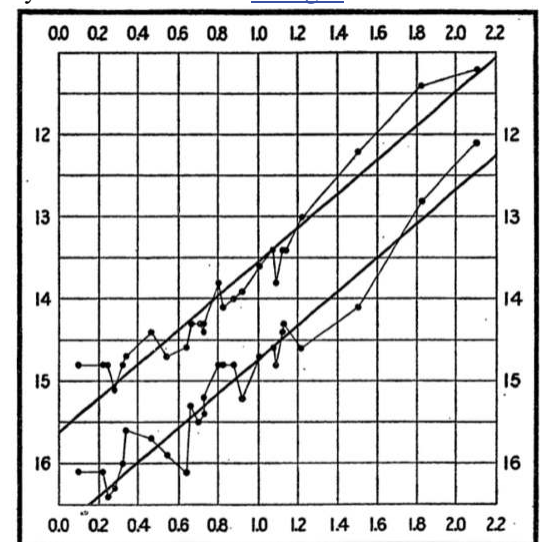


FIG. 2.

THIS HISTORICAL DIAGRAM FROM HENRIETTA LEAVITT’S REVOLUTIONARY PUBLICATION SHOWS THE LUMINOSITY OF A SELECTION OF CEPHEID VARIABLES ON THE VERTICAL AXIS, AND THE LOG OF THEIR PERIODS ON THE HORIZONTAL AXIS. THE LINE DRAWN THROUGH THESE POINTS SHOWS HOW TIGHT THAT RELATIONSHIP IS BETWEEN ALL THE STARS IN THE SERIES. FROM HENRIETTA LEAVITT AND EDWARD PICKERING’S 1912 PAPER, “PERIODS OF 25 VARIABLE STARS IN THE SMALL MAGELLANIC CLOUD,” A COPY OF WHICH CAN BE FOUND AT: [HTTPS://UL.ADSABS.HARVARD.EDU/ABS/1912HARCl.173....1L/ABSTRACT](https://ul.adsabs.harvard.edu/abs/1912HarCl.173....1L/abstract)