



PAStimes

Phoenix Astronomical Society

www.pasaz.org

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Volume 72 Issue 7

PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Will Oldroyd to Speak at March 4 Meeting

By Will Oldroyd

"The Search for Planet X"

At the March 4th PAS meeting, We will discuss the history and current state of the hunt for a hidden world orbiting deep in the far reaches of our solar system.

Will Oldroyd is a graduate student at NAU studying Astronomy and Planetary Science. He grew up in Provo, Utah and graduated from Brigham Young University in Physics and Astronomy with minors in Math, Geology, and Spanish. Will's main research focuses on searching for a myste-

rious undiscovered giant planet---called Planet X---hidden in the distant outer solar system. Some of the most exciting parts of this research are using supercomputers to visualize how the planets are connected through gravity and using some of the biggest telescopes on Earth (or off of it) to discover new worlds. When he's finished with school, Will plans on becoming a professor so he can continue studying the universe and share new discoveries with others. In his spare time, Will enjoys hiking and playing board games with his wife and son.



Please join PAS in welcoming Will Oldroyd as our March 4th Guest Speaker! Photo provided by Will Oldroyd.

March 4th PAS Meeting

By Terri, Event Manager

Please join us on Zoom over the Internet as we learn and hear about "The Search for Planet X". The meeting room opens at 7pm. Then President Mike opens the meeting at 7:30pm, and after a few short announcements, Will Oldroyd takes the floor for a spectacular presentation. Everyone is welcome. Here's the link to the Zoom Meeting:

<https://us02web.zoom.us/j/86743691949?pwd=L1pwa2ZZK29kZGwwaUdGK2d4V3d3UT09>

Please mute your device and turn off your camera to give the Guest Speaker our undivided attention for the presentation. Once Will is done with the main presentation and Q&A, you may turn on your sound and camera. Q&A will be happening

through the Chat Room within Zoom, so come prepared to add your questions. PAS Meeting Host Stu will field the questions to the Guest Speaker. This meeting is slated to end at 10pm, but most of the time, these Virtual Meetings end shortly after 9pm. Feel free to leave when you need to. Invite everyone you know to attend and enjoy this presentation! It's free and fun! Hope to see you there!

February 4 Meeting - Tom Field

By Don K. Boyd, PAStimes Editor

On Thursday February 4, 16 people gathered, via zoom, for the monthly meeting of the Phoenix Astronomical Society. The Zoom meeting did not open until 7:15 as many members, including the host Stu Brackney were attending another Zoom meeting before the PAS meeting. We chatted with the speaker, Tom Field, until 7:30 when the meeting was called to order by President Mike Marron. Tom's talk was about how amateur astronomers can do real science by using simple tools to study the spectra of stars using fairly inexpensive

gratings and software and virtually any camera. Tom said since we did not have a large crowd he would not mind if we asked him questions via the microphone rather than the chat format, and we had a very lively and informative talk. We greatly appreciate his knowledge of his subject and thank him for a great presentation.



Tom Field gave a very informative, fun presentation at the Feb 4th PAS Meeting. Photo by Don Boyd.

See February 4th Meeting on page 4

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PAS Meeting of the Minds Jan 21

By Terri Finch, Event Manager

On this lovely evening, 12 PAS members joined in to talk about the Business portion of PAS. Many topics were discussed. The meeting opened at 7pm with a review of the May 2020 Meeting of the Minds, followed by the July 16 Meeting of the Minds Minutes.

Topics that were discussed were:

* Sam Insana appointed as Secretary of PAS

* Terri Finch giving up position of

Event Manager but staying on as Accounts Receivable & Assistant Editor

* A discussion about the PAS Library position

* A discussion due to an email received from Richard Sauerbrun about having member telescope & sky training, and making a list of PAS members willing to help others learn

* Eric Steinberg gave a brief Treasury Report

* Sam Insana reported on Scholarship Award given to PVCC astronomy students

* And there was a discussion on having every other week Virtual PAS Meetings until Covid is no longer a threat

The meeting concluded at 8:26pm. I wish to thank everyone who attended this meeting and helped with the business decisions of PAS. There will be another Meeting of the Minds in 3 or 4 months, as PAS decides a meeting is needed.

What's Up For March?

By Don K. Boyd, PAStimes Editor

Name	Date	Rise	Set
Mercury	03-15-21	05:38	16:31
Venus	03-15-212	06:39	18:20
Mars	03-15-21	10:085	00:03
Jupiter	03-15-21	05:04	15:44
Saturn	03-15-21	04:33	14:57
Uranus	03-15-21	08:38	21:57
Neptune	03-15-21	06:32	18:12
Pluto	03-15-21	03:50	13:50

All Times Arizona Time

Bold means the object is "visible" in the evening

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March 15, 2021

Sunrise: 06:39

Sunset: 18:37

Q3: March 5

New: March 13

Q1: March 21

Full: March 28





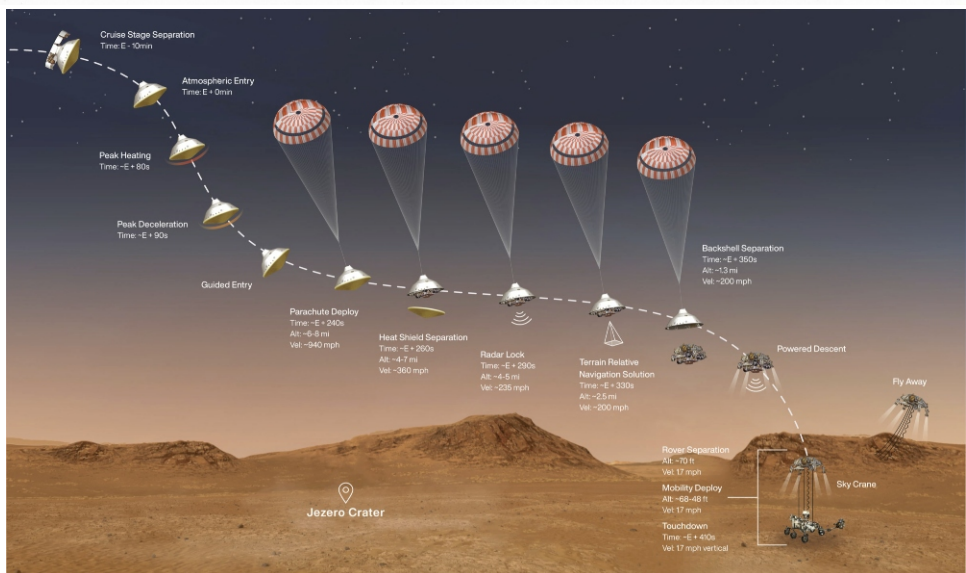
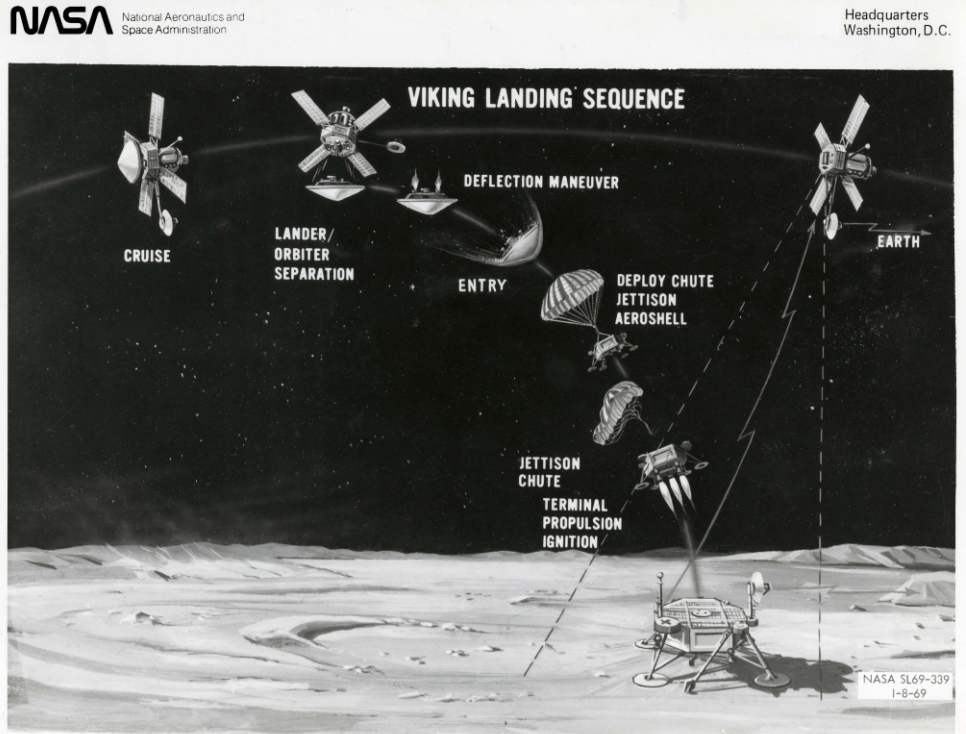
Landing On Mars: A Tricky Feat!

By David Prosper

The Perseverance rover and Ingenuity helicopter will land in Mars's Jezero crater on February 18, 2021, NASA's latest mission to explore the red planet. Landing on Mars is an incredibly difficult feat that has challenged engineers for decades: while missions like Curiosity have succeeded, its surface is littered with the wreckage of many failures as well. Why is landing on Mars so difficult?

Mars presents a unique problem to potential landers as it possesses a relatively large mass and a thin, but not insubstantial, atmosphere. The atmosphere is thick enough that spacecraft are stuffed inside a streamlined aeroshell sporting a protective heat shield to prevent burning up upon entry - but that same atmosphere is not thick enough to rely on parachutes alone for a safe landing, since they can't catch sufficient air to slow down quickly enough. This is even worse for larger explorers like Perseverance, weighing in at 2,260 lbs (1,025 kg). Fortunately, engineers have crafted some ingenious landing methods over the decades to allow their spacecraft to survive what is called Entry, Descent, and Landing (EDL).

The Viking landers touched down on Mars in 1976 using heat shields, parachutes, and retrorockets. Despite using large parachutes, the large Viking landers fired retrorockets at the end to land at a safe speed. This complex combination has been followed by almost every mission since, but subsequent missions have innovated in the landing segment. The 1997 Mars Pathfinder mission added airbags in conjunction with parachutes and retrorockets to safely bounce its way to a landing on the Martian surface. Then three sturdy "petals" ensured the lander was pushed into an upright position after landing on an ancient floodplain. The Opportunity and Spirit missions used a very similar method to place their rovers on the Martian surface in 2004. Phoenix (2008) and Insight (2018) actually utilized Viking-style landings. The large and heavy Curiosity rover required extra power at the end to safely land the car-sized rover, and so the daring "Sky Crane" deployment system was successfully used in 2012. After an initial descent using a massive heat shield and parachute, powerful retrorockets finished slowing down the spacecraft to about 2 miles per hour. The Sky Crane then safely lowered the rover down to the Martian



Illustrations of the Entry, Descent, and Landing (EDL) sequences for Viking in 1976, and Perseverance in 2021. Despite the wide gap between these missions in terms of technology, they both performed their landing maneuvers automatically, since our planets are too far apart to allow Earth-based engineers to control them in real time! (NASA/JPL/Caltech)

surface using a strong cable. Its job done, the Sky Crane then flew off and crash-landed a safe distance away. Having proved the efficacy of the Sky Crane system, NASA will use this same method to attempt a safe landing for Perseverance this month!

You can watch coverage of the Mars Perseverance landing starting at 11:00 AM PST (2:00 PM EST) on February 18 at

nasa.gov/nasalive. Touchdown is expected around 12:55 PM PST (3:55 PM EST). NASA has great resources about the Perseverance Rover and accompanying Ingenuity helicopter on mars.nasa.gov/mars2020. And of course, find out how we plan to land on many different worlds at nasa.gov.

February 4th Meeting

Continued from page 1

By Stu Brackney, Meeting Host

To Tom Field,

Tom on behalf of the entire board and club members, I send you this brief note of appreciation for your excellent presentation to our club via ZOOM this past Thursday, Feb. 4th.

Like all of us, I am fascinated by all that I do not know about light, and your presentation reminded me of how much more I need to learn. Time well spent by all.

By Tom Field in reply to Stu's email:

You're welcome, Stuart. I enjoyed meeting your group and speaking to them.

Thanks for your note.

Tom Field, President. Field Tested Systems LLC

Contributing Editor, Sky & Telescope Magazine

Astronomical Spectra: www.rspectro.com

Imaging the Orion Nebula

By Richard Sauerbrun, PAS Member

In December, 2020, I enjoyed taking and processing this image of the Orion Nebula. I hope you enjoy it!

Here is the equipment I used to get this image:

Celestron Advanced VX mount

Celestron 8" Schmidt-Cassegrain with focal reducer

1280mm focal length at f6.5

QHY PoleMaster camera

Orion 60mm guide scope

ZWO ASI120MM-S guide camera

Canon EOS 70D DSLR with CLS light pollution filter as main imaging camera

Software:

QHY PoleMaster for polar alignment

Planewave CPWI for telescope control

PHD2 for guiding

N.I.N.A for framing, focusing and image capture

Imaging:

ISO 1600

75 5-minute exposures (300s) for a total of 6 ¼ hours of data capture

50 each 300s calibration frames for Darks, Bias, & Flats Processing:

Image stacking and calibration using PixInsight's

Weighted Batch Preprocessing script



*This beautiful photo was taken by Richard Sauerbrun, PAS Member. He said: I took this photo in December 2020. It is my second attempt at M42 - The Great Orion Nebula. ****

PAS Scholarship Recipient Sends Thanks

By Jessi Wright, Paradise Valley Community College, Director of Development, Alumni & Community Relations

Hi Sam,

Happy New Year!

Thank you and PAS again for your generous scholarship. Attached you'll find a thank you note from scholarship recipient Kyle Marentes.

All the best, Jessi

By Kyle Marentes, recipient of the PAS 2020 \$500 Scholarship

12/28/20 - Thank you letter for Phoenix

Astronomical Society

Dear Phoenix Astronomical Society,

I am greatly appreciative of this choice to receive the Phoenix Astronomical Society Scholarship at Paradise Valley Community College. Especially during these hard times, I cannot express my

gratitude enough for this opportunity to assist me in my scholarly endeavors.

My academic plans for the future are to ensure my associates in science at community college, then transfer to university to complete my schooling with at minimum, a

major (Ph.D/Masters) in

astronomy and a minor in physics. With this I would like to graduate and work as an astrophysicist at an observatory or research lab.

This scholarship not only means just extra assistance for funding of my academic endeavors, but is also proof of work I have put in to earn it. I take great pride in my work that pays off, and as a result, I will have a much better outlook, not only for the future but for myself as well.

Sincerely, Kyle Marentes

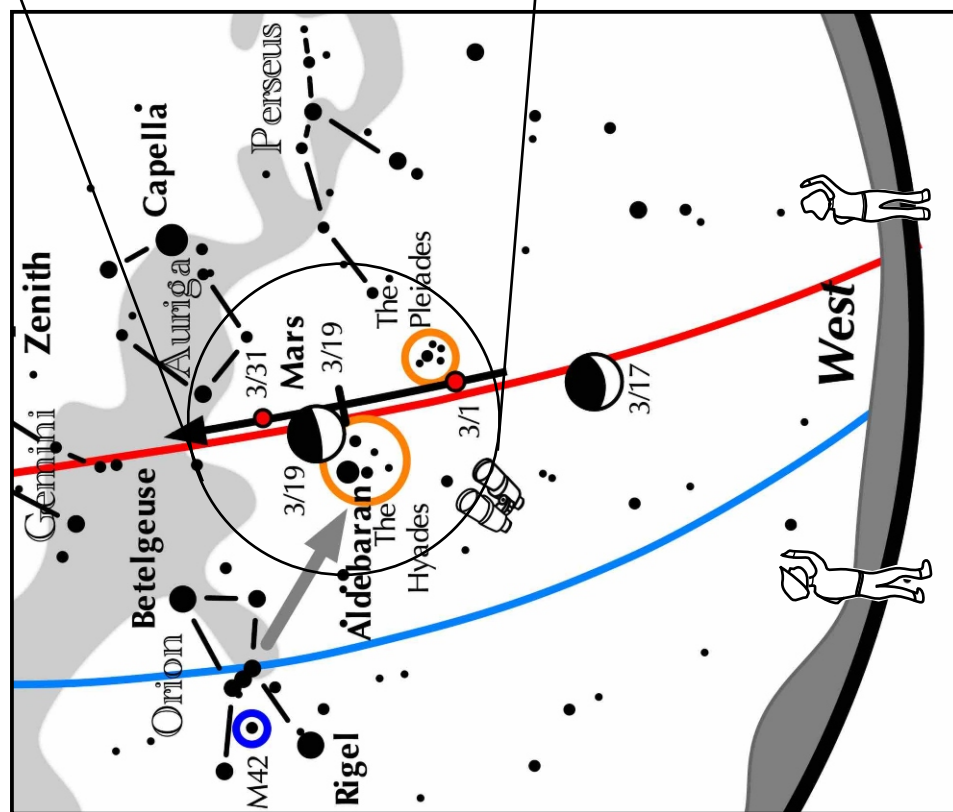
Astronomy Equipment for Sale

By Terri, Event Manager & Assistant Newsletter Editor

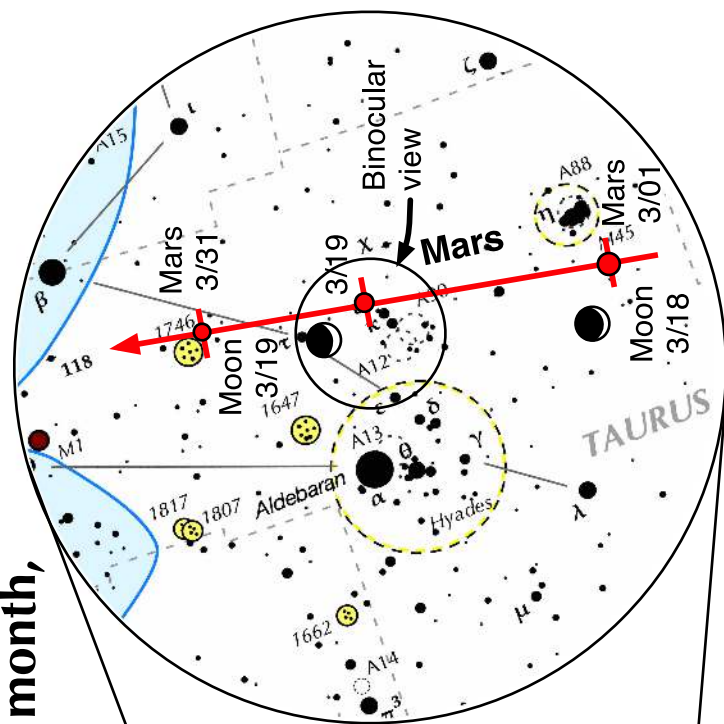
Do you have some astronomy related items you'd like to sell? Prepare an ad and send it my way so that Don and I can help you sell it through the club newsletter. PAS Members get this service for free. Items you may wish to sell: Books, Star Charts, Telescopes, Eyepieces, Finder Scopes, and more. As long 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 the contact info for the way you wish to be notified, such as email or phone number. I await your submissions to Starstuff@gmail.com. Your deadline for the April issue is March 10th.

SkyShed POD for sale, Desert Tan, 3 Bays (XL3), in excellent and pristine condition, pickup only unless delivery can be worked out. Asking \$2,000. Pick up location is North Scottsdale (actually closer to Rio Verde) with cross streets of 146 and East Desert Vista Trail. Contact Tim info@starlitridge.com or (515) 468-9300

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



**West-northwest
90 minutes after sunset on
March 1 20**



The Scene: Crescent Moon and Mars slide between the Hyades and Pleiades

In the early evening just as darkness settles from March 1 through March 20, look low in the west-northwest for a fascinating celestial interplay.

Mars, far dimmer than it was last October, still shines noticeably in the west. For much of March, it slides between the Pleiades and Hyades star clusters.

On March 8, Mars lies between the two clusters.

On March 18, the crescent Moon full with earthshine hangs magically next to the Pleiades.

On March 19, the crescent Moon joins the Red Planet by moving near the bright star Aldebaran.

Observing & Photographing Session Jan 11

Mark Johnston, PAS Member

Monday Jan 11 looked best for the new moon, so Sam Insana and I arrived at the Antennas site an hour before sunset to get set up for a full night's observing. An early wind died down and while it was cold - 32F in the early hours - we were prepared and the wind wasn't bad. It was very dark, Bortle 2 most of the night and even hit SQM 21.77 (Bortle 1) for a while after midnight. We packed up and were on our

way home after 4:30am Tuesday morning. Here are a few photos from our trip: M104, M97, M81/82.

By Sam Insana, PAS Member

I took a photo of Mark with his refractor setup and the beautiful sunset behind him. Also included is a photo of Sam with his setup. It was so cold that Sam brought a Coleman camping heater which he used from midnight until 4:30 am. Sam took some photos of the Horsehead Nebula in

Orion with his 35-year-old 8-inch Newtonian reflector with an equatorial mount and clock drive and his DSLR. He took many 30-second exposures at 6400 iso and stacked them together with Deep Sky Stacker. There were several nice meteors throughout the very dark night.

We hope to see other PAS members outside, where we social distance and still have a great observing session.



This is Sam's 2nd photo of the Horsehead Nebula taken early morning of January 12th. Photo by Sam Insana.



Mark's scope & table set up for a long night of observing from the time of this photo of 5:52pm on Jan 11th, to 4:30am on Jan 12th. Photo by Sam.



The set up for observing at the Antennas site on January 11th. Photo by Sam Insana. Sam with his table & scope set up are in the foreground and Mark's scope is in the back right of this photo.



Horsehead Nebula taken by Sam Insana on Jan 11th. The Horsehead Nebula (also known as Barnard 33) is a small dark nebula in the constellation Orion. The nebula is located just to the south of Alnitak, the easternmost star of Orion's Belt, and is part of the much larger Orion Molecular Cloud Complex. It appears within the southern region of the dense dust cloud known as Lynds 1630, along the edge of the much larger, active star-forming H II region called IC 434. The Horsehead Nebula is approximately 422 parsecs or 1,375 light-years from Earth. It is one of the most identifiable nebulae because of its resemblance to a horse's head.



This photo has M81 on the left and M82 on the right. Messier 81 (also known as NGC 3031 or Bode's Galaxy) is a grand design spiral galaxy about 12 million light-years away, with a diameter of 90,000 light years, in the constellation Ursa Major. Messier 82 (also known as NGC 3034, Cigar Galaxy or M82) is a starburst galaxy approximately 12 million light-years away in the constellation Ursa Major. A member of the M81 Group, it is about five times more luminous than the whole Milky Way and has a center one hundred times more luminous than our galaxy's center. The starburst activity is thought to have been triggered by interaction with neighboring galaxy M81. Photo by Mark.



The Owl Nebula (also known as Messier 97, M97 or NGC 3587) is a planetary nebula located approximately 2,030 light years away in the constellation Ursa Major. The nebula is approximately 8,000 years old. It is approximately circular in cross-section with a little visible internal structure. It was formed from the outflow of material from the stellar wind of the central star as it evolved along the asymptotic giant branch. The nebula is arranged in three concentric shells, with the outermost shell being about 20–30% larger than the inner shell. The owl-like appearance of the nebula is the result of an inner shell that is not circularly symmetric, but instead forms a barrel-like structure aligned at an angle of 45° to the line of sight. Photo by Mark.



The Sombrero Galaxy (also known as Messier Object 104, M104 or NGC 4594) is a spiral galaxy in the constellation borders of Virgo and Corvus, being about 9.55 megaparsecs (31.1 million light-years) from Earth. The galaxy has a diameter of approximately 15 kiloparsecs (49,000 light-years), 30% the size of the Milky Way. It has a bright nucleus, an unusually large central bulge, and a prominent dust lane in its inclined disk. The dark dust lane and the bulge give this galaxy the appearance of a sombrero hat. Photo by Mark.

Evening at Picket Post Feb 5

By Sam Insana PAS Secretary

I took a sky quality reading at Pickett Post of 3.2 Bortle at 11 pm.

It was a great night with little wind and no clouds. It did get down to 42 degrees, so I used my Coleman heater from 11 pm until 1 am. I used my 36-year-old 8-inch Newtonian reflector and my Canon EOS Rebel T6i camera to take the photo of M81 and M82 galaxies and the Flame Nebula. I also used Deep Sky Stacker and adobe photoshop. An EVAC member, David, was also taking astrophotos with his DSLR at Pickett Post. I really enjoyed looking at Mark's

high quality photos throughout the night.

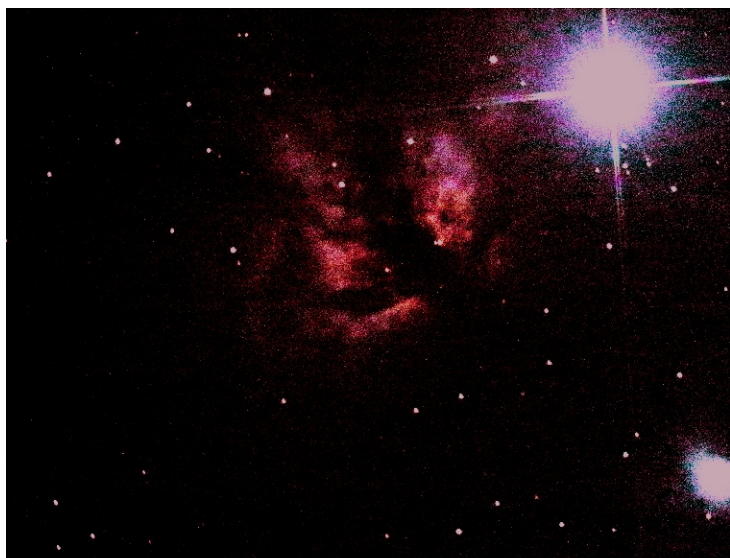
By Mark Johnston, PAS Member

On Feb 5th, Sam Insana and I spent an evening imaging at the Pickett Post observing site east of Gold Canyon. The new moon weekend appeared to have an uncertain forecast so we decided to take advantage of clear skies in the 3rd quarter. Conditions were good (Bortle 4 bordering on Bortle 3), clear with good transparency but colder than first forecast. We had a nice chat with the on-site ranger, who told us officially the gate is closed and locked at 7:30pm, but if there are astronomers pres-

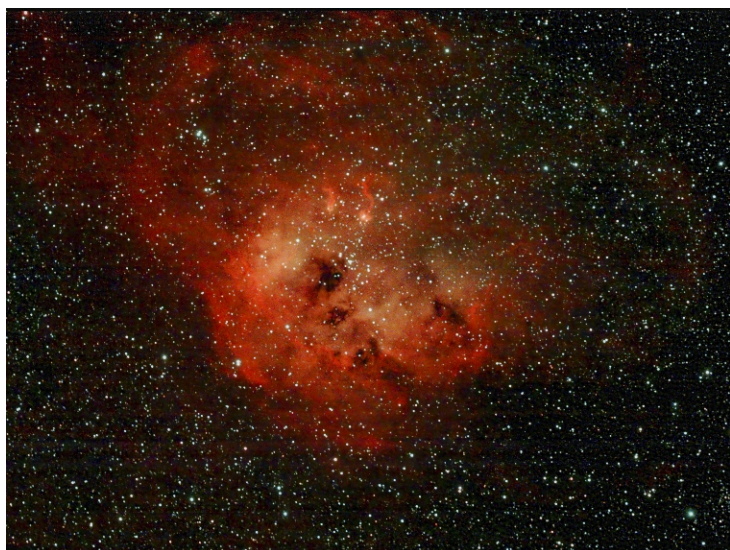
ent he closes it without locking it and lets us open/close it behind us when we leave.

I was experimenting with different cameras, filters and exposure settings and tried a couple of new objects for me. It's always a learning experience! After post processing, my better images included the M51 galaxy, IC410 the Tadpole nebula, M81 and M82 and the NGC2169 the XY Cluster.

It was down to the low 40's by 1am so we packed up and headed out. It was a very successful observing and photographing evening.



The Flame Nebula, designated as NGC 2024 and Sh2-277, is an emission nebula in the constellation Orion. It is about 900 to 1,500 light-years away. This fantastic photo by Sam Insana.



IC 410, sometimes known as the Tadpole Nebula due to its northeastern filaments, is a large emission nebula visible in the constellation Auriga. This photos was taken by Mark Johnston.



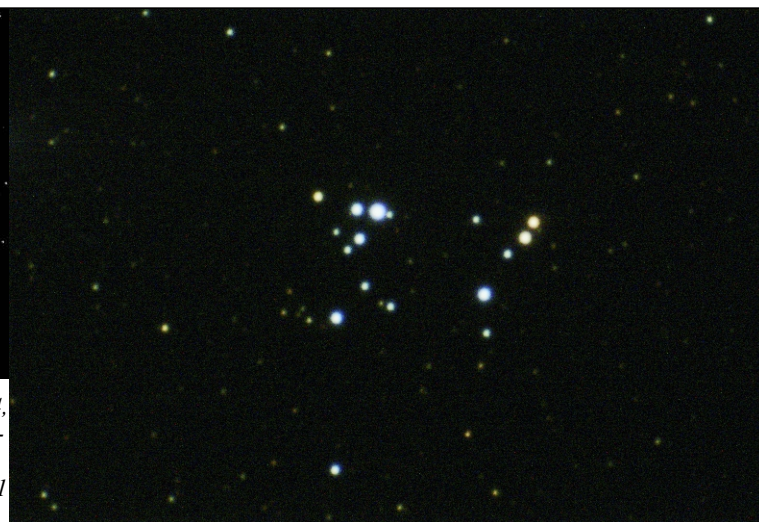
Messier 81 (also known as NGC 3031 or Bode's Galaxy) is a grand design spiral galaxy about 12 million light-years away, with a diameter of 90,000 light years, in the constellation Ursa Major. Due to its proximity to our galaxy, large size, and active galactic nucleus (which harbors a 70 million $M_{\odot}$ supermassive black hole), Messier 81 has been studied extensively by professional astronomers. Messier 82 (also known as NGC 3034, Cigar Galaxy or M82) is a starburst galaxy approximately 12 million light-years away in the constellation Ursa Major. A member of the M81 Group, it is about five times more luminous than the Milky Way and has a center one hundred times more luminous. The starburst activity is thought to have been triggered by interaction with neighboring galaxy M81. As the closest starburst galaxy to Earth, M82 is the prototypical example of this galaxy type. SN 2014J, a type Ia supernova, was discovered in the galaxy on 21 January 2014. In 2014, in studying M82, scientists discovered the brightest pulsar yet known, designated M82 X-2. This photo was taken by Sam.



This Awesome photo of M81 + M82 was taken by Mark.



The Whirlpool Galaxy, also known as Messier 51a, M51a, and NGC 5194, is an interacting grand-design spiral galaxy with a Seyfert 2 active galactic nucleus. It lies in the constellation Canes Venatici, and was the first galaxy to be classified as a spiral galaxy. Its distance is estimated to be 31 million light-years away from Earth. This photo was taken by Mark.



NGC 2169, is an open cluster in the Orion constellation. It was possibly discovered by Giovanni Batista Hodierna before 1654 and discovered by William Herschel on October 15, 1784. NGC 2169 is at a distance of about 3,600 light years away from Earth. It is nicknamed "The '37' Cluster" due to its striking resemblance to the numerals "37". The cluster is composed of components Collinder 38, a 13pn open cluster, and Collinder 83, a III3m open cluster. This photo was taken by Mark.

2021 PAS Guest Speakers

By Terri Finch, Event Manager Events@pasaz.org

Due to the Covid-19 pandemic, PAS Meetings are being held via Zoom over the internet. It is planned that a few days before the meeting, the Zoom link will be added to the calendar listing for that night's meeting. Please visit the PAS calendar to find out more about these upcoming Virtual Meetings and Guest Speakers.

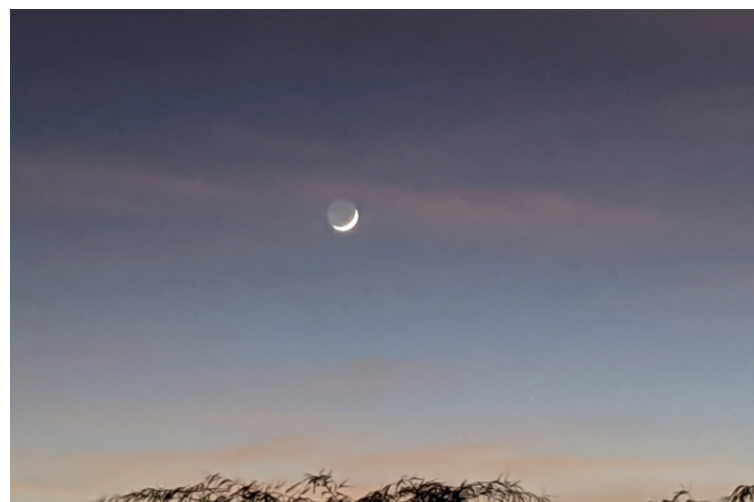
Do you have an idea for a guest speaker? Email Terri Finch, Paul Facuna, or Mike Marron the details (their email addresses are at the top of page 2 of this newsletter).

Here are the next scheduled guest speakers at PAS:

Apr 1: David Jacobs: Cubestats

May 6: Dolores Hill: Osiris-REx Mission

Sept 2: TBA



This beautiful photo of the "Old Moon in the New Moon's Arms" was taken the evening of the January 14th PAS meeting by Susan Mullarkey, PAS Member.

Pinnacle Peak Park Feb 6

By Mark Johnston, PAS Member

Feb 6th I did an EAA outreach program for the City of Scottsdale at Pinnacle Peak Park. I sat safely behind my table and moved the scope from object to object while guests were seated in folding chairs in a semi-circle of several rows in front of the monitor. We had a full house with 30 guests. I was able to show the Pleiades, M31/32/110, M33, M42/43, the Rosette nebula, M15, the double cluster in Perseus, Rigel double, and M81/82. I also explained some of the mythology as I pointed out the winter constellations with my laser pointer.

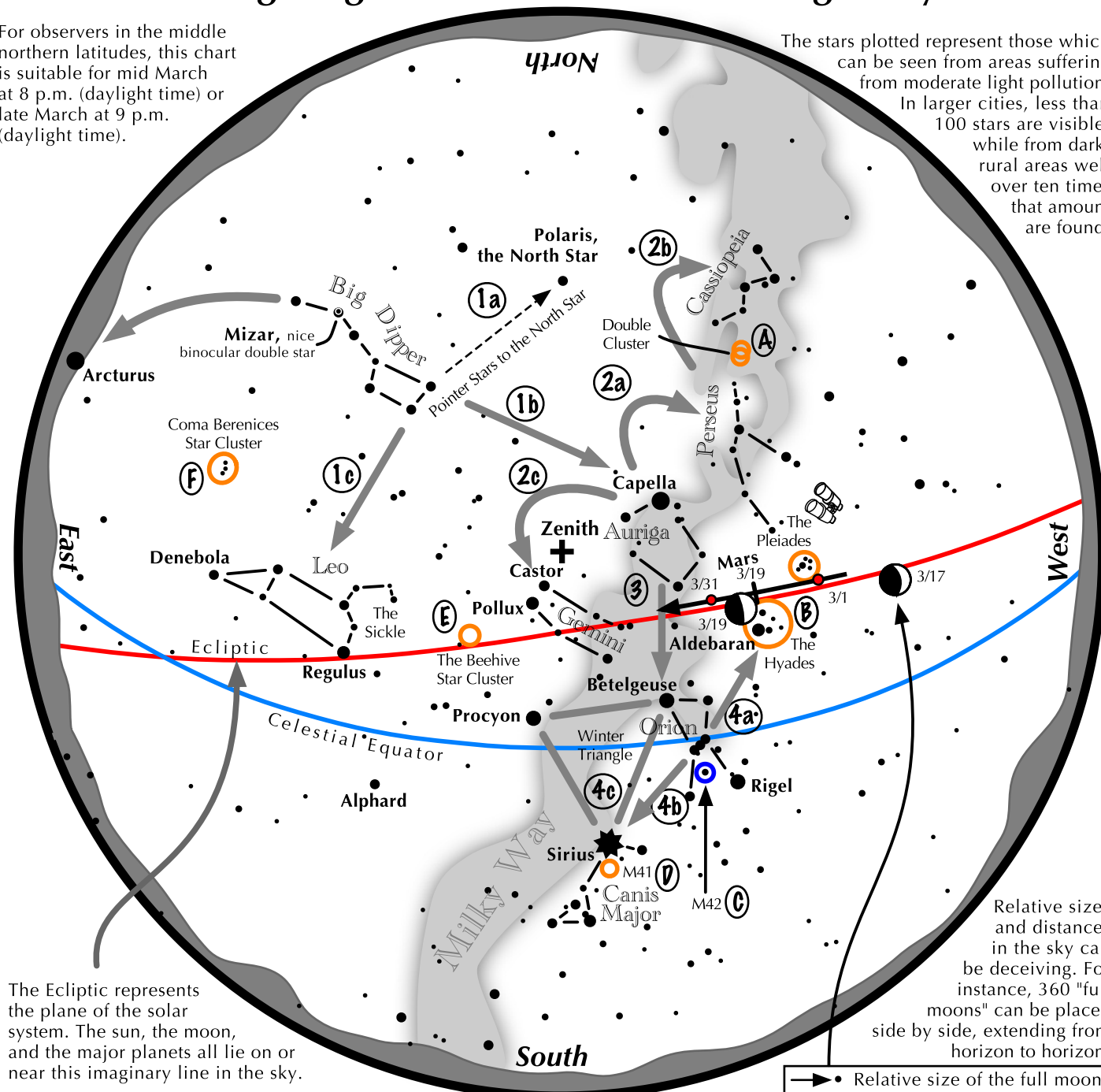


This was my set up for the EAA event at Pinnacle Peak Park on Feb 6th. It was an enjoyable evening event. Photo provided by Mark.

Navigating the mid to late March Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid March at 8 p.m. (daylight time) or late March at 9 p.m. (daylight time).

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 March night sky: Simply start with what you know or with what you can easily find.

- 1 Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star. Its top bowl stars point west to Capella in Auriga, nearly overhead. Leo reclines below the Dipper's bowl.
- 2 From Capella jump northwestward along the Milky Way to Perseus, then to the "W" of Cassiopeia. Next jump southeastward from Capella to the twin stars of Castor and Pollux in Gemini.
- 3 Directly south of Capella stands the constellation of Orion with its three Belt Stars, its bright red star Betelgeuse, and its bright blue-white star Rigel.
- 4 Use Orion's three Belt stars to point northwest to the red star Aldebaran and the Hyades star cluster, then to the Pleiades star cluster. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius. It is a member of the Winter Triangle.

Binocular Highlights

A: Between the "W" of Cassiopeia and Perseus lies the Double Cluster. **B:** Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **C:** M42 in Orion is a star forming nebula. **D:** Look south of Sirius for the star cluster M41. **E:** M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux. **F:** Look high in the east for the loose star cluster of Coma Berenices.

