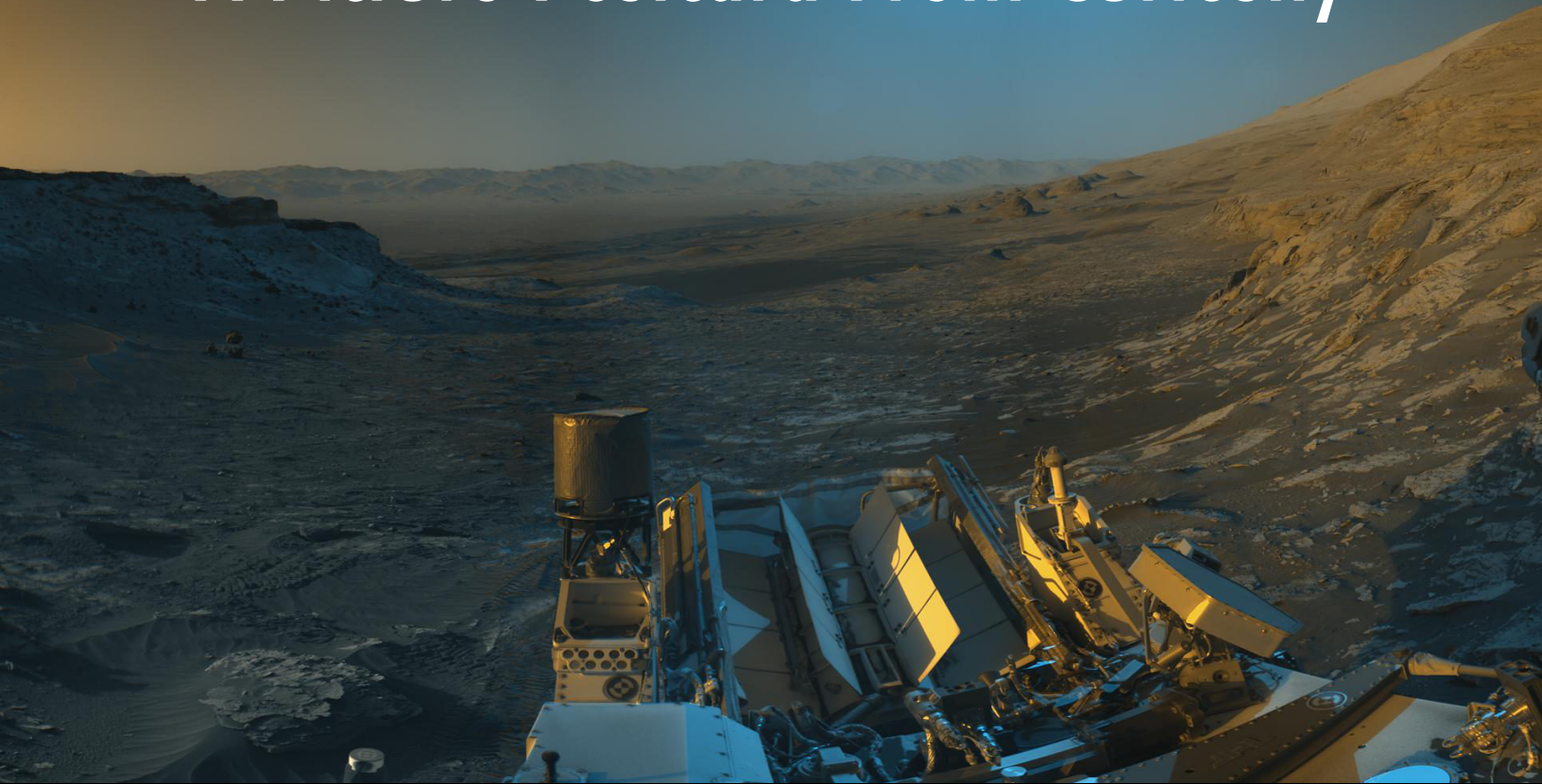


The Prairie Astronomer

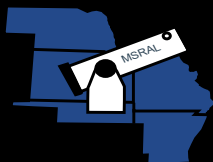
December 2021 Volume 62, Issue #12



A Picture Postcard From Curiosity



IN THIS ISSUE: Water Plumes on Europa
PAC Board Meeting Minutes
Member Profile: Bill Lohrberg



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer



NEXT MEETING AND PROGRAM

December 21: 7pm at Tanners

PAC Family Christmas Party
Tanners Bar and Grill (8600 S 30th and Yankee Hill Road)
party room.

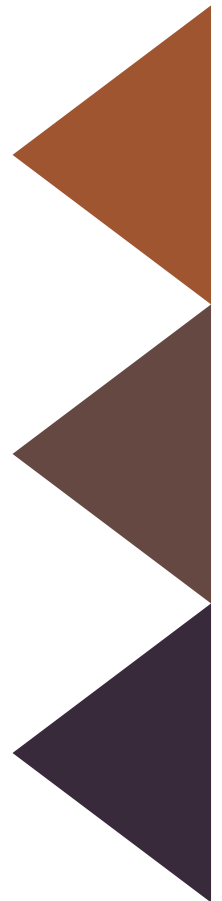
FUTURE PROGRAMS

January: New Technologies in Planetarium Shows

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Cover: An artistic interpretation of Curiosity's view high up on a Martian mountain was created by mission team members who were stunned by the sweeping landscape. [See JPL website for details.](#)



CALENDAR

PAC Christmas Family Party
Tanners Bar and Grill (8600 S 30th and Yankee Hill Road) party room.
December 21, 7pm

PAC Meeting
January 25, 7:30pm, either Zoom or if possible live meeting at Hyde. Jack Dunn will provide an update on new technologies that have changed planetarium shows.

PAC Meeting
February 22, 7:30pm

PAC Meeting
March 29, 7:30pm

2022 STAR PARTY DATES

	Date	Date
January	28	2/5
February	25	3/4
March	25	4/1
April	22	29
May	20	27
June	17	24
July	22	29
NSP	7/24	7/29
August	19	26
September	23	30
October	21	28
November	18	25
December	16	23

Dates in **BOLD** are closest to the New Moon.

CLUB OFFICERS

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Night Sky Network



www.prairieastronomyclub.org

Meeting Minutes

Jim White

PAC meeting minutes taken on 11-30-2021.

The November meeting was hosted by President Bob Kacvinsky via Zoom and started at 7:33 pm with 21 participants and ended with approximately 23 participants. Bob started the meeting with an introduction about tonight's program Juno Discoveries presented by Christopher Mick a NASA ambassador based out of Hudson, Wisconsin. Juno is a NASA spacecraft orbiting Jupiter that launched in 2011, arrived at Jupiter in 2016 and has had its mission extended into 2025.

Bob turned the meeting over to Jim Kvasnicka to give his December observing report. Jim noted that there is an upcoming club star party this Friday, December 3rd, at the club observing site and that there are a couple of opportunities for star parties at the end of the month but they fall on December 24th and December 31st so we may look at planning something around but not on those dates. Jim noted that the Geminids Meteor Shower will be happening toward the middle of the month and that there is a comet that will be viewable this

month comet C/2021 A1 Leonard. Jim finished his observing report at 7:42 and turned the meeting back over to Bob.

Bob announced that Hyde Observatory is still unavailable due to the Covid risk dial. December's meeting is on the 21st and is a week early due to the Christmas Holiday. In place of the normal monthly meeting we are going to have our traditional holiday gathering, it will take place in a party room at Tanner's Restaurant on Yankee Hill Road at 7 pm. The gathering is a social event for club members and their family and no formal program is planned. A basic astronomy class is scheduled for December 2nd and there are currently 16 people registered. PAC is having a board meeting on December 7th at Hyde Observatory and members were encouraged to pass along any input, recommendations or suggestions that they have so they could be brought up at the meeting.

At 7:45 John Reinert was asked for the club treasurers report. John

stated that the report was not a lot different from what the recent audit represented, dues notices will be sent out on December 1st so that we can project out into February. The checking account and CD's look good and the big CD comes due in January.

Bob then discussed club membership cost for individuals, families and student's and the benefits of membership. New business coming up, ALCON is set for the end of July in Albuquerque, NM, Texas Star Party is coming up in late April, Rocky Mountain Star Stare is Labor Day weekend, Okie-Tex Star Party is around the end of September and NSP is set for July 24th to 29th at Merritt Reservoir. With no new business to discuss the official meeting was adjourned at 7:50 pm and Christopher Mick began his Juno Mission presentation. The presentation lasted until 8:28 pm.

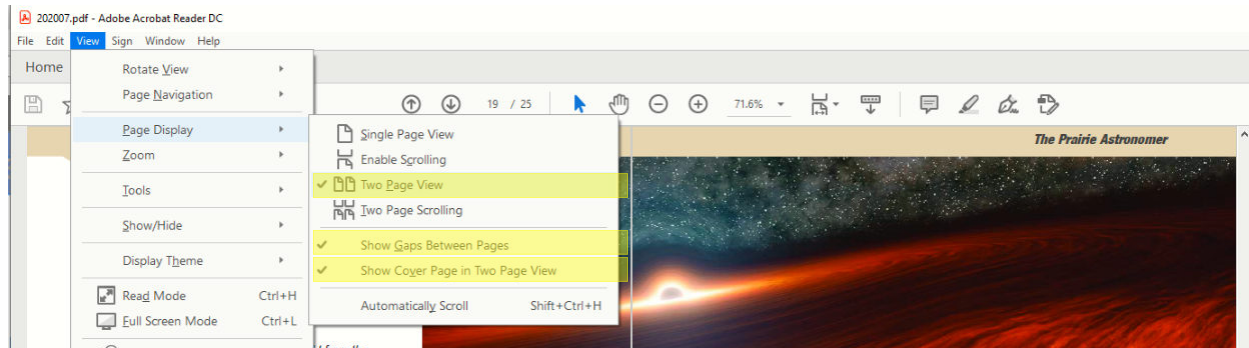
Club Secretary

Jim White

[Editor's Note: See Page 24 for the PAC Board Meeting minutes]

New Newsletter Format

How to Adjust Adobe Acrobat Settings for Two Page View



To view this newsletter in magazine spread format in Acrobat, select View -> Page Display-> Two Page View. Acrobat will then show two pages side by side. Also make sure the checkboxes "Show Cover Page in Two Page View" and "Show Gaps Between Pages" are checked. **If you have it setup correctly, the cover page will be displayed by itself and subsequent pages will be side by side with the odd numbered pages on the left.**

PAC Newsletter Archive

Back issues of the Prairie Astronomer from 1962 to present are now available online: <https://www.prairieastronomyclub.org/newsletters>

PAC-LIST

Subscribe through [GoogleGroups](#) or contact Mark Dahmke to be added to the list. You'll need a Google/gmail account, but if you want to use a different email address, just associate that address with your google account to access Google Groups. Once subscribed, you can view message history through the GoogleGroups website.

The President's Message

Bob Kacvinsky



Happy Holidays to you and your families. I hope this article finds you healthy, festive, and ready to turn the page on a new year. To help celebrate 2021 and kick off 2022 please plan to attend our December gathering.

December 21st. 7-8:30 PM. PAC Christmas Dinner. Tanners Bar & Grill, 8600 S 30th & Yankee Hill Road just west of Anderson Mazda. In 2020 we missed the opportunity to gather for our traditional Christmas social gathering. We have the party room reserved for you and family to join for drinks and order food off the menu. We are not planning any formal meeting but just a time to gather. We moved the date up a week from our traditional last Tuesday to avoid missing those that might be traveling between the Holidays. Hope you and any family members will be able to attend.

January 25th. 7:30 PM. Next PAC Meeting. Program presented by Jack Dunn on the newest

technologies being incorporated into planetarium shows. Jack will share how innovations have completely changed the planetarium experiences from what most of us know. We will likely be meeting via Zoom with the present risk dial reading but will keep you informed of any changes.

On December 7th the PAC Board met for our annual planning meeting. We will be rolling out more details in the upcoming months, but a few highlights include:

- John Reinert is setting up the process where members can pay membership dues via credit card
- The Board is pursuing a method to consolidate annual membership due dates into a single month to simplify the process for our treasurer. More details will be coming in the new year.
- Mark Dahmke will be adding a "meet the member" feature in our

monthly newsletter

- Initiation of a mentorship program to match up "experienced" member with "less experienced" member to provide support at star parties and gaining comfort in Astronomy interests
- Rick Littrell will be revamping the library and loaner telescope process for members use
- More Astronomy learning opportunities including an Astrophotography class
- Enhancements to our monthly star parties to add some fun with observing programs and suggested observing plans

The PAC Board had a lively discussion around possible meeting program content. If you have an area of Astronomy you would like to hear more about, please let Bill Lohrberg or any of the Board know and we will

work to find a speaker. We can tap either an existing member or find an outside speaker to cover the subject.

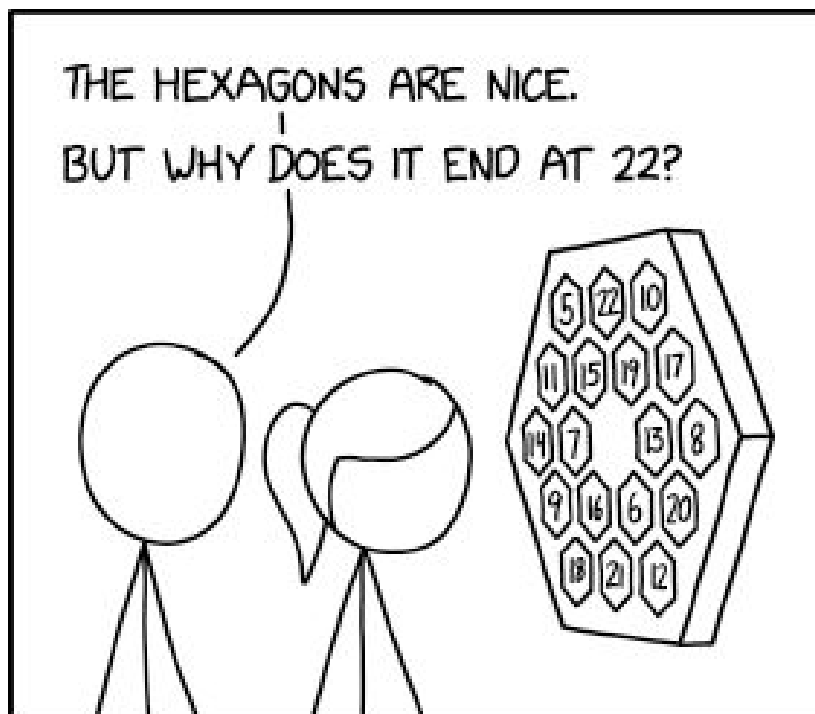
Over the past 20+ months Covid has wreaked havoc with our society, community, and PAC Outreach activities. Our club has a great reputation for our involvement in the community through Hyde and public observing events. I suspect many of you are anxious like me to get back out to sharing

the wonders of our Universe with others. Once this latest wave of Covid subsides (at some point it will) please consider how you can safely reenergize your Astronomy passion. Whether volunteering at Hyde, participating on PAC Outreach events, or just gathering again at meetings. The public will be looking for activities to safely "get out" and being outside looking at the night sky is a great place to begin.

Merry Christmas and Happy New Year to all. Hope to see you all on December 21st.

Dark and Clear Skies to you,
Bob Kacvinsky
PAC-President
kacvinskyb@yahoo.com
402-840-0084

WEBB



ASTRONOMER ADVENT CALENDAR



Rick Johnson

ARP 37

Arp 37/M77 may be the most important entry in his catalog. Though not for the reason that he included it. Arp included it as the first entry under Spiral Galaxies with Companions on Arms: Low surface brightness companions. I can't even find the companion in Arp's image nor can I find anything in the literature on it.

Arp 37 is located in Cetus right on the celestial equator and is about 30 to 60 millions of light years distant. Even the Hubble images can't decide on a distance with one article in 1990 http://hubblesite.org/news_release/news/1990-13 saying 30 million light years and another in 1994 saying 60 million http://hubblesite.org/news_release/news/1994-07 while NED gives estimates of 33 to 47 million light years using Tully-Fisher measurements. Redshift

isn't very reliable this close but does show 42 million light years. So spin the dial and pick a distance. Most sources say it is close to NGC 1055 in my previous post. But the distance to it is also all over the board but 60 million light years seems to be gaining popularity for it. For now, I'll go with that for Arp 37 as well.

While Arp says it has a low surface brightness companion on its arm I see at least 4 that could fit that description. All outside his image so can't be what he is seeing. The two with redshift distances are over a billion light years further away so meaningless to Arp 37's evolution.

In any case, this is unimportant. The galaxy is important for a far different reason. It is the archetypal example of a Seyfert galaxy. Quasars far outshine the galaxy

they are in. Seyferts seem to have a similarly active core but one that isn't anywhere near as bright. They can be divided into two camps. Those with very broad emission lines indicating super high velocities for the gasses emitting this light and those with narrower lines indicating very high velocities, just not as high as the first group. The first is called Seyfert 1 and the second Seyfert 2. M77 is a Seyfert 2. But then things get complicated.

At one time it was thought the difference was age as quasars are seen mostly at distances of over 2 billion light-years with Seyfert 1 seen, on average, somewhat closer and Seyfert 2 galaxies tending to be closer yet. Since distance indicates age we are seeing quasars at a younger age of the universe than Seyfert 1 galaxies tend to reside with Seyfert 2 galaxies tending to be

The Mantrap Skies Image Catalog

Rick Johnson, a founding member of the Prairie Astronomy Club, passed away in January, 2019. His legacy lives on through his comprehensive catalog of over 1600 images at www.mantrapskies.com.



seen only in the more current universe. So is this due to the black hole that powers each having used up its easy fuel so not being as energetic as in the past? That has been the prevailing idea for some time now but studies of Arp 37 (M77) are causing some doubt.

Lately, this idea is falling somewhat out of favor though likely contains some truth. Study of M77 which Hubble and radio telescope arrays can see in fine detail is showing that we tend to see quasars fully face on to the jet emitted by the black hole. They are super bright since we are looking down their gun barrel. This greatly increases its brightness to where it overpowers the galaxy itself. Alignment is critical for this. We see them mostly in the early universe because we see a much higher volume of space and thus by the law of averages see more of them since there are more to see. Seyfert galaxies are just as common as today, just they are too faint to see at that distance because their light is blocked by the inner disk of the galaxy that surrounds the black hole. Only

when they are close enough for the galaxy itself to be seen do we recognize their true nature.

Seyfert 1 galaxies have the jet tilted away from us so we don't see it directly but do see what they illuminate. Since we are seeing to near the core we see the high velocities involved.

Seen at more of an angle these are hidden by the disk and we see only illuminated clouds further from the black hole and thus clouds with lower velocity.

These are dimmer yet so must be closer, on average, for us to see and recognize them. We now can measure the angle of such disks and find those of the few Seyfert 1 galaxies we can measure aren't tilted as much as those of Seyfert 2 galaxies. So it is possible Quasars and Seyfert galaxies are really the same type of object, just that our view is more blocked in the case of Seyfert 1 and 2 galaxies by the inner core of the galaxy itself.

M77 is important here because while its basic spectrum screams Seyfert 2; by using techniques to peer into the hidden regions it shows a Seyfert 1

spectrum. It is both! Just that the Seyfert 1 characteristics are hidden behind the inner ring. Both are seen in a cone illuminated by its black hole. Some papers describe it as an overt Seyfert 2 and a hidden or closet Seyfert 1. NED recognizes this by classifying it as (R)SA(rs)b;Sy1 Sy2.

Both theories may carry some truth. Maybe the James Webb space telescope will further illuminate this situation (sorry, I couldn't resist).

I found more articles on this galaxy than any Arp galaxy I've researched. Far too many to even start to read. There must be over 1000 though I didn't try to count them. With that many, there must be at least one for every possible theory about this galaxy. So while this is my longest post, I had far more information available I could sort of understand. But I'm not done yet.

Besides the Seyfert angle, Arp 37 has a very large outer disk of faint stars. These are likely due to an interaction with another galaxy.

More on M77 can be found at <http://>

www.seds.org/messier/m/m077.html which was discovered by Pierre M'chain on October 29, 1780 then verified and recorded by Charles Messier on December 17, 1780.

One aspect of my image bothered me when comparing mine to others. I see a faint blue halo about the main spiral. It is a bit brighter on the western side. I couldn't fathom any reason my processing could have done this. Then I came across this article about an ultraviolet halo in the galaxy. Its position seems to match my feature. Since my filters block UV light this makes no sense unless the halo is also seen in blue light. Probably not related but it does make me wonder.

<http://apod.nasa.gov/apod/ap960910.html> . The orientation of the linked image is the same as mine making the similarity easy to spot.

My image seems to fit the above description of quasar vs Seyfert perfectly as it contains many quasars and some Seyfert galaxies as well as two that seem to have characteristics of both. One more quasar-like (identified as Q/G? on

the annotated image) and one more Seyfert like (G/Q?). Quasars range out to over 10 billion light years with a Seyfert 2 galaxy [G(SY2)] at 4.4 billion light years and several clusters over 3 billion light years distant. One cluster I've marked is behind Arp 37's outer arms and invisible in my image. I mark its center only because it is almost on top of one of the larger galaxies seen the disk, the only one without redshift value unless it is a member of the cluster. Unlikely, but they vary by only a few seconds of arc so thought it worth pointing out. Another cluster at about the same distance is also positioned behind the disk at the 2:30 position. I didn't mark it. All clusters marked are said to be 2 to 3 minutes in diameter. I've drawn a line to their approximate center. NED only gives their approximate position to an accuracy of +/- about 6 pixels.

There are two asteroids in the image, one of which isn't in the minor planet database. I've identified it as unknown. Several other similar streaks are seen in the outer disk of the galaxy, all are seen in their entirety in each subframe

so aren't asteroids. The unknown, however, shows as a very slightly elongated object in each subframe so is a real moving object. Several have asked me why I don't take just one 40 minute frame. This is one of several reasons. It allows me to separate real asteroid trails from noise created impostors.

Arp's image:

http://ned.ipac.caltech.edu/level5/Arp/Figures/big_arp37.jpeg

Focus on Constellations

Orion

Jim Kvasnicka

Orion the Hunter is perhaps second only to the Big Dipper in Ursa Major as the most recognizable star pattern in the sky. It covers 1,231 square degrees. Orion is accompanied by his faithful dogs, Canis Major and Canis Minor. Together they hunt various celestial animals including Lepus the rabbit and Taurus, the Bull. The three bright stars Alnitak, Anilam, and Mintaka make up Orion's belt. Betelgeuse forms Orion's left shoulder. Hanging down from Orion's belt is his sword. The central star of his sword is not really a star, but the Great Orion Nebula, M42, one of the most famous and observed objects in the sky. Besides M42 Orion has two additional Messier objects in bright nebulae M43 and M78. The constellation Orion is best observed in January.

Showpiece Objects

Open Clusters: NGC 1981, NGC 2169 (The 37 Cluster)

Bright Nebulae: M42 (The Orion Nebula), M43, M78, NGC 1977, NGC 1980

Multiple Stars: Beta

Orionis (Rigel), Delta Orionis (Mintaka), Theta 1 Orionis (The Trapezium), Sigma Orionis

Dark Nebulae: B33 (The Horsehead Nebula)

Mythology

Orion, the son of Neptune, boasted that so great was his might and skill as a hunter that he could kill all the animals on Earth. Gaea, Goddess of Earth, was alarmed by such a boastful statement. Gaea was afraid that Orion might try to carry out his boast. Gaea sent a giant scorpion and

ordered the beast to sting Orion. After a brief battle the scorpion stung Orion in the heel (the star Rigel) and he died. Both Orion and the scorpion were given honored places in the sky, but they were placed at opposite ends of the sky dome so they would never engage in battle again.

Number of Objects
Magnitude 12.0 and Brighter

Galaxies: 0
Open Clusters: 11
Planetary Nebulae: 0
Bright Nebulae: 9
Dark Nebulae: 6



By Till Credner - Own work: AlltheSky.com, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=20042019>

January Observing

Jim Kvasnicka



Planets

Venus: Low in the SW at sunset to start January and becomes a morning planet on January 10th.

Jupiter, Saturn, and Mercury: In the SW after sunset.

Uranus and Neptune: Uranus in Aries, Neptune in Aquarius.

Mars: In the dawn sky at magnitude +1.4.

Meteor Showers

Quadrantids: Short peak the night of January 3-4.

Messier List

M33: The Pinwheel Galaxy in Triangulum.

M34: Open cluster in Perseus.

M52: Open cluster in Cassiopeia.

M74: Galaxy in Pisces.

M76: The Little Dumbbell in Perseus.

M77: Galaxy in Cetus.

M103: Open cluster in Cassiopeia.

Last Month: M2, M15, M29, M31, M32, M39, M110

Next Month: M1, M35, M36, M37, M38, M42, M43, M45, M78, M79

NGC and other Deep Sky Objects

NGC 1406:

Galaxy in Fornax.

NGC 1425: Galaxy in Fornax.

NGC 1857: Open cluster in Auriga.

NGC 1907: Open cluster in Auriga.

NGC 1980: Emission nebula and open cluster in Orion just south of M42.

NGC 2169: The "37" Cluster in Orion.

Double Star Program List

Beta Orionis: Rigel, bright white and dim blue stars.

Delta Orionis: Mintaka, white and blue pair.

Struve 747: White pair of stars.

Lambda Orionis: White stars.

Theta 1 Orionis: The Trapezium.

Iota Orionis: White primary with a blue secondary.

Theta 2 Orionis: Three white stars.

Sigma Orionis: White primary with three pale blue stars.

Zeta Orionis: Bright white primary with two white secondary stars.

Challenge Object

B33: The Horsehead Nebula in Orion. Use a Hydrogen-Beta filter.

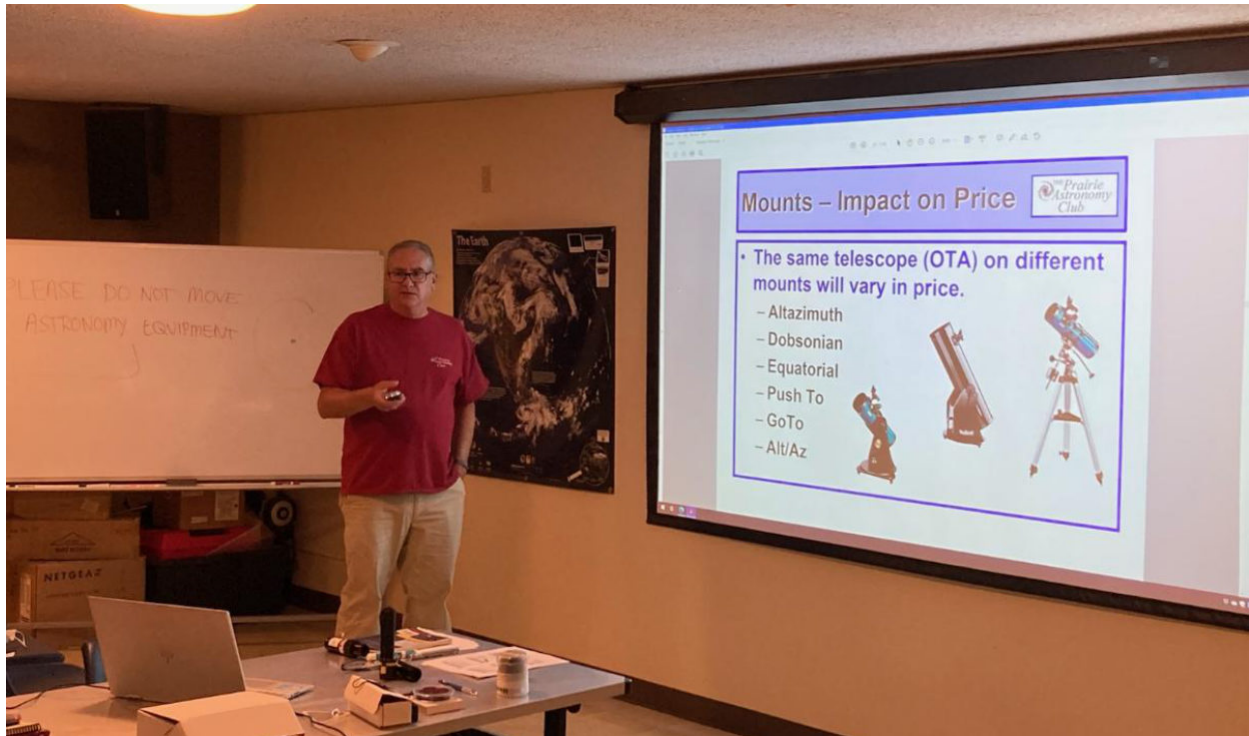


Basic Astronomy Class at Hyde Observatory December 2, 2021

We had excellent participation in the Basic Astronomy Class on Thursday night. There were 14 participants present and an additional 4 attended via Zoom connection. We gained 3 new memberships from the program. Special

thanks to all who helped assisting with the program and especially Dan and Jim for their time in preparation and presenting. – Bob Kacvinsky





Club member Mike Cerny brought his new Orion EON 104mm ED-X2 f/6.25 Triplet refractor.



Are Water Plumes Spraying From Europa? NASA's Europa Clipper Is on the Case

Finding plumes at Europa is an exciting prospect, but scientists warn it'll be tricky, even from up close.

In 2005, images of a brilliant watery plume erupting from the surface of Saturn's moon Enceladus captivated the world. The giant column of vapor, ice particles, and organic molecules spraying from the moon's south polar region suggested that there's a liquid water ocean below

Enceladus' ice shell and confirmed the moon is geologically active. The plume also thrust Enceladus and other worlds in the outer solar system, with no atmospheres and far from the heat of the Sun, toward the top of NASA's list of places to search for signs of life.

Scientists now are preparing for a mission to another ice-covered ocean world with possible plumes: Jupiter's moon Europa. Scheduled to launch in 2024, NASA's Europa Clipper spacecraft will study the moon from its deep interior to its surface to determine whether it has ingredients



This triptych image shows views of Jupiter's moon Europa as taken by various NASA spacecraft, including Voyager 1, Voyager 2 and Galileo.

Credit: NASA/JPL-Caltech

that make it a viable home for life.

Like Enceladus, Europa is geologically dynamic, meaning both ice-covered moons generate heat inside as their solid layers stretch and flex from the gravitational tug-of-war with their host planets and neighboring moons. This, instead of heat from the Sun, keeps subsurface water from freezing. The heat may also help produce or circulate life's chemical building blocks at their seafloors, including carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur.

But that's where the similarities end.

"A lot of people think Europa is going to be Enceladus 2.0, with plumes constantly spraying from the surface," said Lynnae Quick, a member of the science team behind Clipper's Europa Imaging System (EIS) cameras.

"But we can't look at it that way; Europa is a totally different beast," said Quick, who's based at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Evidence suggests Europa may vent water from its subsurface just like Enceladus. For example, scientists using NASA's Galileo spacecraft, NASA's Hubble Telescope, and large Earth-based telescopes have reported detections of faint water plumes or their chemical components at Europa.

But no one is certain. "We're still in the space where there's really intriguing evidence, but none of it is a slam dunk," said Matthew

McKay Hedman, a member of Europa Clipper's Mapping Imaging Spectrometer for Europa (MISE) science team and associate professor in the Department of Physics at the University of Idaho.

Scientists are drawn to plumes for a couple of reasons. First, they're undeniably cool: "We're scientists, but we're also human," said Shawn Brooks, who is working with Europa Clipper's Europa Ultraviolet Spectrograph (Europa-UVS) science team and is based at NASA's Jet Propulsion Laboratory in Southern California.

But more practically, Brooks said, plumes offer scientists easier access to Europa's interior. "It all comes down to whether Europa is habitable, and that comes down to having some understanding of what is happening below the surface, which we can't reach yet," he said.

In other words, the magic of Europa, an archetype for a potentially habitable world, is hidden from view deep within the moon.



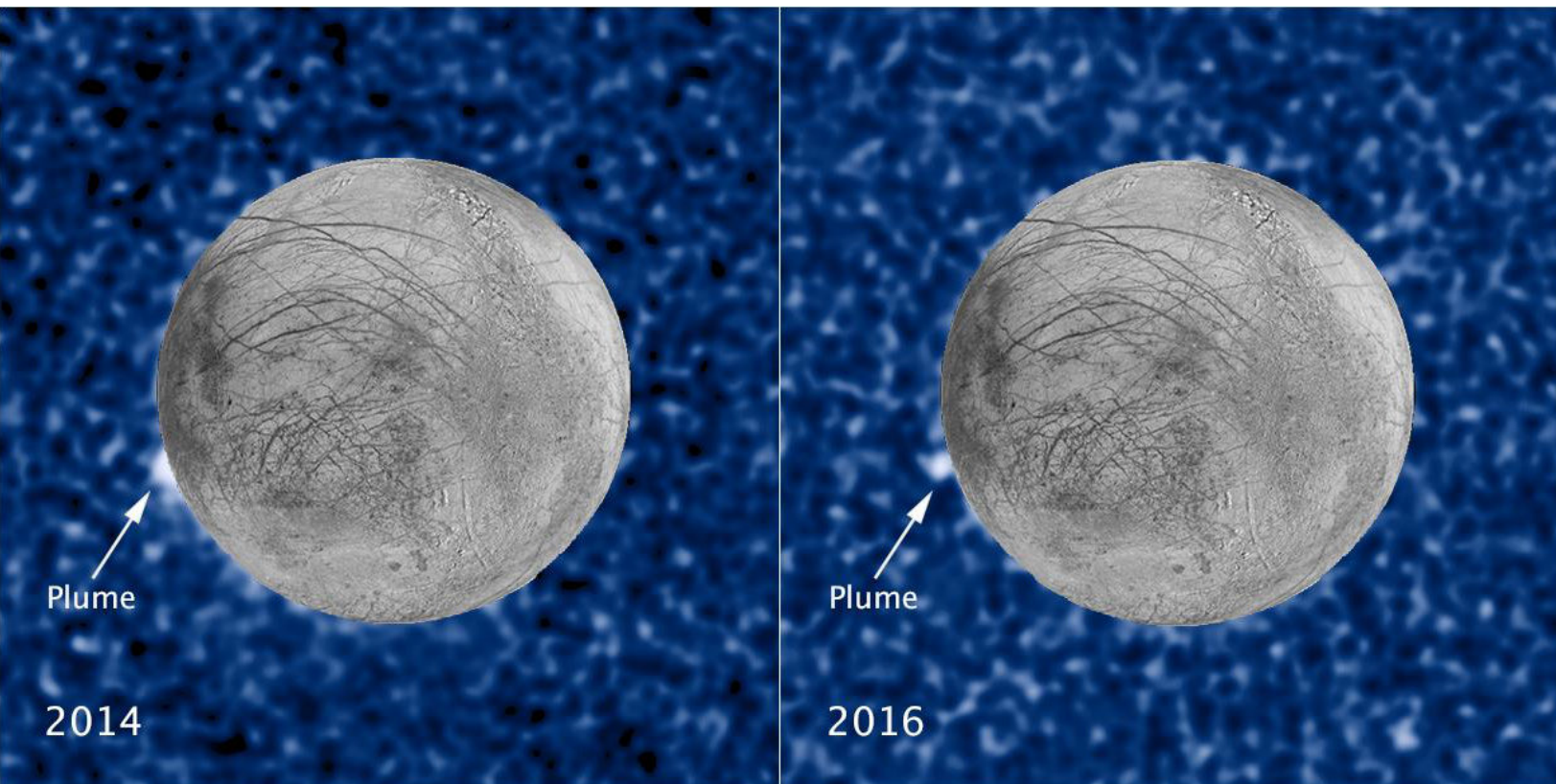
Compared to Enceladus, which is the size of Texas, Europa is about a quarter of Earth's size, or a bit smaller than Earth's moon. And evidence suggests Europa has a much deeper saltwater ocean than Enceladus, possibly 40 to 100 miles (about 60 to 160 kilometers) deep, which means it could contain about twice as much water as Earth's oceans. Some scientists hypothesize that Europa's ocean could be reacting with superheated rocks

below its seafloor, possibly through hydrothermal vents. On Earth, such areas are hotbeds of chemical activity that nourishes innumerable creatures.

Scientists say there also could be large pockets of melted water in Europa's ice shell, which are more likely than the ocean to be the source of plumes. These pockets could produce cozy habitats for organisms as well.

Because of Europa's

elliptical orbit, which sometimes brings it closer and sometimes farther away from Jupiter, plus Jupiter's immense gravitational pull, more heat is generated in Europa from friction as it circles its host planet. Given that internal heat stimulates geological activity on rocky worlds, Europa is expected to have more extensive geology than Enceladus. Some scientists predict that Europa has plate tectonics that shift and recycle the icy blocks

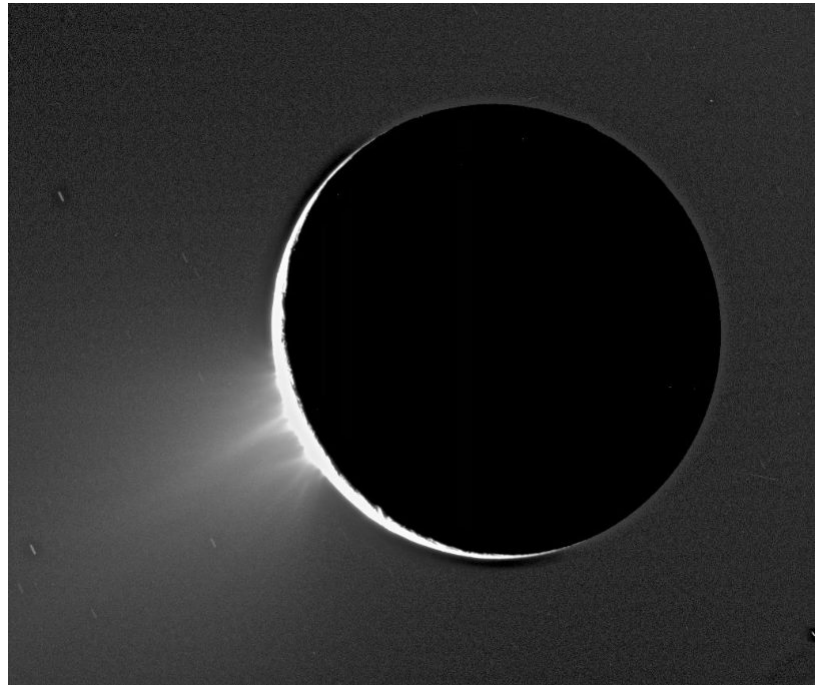


This composite image shows suspected plumes of water vapor erupting from Jupiter's moon Europa. The image of the plume was made from data collected by NASA's Hubble's Space Telescope Imaging Spectrograph in 2014. The image of Europa itself is made from data from NASA's Galileo and Voyager missions. Credit: NASA/ESA/W. Sparks (STScI)/USGS Astrogeology Science Center

making up the moon's surface. If so, Europa could be circulating nutrients produced on the surface by radiation from Jupiter, such as oxygen, to pockets of liquid in the ice shell or perhaps to the ocean itself. Through Europa Clipper, scientists will have a chance to test some of their predictions by analyzing the chemical makeup of plumes or the traces they may leave on the surface.

Scientists warn that European plumes, even if they're there, could be hard to detect even from close-up. They may be sporadic, and they may be small and thin, given that Europa's gravity, which is much stronger than Enceladus', likely would keep these water plumes close to the surface. That's a drastic departure from Enceladus' spectacular vapor column: It's always on and bigger than the moon itself, spraying icy particles hundreds of miles above the surface. "Even if they're there, Europa's plumes may not be that photogenic," Hedman said.

Though Europa Clipper scientists are devising a variety of creative strategies to find active plumes when the spacecraft begins exploring Europa in 2031, they're not relying on them to understand what's



This image of the water jets at Saturn's moon Enceladus was captured by NASA's Cassini spacecraft on Nov. 27, 2005. Enceladus is backlit by the Sun. Credit: NASA/JPL-Caltech/Space Science Institute

going on inside the moon. "We don't have to catch one for a successful mission," Quick said.

Quick added that every instrument aboard Clipper can contribute evidence of habitable conditions below the surface, regardless of active plumes.

A few examples of how the science team will search for potential plumes include Europa Clipper's camera suite, EIS. It will scout for plumes near Europa's surface partly by looking for their silhouettes at Europa's limb, or edge, when the moon is illuminated by the light of

Jupiter as it passes in front of the planet. EIS will snap photos of plumes should they appear, as well as plume deposits that might be visible on the surface. The Europa-UVS will also strive to detect plumes in ultraviolet light, including at the edge of the moon when Europa passes in front of nearby stars, and can measure the chemical makeup of such plumes. A thermal camera, the Europa Thermal Emission Imaging System (E-THEMIS), will look for hotspots on the surface that may be evidence of active or recent eruptions.

The Europa Clipper team

is set to succeed whether or not researchers find plumes at Europa, though many scientists hope for a spectacular water show to enrich the mission and our understanding of Europa. "I do suspect Europa is active and letting some material escape," Hedman said. "But I expect that when we actually get to understand how it's doing that, it's not going to be what anyone expected."

More About the Mission

Missions such as Europa Clipper contribute to the field of astrobiology, the

interdisciplinary research on the variables and conditions of distant worlds that could harbor life as we know it. While Europa Clipper is not a life-detection mission, it will conduct detailed reconnaissance of Europa and investigate whether the icy moon, with its subsurface ocean, has the capability to support life. Understanding Europa's habitability will help scientists better understand how life developed on Earth and the potential for finding life beyond our planet.

Managed by Caltech in Pasadena, California, JPL leads the development of the Europa Clipper mission in partnership with the Johns Hopkins Applied Physics Laboratory in Laurel, Maryland, for NASA's Science Mission Directorate in Washington. The Planetary Missions Program Office at NASA's Marshall Space Flight Center in Huntsville, Alabama, executes program management of the Europa Clipper mission.

Club Member Profile: Bill Lohrberg

Our first member profile is of our Second Vice President.

I am a Lincoln native – born here in 1962, graduated High School in 1980 from Lincoln Southeast, attended UNL off and on until reaching junior status pursuing a degree in meteorology/ climatology. For various reasons I changed directions and quit UNL to "reset." After a few years in my early 20's spent working full time in my

brother's business (Cornhusker Billiards), and trying to figure out what career path would suit me best, I finally chose to get into the sound and music production business. In 1986 I enrolled in the Audio and Recording program at Northeast Community College in Norfolk, NE graduating with a bachelor of arts

degree in 1989. In that same year I married the love of my life – Mary, and we started a family here in Lincoln with our son Lee born at the end of July. At the end of that year I became employed with Midwest Sound and Lighting where I remain



Bill Lohrberg, continued.

today. In 1994 our daughter Katherine was born.

I grew up around music mostly at Church, (I still enjoy the majestic sound of organ music played through a pipe organ as we had at Trinity Lutheran here in Lincoln) but also from listening to my elder brothers' and sisters' records. In my preschool days I loved making "sounds" with the piano. Somehow my parents must have thought my piano experimenting sounded potentially musical, so they signed me up for piano lessons. Later at the age of 13 my interest shifted from piano and I taught myself on the guitar. I have continued my zeal for sound and music, playing guitar in a few bands, dabbling a little with recording, and my career at Midwest Sound and Lighting.

At the invitation of Lee Thomas and Brian Sivill – both with whom I had some business dealings at Midwest Sound & Lighting, I started to attend PAC meetings in the early 2000's. I became a member in 2003 and have remained in the PAC since.

When I think back to what

got me interested in astronomy, some significant events come to mind. While an elementary school student, our class took a field trip to the museum and planetarium at UNL. The whole museum tour was awesome, but for me what made a huge impression was the planetarium show. Jack Dunn enthusiastically took us on a tour through the constellations, and what a memorable experience that was. And the planetarium projector - a robotic contraption which looked like something out of a Star Trek set - with great fanfare, rose out of the middle of the room and impressively duplicated the night sky. I was in awe. After that I began to pay more attention to the "real" night sky. I could point out some of the asterisms and constellations Jack had shown us in the planetarium that day. I continued to enjoy planetarium visits ever after, including the laser light shows, and a rare treat – a live performance in the dome by electronic and ambient space music artist and composer John Serrie.

With friends from High School I remember going

to visit the newly opened Hyde observatory in the mid to late 1970's. We eagerly waited for our turn at the eyepiece to view Saturn, and in another scope was M57 the ring nebula. I remember staying at the eyepiece long as I could, nearly overstaying my welcome. After returning to each scope a second time I wondered what else could be seen. And when we were done viewing on the deck we were enlightened by the narrated slide show inside. That too was something that really sparked my interest. I think it was a tour through the summer constellations and featured some of the objects found within those constellations. It was then I realized I wanted to learn a lot more about astronomy, not only how to find my way around the night sky, but some of the history and lore surrounding astronomy interested me; as well as the possibility of having my own telescope to find and explore for myself.

Between those years and now I maintained my interest in astronomy somewhat passively but had never owned a telescope. In the early 2000's I began to explore the possibilities. I found a

Bill Lohrberg, continued.

“how-to build a telescope” guide on line and learned the John Dobson story. When I began to attend the PAC meetings, it gave me the opportunity to survey those who had been through the same buy or build decision process. At first, I thought I would buy a glass blank to grind my own mirror. The first time I volunteered at Astronomy day held on UNL campus at the museum, Martin Gaskill had set up a station demonstrating how to grind a primary mirror. Long story short - I found it to be just about as cost-effective and more immediately gratifying to buy a complete scope. In 2004 I became the happy owner of my first telescope, the Orion Skyquest XT10 Newtonian reflector, complete with a couple of eyepieces and rocker box. This scope has given me great satisfaction. I have been enjoying taking it out for some casual observing, to club star parties and NSP slowly logging the Messier list, but I’ve especially enjoyed volunteering for club events like solar observing with my white light filter, observing the transit of Venus in 2012, at NSP and club star

parties, or just sharing celestial views in the backyard with friends and family members.

In the summer of 2016 I was browsing Craigslist and found a listing for a lightly used Meade 8” LX10 SCT scope. I went to just take a look and wound up buying it! It came complete with the tripod base and equatorial wedge mount, a few eyepieces and a T-adapter for mounting a camera. I thought I might enjoy having the motorized tracking ability that I don’t have with my XT10 Dob. I haven’t taken the dive into the imaging part of the hobby much although I’ve captured some decent but crude images with my iPhone camera attached to an adapter. Maybe some time in the future I will get into some more serious astro imaging, but for me it’s just as thrilling to observe visually. And maybe that’s why I love the hobby. There’s so much more to it than just having a good telescope and map of the night sky at hand. There is always something new to learn and discover and first-time experiences to share.

I have been to NSP on several occasions since becoming a club member. There have been so many memorable experiences from each of those, but what made the biggest impact on me at the very first NSP was the glow of the band of the Milky Way that can be observed naked eye out there. That’s an image that will stick in my memory for all time and it’s what I yearn to see again and again.

I am just a handful of observations away from completing the Messier observing program, and I want to finish what I had started very early since joining the club – the lunar observing program. And after that, I’m sure I’ll pick from many of the other observing programs to complete. I will continue to enjoy this hobby and I plan to be a member in the club for many years to come. I’m grateful and proud to be a part of it. And thanks to you fellow club members and astronomy enthusiasts for so graciously sharing your knowledge and experience and for sharing the views.

From the Archives

December, 1981

Start your New Year's observing with the open cluster NGC 752 located three degrees north and two degrees west of Beta Trianguli. The cluster has about 70 stars spread over a degree or so of field. For a more difficult target, try the edge-on spiral galaxy NGC 891, located about three degrees east of Gamma Andromedae. This spiral is a test object for a six-inch telescope, appearing as an irregular faint spindle.

Larger instruments will begin to show the irregular dark lanes running the length of the galaxy. Novices who try for the Crab Nebula usually fail or come away disappointed. The object can be seen with a 2.4-inch refractor as a very faint patch of light located one degree northwest of Zeta Tauri, but most people expect to detailed mass of nebulosity. I have seen the nebula with telescopes large as 30 inches, and I have not

Observing Chairman's Report, Dave Knisely

seen any of the filaments shown in the photographs.

If you want something a bit more satisfying, try the Orion Nebula [see next page]. To really get the most out of the view, spend at least 15 minutes in total darkness and then use a black cloth to screen out any ambient light. This is rather effective in bringing out the fainter details of the nebula. Those with eight-inch or larger instruments should have little trouble seeing the loop of nebulosity which extends south to envelope Iota Orionis. Those with smaller telescopes should try the open cluster NGC 2244, a beautiful cluster of fairly bright stars located two degrees east of Epsilon Monocerotis. Those with large telescopes may see some faint nebulosity surrounding these stars. This is the famous Rosette Nebula. For those who like globular clusters, M 79 should prove a challenge.

Located about four degrees south and one degree west of Beta Leporis, it appears as a bright ball of haze in most instruments although high power on an eight-inch telescope will show some stars on the fringes.

For those who feel a "bit chilled" by winter observing, I would suggest coming out to the star parties at Earl Moser's house. Usually someone brings something hot to drink, and if you're still cold you can duck inside and warm up a bit. But if you don't come, you'll be missing some of the best sights the winter sky has to show.

Astrophotography



M42 by Dave Knisely

I have been wanting to do this for a long time and around 2 a.m. on December 3rd, I finally did it from my backyard in northeastern Beatrice. I have an old 100mm f/6 refractor (Orion Skyview Pro-100) with a simple doublet lens, which is OK for visual wide-field use but maybe might not be the best for astrophotography. I decided to couple my Canon Rebel XT camera to the scope to see what I might get, as the scope does have a clock drive and is pretty easy to point. After a "quick and dirty" polar

alignment, I took a shot and screamed with joy when the image below appeared on my camera's tiny screen of the Great Orion Nebula (M42) in the sword of Orion (celestial north is to the left). It took about a 120 second exposure at ISO-1600 with the camera working at prime focus (600mm focal length or f/6), so the halos of chromatic aberration are present around the bright bluish stars, but the nebula itself was just plain awesome for a first try. Also, around the stars in the left part of the image is the faint nebula known as "The Running-man Nebula" (NGC 1975).

PAC Board Meeting Minutes

Jim White

PAC Board meeting minutes taken 12-7-2021 by Jim White

Bob Kacvinsky started the meeting at 7:05 pm, there were eight people in attendance. The meeting began with introductions by all those present, Jason O'Flaherty – 1st Vice President, Jim White – Secretary, Bill Lohrberg – 2nd Vice President, John Reinert – Treasurer, Rick Littrell – Equipment Chair, Jim Kvasnicka – Observing Chair, Mark Dahmke – Editor, Bob Kacvinsky – President.

First item on the agenda was an open discussion about our club timeline for transitioning to our new normal with the covid situation. Over the last 20-22 months or so we have been meeting virtually via Zoom other than our June meeting which was held outside as it is the clubs yearly solar viewing meeting. In person meetings have been in limbo mainly because we are using a public facility which has been closed due to the covid pandemic and as long as the Hyde Observatory is closed to the public and our club uses the Observatory to hold our meetings, which are open to the public, we

will probably continue the use of Zoom for club meetings for the immediate future. Normally the PAC Board meets once per year, after elections, then most business takes place via emails unless something comes up that requires a vote by the board. Once the club gets to meet again hopefully, we can resume our public outreach star parties with different organizations like Boy Scouts, Girl Scouts and different organizations throughout southeast Nebraska. Normally outreach events are initiated by the club being contacted by an organization, individual or business.

The second item on the agenda was the transition from Zoom to Live/Hybrid Zoom meetings. An initial test of this was done with the Basic Astronomy Class that was held December 2nd at Hyde and with a live Zoom feed, which worked out well. Feedback from people that attended via Zoom said that the visual feed was a little grainy but they didn't have trouble seeing the presentation and the sound was good. Bob and Mark stated that they had discussed the feedback that they

received from the Zoom attendee's and that they would be able to clean up the minor issues that were brought up.

Item number three was regarding membership renewals and payment options. John Reinert made contact with the club's bank to check on who they partnered with for electronic payments, which is Elavon, and what fees etc. would be associated with their service. John also had a discussion with Mark Dahmke who has experience with electronic payment options through NSP (Nebraska Star Party), his own business experience and another organization that Mark is involved with. Mark has used Stripe as a payment facilitator for NSP which has worked well. Square was also brought up as an option for use with in-person transactions so that credit card numbers wouldn't have to be entered manually. Elavon has an initial sign-up fee that would be waved and would have an on-going monthly fee along with a small per transaction fee. Stripe doesn't have an initial sign-up fee or monthly fee, just a per transaction fee. Square uses a swipe device with

PAC Board Meeting Minutes, continued.

an app on a cell phone or tablet and a per transaction fee. There was a motion made and voted on unanimously to use Stripe which would be setup on the Club website to allow members to pay club dues electronically if so desired, members can also still pay by check if so desired. John and Mark will work together to get this setup.

In addition to membership payments John put forward an idea to normalize membership renewals to one or possibly two months out of the year instead of every member's membership "following the moon" and renewing on the month that they originally joined the club. The reality of the way the club is setup now with sixty members we have roughly 6-8 transactions per month. If we were to normalize memberships to one or maybe two months out of the year, say one in the spring and one in the fall, members would have their membership pro-rated to get it normalized to a particular month out of the year which would make it easier to track membership renewals. This would still allow for new members to join at any time of the year, their first membership payment

would just be pro-rated to get them to one of the normalized months. For this to take place it would require a change to the bylaws of the club which requires a vote or the club membership. Bob suggested that it would be good to have a spring month for normalization as spring is the time when people are getting excited about getting out and doing observing or getting started in the hobby. There was a motion brought forward to have John put together a proposal to bring to the club membership about moving to a normalized membership date(s) which would help simplify some of the treasure's work. Jim White motioned to move forward on this and Bill Lohrberg seconded the motion to have John put together a proposal for how he would like to see the membership payment date(s) normalized. The motion was voted on and passed unanimously. John will put together a proposal to be circulated among the board members for review and the board can vote on line to say yeah or nay, or modify and adapt it accordingly. Once it is approved by the board it would then be posted in the newsletter for the membership to review at

least thirty days prior to a vote taking place.

Item number four is engaging new and younger members. In a little over a year, we have gained 17 new members and we have had 20 months since the start of covid where we haven't had in person meetings other than star parties and some lunar parties. How do we engage these new or younger members? Bob would like to get a mentorship program started to match up an experienced person with members that are new to astronomy to try to get them to communicate on a monthly or quarterly basis and possibly meet at a star party or lunar party with a goal of getting them engaged and participating and not intimidated by those of us that may remind them of their grandparents. Bob said that we have several generational gaps and we have some communication barriers that we need to overcome in both directions, young to older and older to younger along with inexperienced and experienced observers. Bob said that he is going to ask people to be mentors to these new members to try to lower the intimidation factor that

PAC Board Meeting Minutes, continued.

some people may be experiencing. Many of the surrounding larger clubs have mentorship programs setup to help new people feel comfortable and get them involved in their organization. Bob wanted to bring this to the board and he is going to take the lead on this. The board gave Bob the okay to proceed. Mark is going to send out a meet the club member questionnaire to help get people familiar with the membership.

The next item up for discussion was training classes. Bob said that we had a fantastic basic astronomy class on December 2nd. We had 14 people in the class, 4 on line and 6 people helping out. We received exceptional ratings from the class except for 1 person who was overwhelmed so Bob reached out to that person to let them know that if they had any questions to reach out to him and he would get them answered. The club gained 3 new members from the class and 2 renewals. Bob said that he is going to send a follow up email out to the class participants thanking them for taking the class and tell them to let him know if they have any follow up questions. Bob

and Jim have talked about sometime in January or February having a special star party just for the group that took the class to give them a little extra attention and go through setting up a telescope or their telescope if they have one that they would like help with. There were two other requests for meetings, one is for astrophotography. Mark stated that Brett Boller and himself had put together a program just before covid began. Mark said that it would be a good idea to break things up into a beginner and advanced class. Bob is going to send emails out to Mark, John, Jim, Brett and Jason. Mark said that it would be a good idea to have a beginner class put together and then use the one that was already put together, used or adapted for use in the advanced class. Time frame for having an astrophotography class would preferably be in February to early March while it is still cold out which makes for good classroom time. Bob suggested possibly having an astrophotography focus sub group within the club. The next area is to get people more involved in the observing programs, possibly do four lunar phase parties

instead of the quarterly lunar parties to get people started in observing programs. There was also a suggestion to have a quarterly Messier event. The last Messier pin awarded in the club was in 2009! 2022 Activities are still on hold but we're hoping for things to start to open up in April or May. The topic of solar observing was brought up and maybe have a program that goes into what it takes to get into solar observing, costs etc.

The next item up for discussion was the club library redo, restock, upgrade, check-in, check-out and observing guides. Rick Littrell has volunteered to be the clubs Equipment Chair. Rick is going to work on getting the club library in shape and our loaner equipment. Bob and Rick plan on getting together so that Rick can get into Hyde to check out what is in the library and how up to date the list of what we have is. One of the goals is also to figure out what observing guides the club has in its library, some of the observing programs have specific guides that are required to complete the program. Mark said that there is a list of what is in the library but nobody is sure how up to date the

PAC Board Meeting Minutes, continued.

list is so he will see if he can find the list and get it to Rick. Mark mentioned that in the library there are some club historical items that we need to be aware of and make sure that they aren't discarded. One minor item, who has the key to the library?

The next item discussed is the telescope loan program. We need to identify what equipment we have as a club and what may need repair and also figure out a good way going forward to check out and check in equipment to the club membership. Apparently there has been some club equipment in the past that was loaned out to members who never returned it and no longer live in the area. Rick is going to put together a procedure for what he would like to see done to handle checking out and checking in equipment and bring it to the board to be reviewed. Another issue that the club has with equipment is

that for the most part it is being stored at Hyde Observatory which is Lincoln Parks and Rec. property and should really not be used for storage of club equipment. What should we do for storage of club loaner equipment? One suggestion was to approach Branched Oak Observatory to see if we could setup some sort of permanent storage at their location. Could the club put up a shed at BOO that is secure? Jason and Rick are going to work together on the clubs' equipment issues. Mark suggested that we should get tags on all of the clubs' equipment that has property of Prairie Astronomy Club.

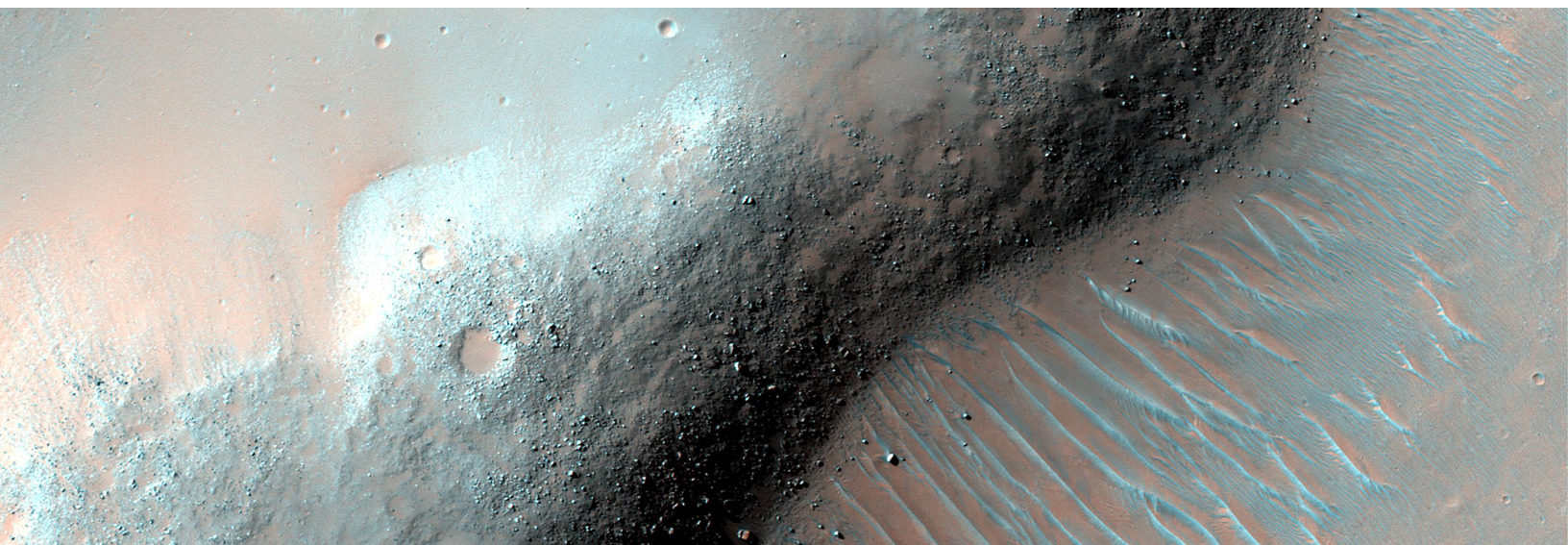
The last item up for discussion is upcoming meeting programs. Jack Dunn is going to do the January meeting on new Planetarium technologies. Dave Knisely is setup to do a program on filters but needs to do it at Hyde so it will have to wait until we

can meet again at Hyde. June is a solar program with Dave Churilla, August is NSP recap. New ideas? Space law, NEAT – Near Earth Asteroid Tracking, Observatories, Larry Stepp – Thirty Meter Telescope, Big Amateur Telescope and Lucky Imaging, Voyager, Perseverance and Ingenuity. Bob said he would reach out to the club we have contact with in the UK. We would like to try and balance programs for beginners also. A goal that we would like to achieve is 50% or more live speakers.

Recap – Stripe payment facilitator, Proposal on Normalizing Dues, Mentorship, Meet the Member in the Newsletter, Astrophotography, Observing Programs, Library and Equipment, Programs.

Meeting adjourned at 9:00 pm.

Below: the [wrinkled surface of Mars](#). Credit: NASA/JPL-Caltech/University of Arizona



CLUB MEMBERSHIP INFO

REGULAR MEMBER - \$30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - \$35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - \$10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

CLUB TELESCOPES

To check out one of the club telescopes, please contact a club officer. Scopes can be checked out at a regular club meeting and kept for one month. Checkout can be extended for another month if there are no other requests for the telescope, but you must notify a club officer in advance.

100mm Orion refractor: Available
 10 inch Meade Starfinder Dobsonian: Available
 13 inch Truss Dobsonian: Needs repair
 10 inch Zhumell: Needs mount

Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy. Order online from Amazon or lulu.com.

ADDRESS

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