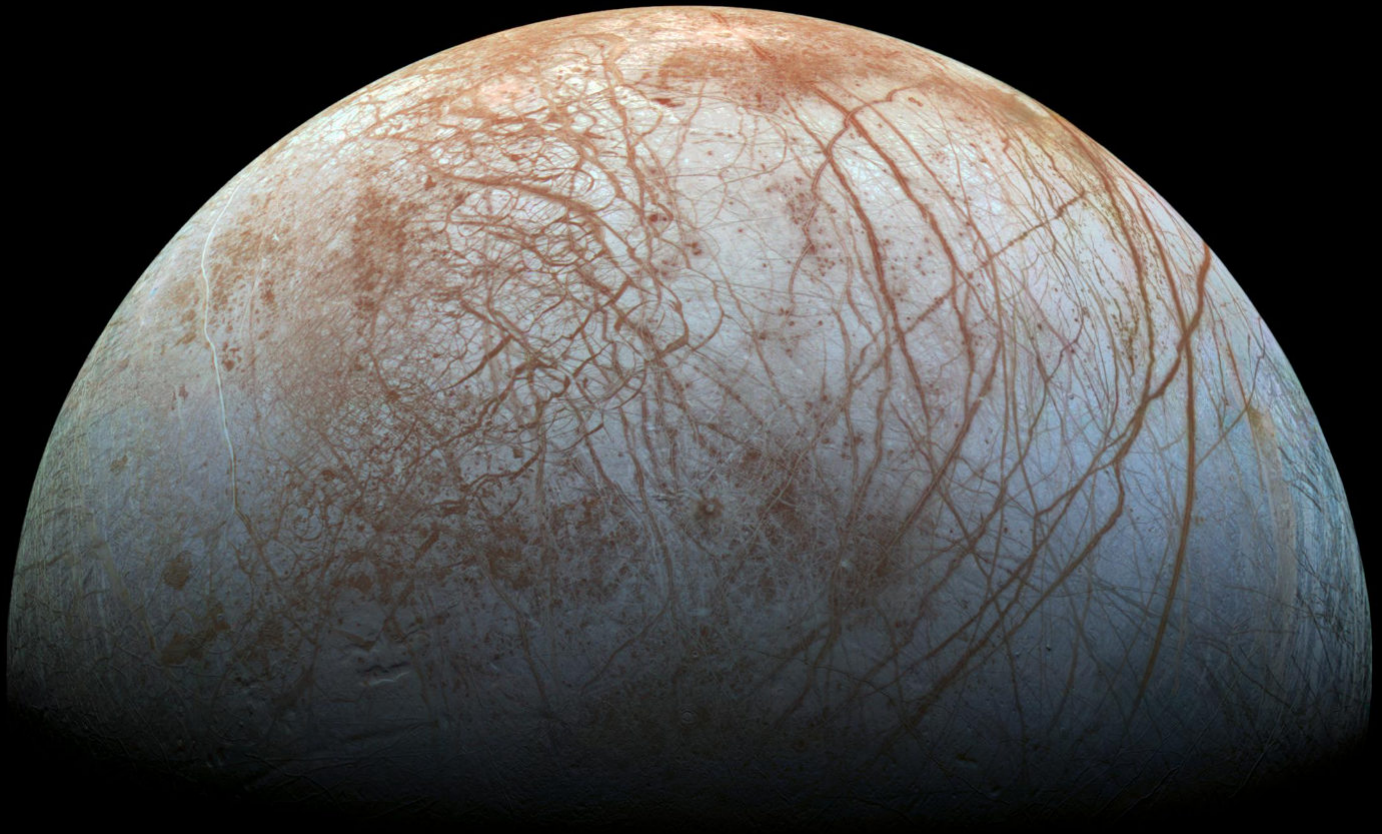


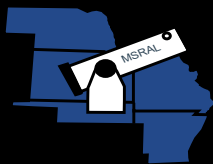
The Prairie Astronomer

November 2020 Volume 61, Issue #11

**November Program:
Planet Nine from Outer Space**



Europa!



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer



NEXT MEETING AND PROGRAM

November 24, 7:30pm: - "Planet Nine from Outer Space" via Zoom

Planet Nine from Outer Space by Dr. Konstantine Batygin, Cal Tech. Intrinsic proof that a large planet exists out beyond the Kuiper Belt.

The Zoom link will be emailed to all club members on November 23rd or 24th.

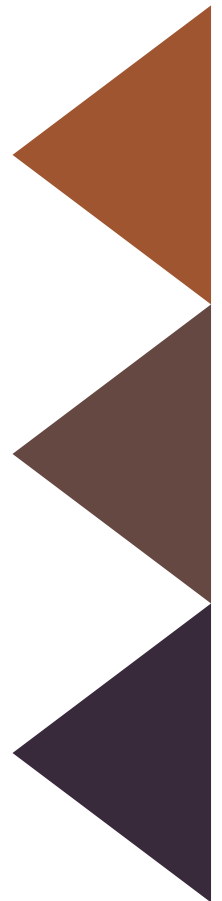
FUTURE PROGRAMS

December - To be announced

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Cover: The puzzling, fascinating surface of Jupiter's icy moon Europa looms large in this newly-reprocessed color view, made from images taken by NASA's Galileo spacecraft in the late 1990s. This is the color view of Europa from Galileo that shows the largest portion of the moon's surface at the highest resolution. Image credit: NASA/JPL-Caltech/SETI Institute.



CALENDAR

Livestream: "[Exploring the Ice Giants](#)" - Towson University.
November 20, 7pm on Youtube.

PAC Meeting
Tuesday, November 24, 2020, 7:30pm

Lincoln (UK) Astronomical Society Meeting
December 1, 2020, 1:30pm CT via Zoom
Program: A Virtual Tour of Hyde Observatory and Branched Oak Observatory. Zoom link will be emailed to PAC members.

PAC Meeting
Tuesday, December 29, 2020, 7:30pm

PAC Meeting
Tuesday, January 26, 2021, 7:30pm

2021 STAR PARTY DATES

	Date	Date
January	8	15
February	5	12
March	5	12
April	2	9
May	7	14
June	4	11
July	2	9
August	Jul 30	6
September	Aug 27	3
October	1	8
November	Oct 29	5
December	Nov 26	3

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

CLUB OFFICERS

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Night Sky Network



www.prairieastronomyclub.org

The President's Message

Bob Kacvinsky



November is a transition month for PAC in many ways. Your new PAC Board begin their terms - although it is the same group as last year so you may not see dramatic changes. Our sky transitions from the Summer triangle constellations to Auriga, Taurus, and Orion begin to take their place in the evening sky. Observers put away their bug dope and dig out the thermal underwear and switch from "dewing up" to "frosting up." As the cold temps move in and snow becomes likely we will transition to our winter star party schedules of moving at least one Star Party each month onto the cement slabs at the Branched Oak Observatory.

Unfortunately COVID continues to prevent our gathering physically for club meetings, so we will

continue with our Zoom schedules. Due to the logistical issues with opening up Zoom meetings to the general public, we will not have our traditional November meeting presentation of "How To Buy a Telescope." That presentation has been recorded for use with social media.

Our November Club Program will be a presentation from Dr. Konstantine Batygin, Cal Tech, entitled "Planet Nine from Outer Space". Dr. Batygin and Dr. Mike Brown at Cal Tech have been working on the science, and mathematics, of the existence of a large planet beyond the Kuiper Belt. Their research provides some great graphics and modeling that provides a compelling argument for a Planet Nine that you will not want to miss.

I want to thank everyone who responded to our survey following last month's meeting presentation. Your feedback is very important. The survey in November, 2019 brought up the idea of having a short update each month of what is "In The News" which has become a part of every meeting program. This year's feedback highlighted a request to have an experienced PAC member give a quick note of a key resource, piece of equipment, or item that has improved their Astronomy experience. Starting in November, we will add a spot on each meeting program to focus on this request. Our goal is to rotate between different Astronomy areas of interest. We appreciate your inputs on this

additions and thanks for the great idea.

We are almost done with November, but December offers some great observing highlights. December 13-14th will be the peak of the Orionid meteor shower. It corresponds to the new moon, with earth entering the denser part of the

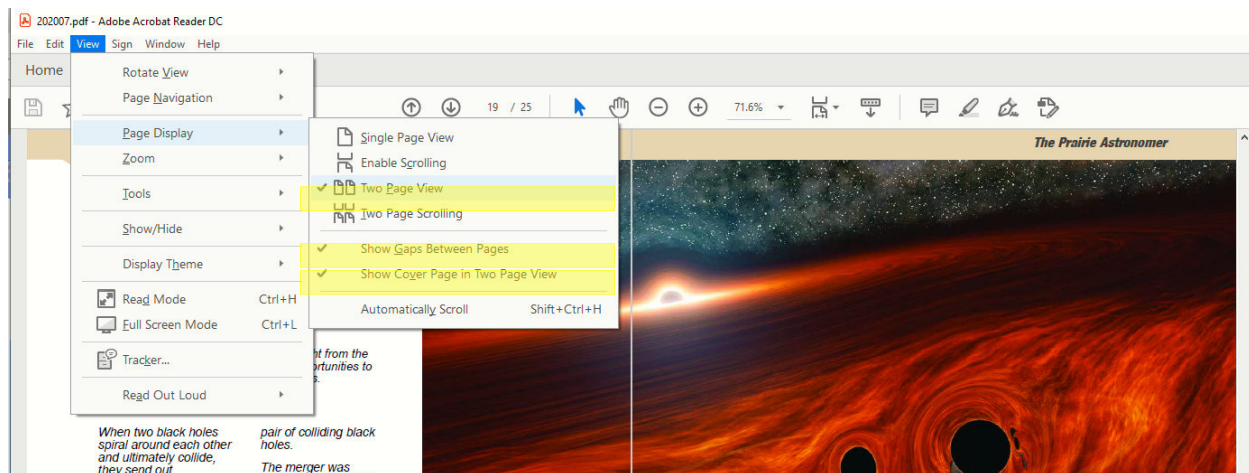
comet tail remnants promising over 120 per hour numbers. Also on December 21st Jupiter and Saturn will be only 7 arch seconds apart forming a very bright “peanut” in the SW skies. What a great opportunity to share your hobby as we gather for the Holidays.

Blessings to all. Stay safe. Remember telescopes allow for great social distancing. Dark clear skies to all.

Bob Kacvinsky
kacvinskyb@yahoo.com
 402-840-0084

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.

Meeting Minutes

Bill Lohrberg

PAC meeting minutes
October 27, 2020 as
recorded by Bill Lohrberg

PAC meeting via Zoom
President Bob Kacvinsky
hosting with 19
participants at time of start
7:32pm. Bob began the
meeting with a welcome
and introduction of the
night's program by Patricia
Craig and her work with
Mars Rover Curiosity.

Announcements

- Bob started with news that the Perseverance rover had reached the halfway point to Mars on schedule to be landing in February
- Hyde remains closed until further notice due to pandemic and safety restrictions in effect.
- PAC star parties scheduled for Nov 6th, 13th at the farm and/or Branched Oak Observatory. Bob will send out a note to notify locations of each date.
- November meeting program would usually be our annual "how to buy a telescope" with

public attendance, however this year will be posted virtually, a 20 minute presentation posted on the PAC web site – no public zoom meeting.

Jim Kvasnicka presented the November observing report verbally (due to technical glitch sharing screen) reminder that his observing reports can be found in the PAC newsletter.

- Evening planets; Jupiter, Saturn, Mars
- Pre-dawn planets: Venus and Mercury (Mercury will be visible all month – a somewhat rare event.
- Messier objects: M27, M57, GC's M30, M56, M71, M72, M73
- NGC objects: 7662 (blue snowball), 128, 253, 288, 457
- Leonids meteor shower peaks November 16 & 17 and no moon to compete with.

John Reinert gave a Treasurers update

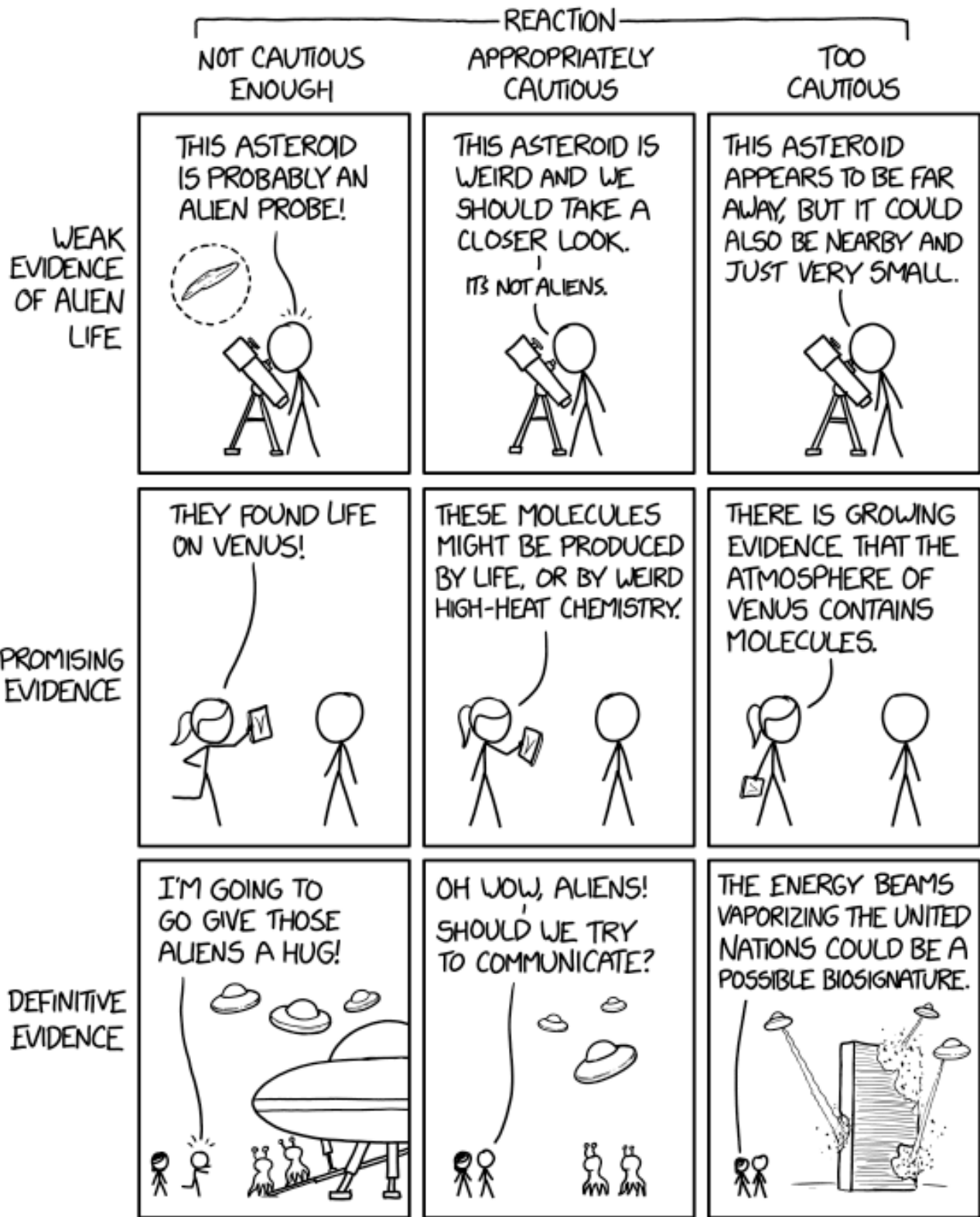
- We're \$100 ahead of last month
- Reminder to renew dues
- All other balances seem to be in line.
- Election of officers was held, no new nominees were named.

Dan Delzell made a motion to close nominations, John Reinert seconded, all in favor.

Jim Kvasnicka moved to elect by consent, Ron Veys seconded, none opposed, all offices were retained as follows:

- President Bob Kacvinsky
- First Vice President Rick Brown
- 2nd Vice President James Quach
- Secretary Bill Lohrberg
- Treasurer John Reinert

With no further business the meeting was adjourned to the program by Patricia Craig "Roving Mars with Curiosity."





Rick Johnson

ARP 24

Arp 24/NGC 3445 is a galaxy Arp put in his one arm spiral category. It also would have fit in his spirals with large, high surface brightness companions. It is located in Ursa Major about 100 million light-years from us. NED classifies it as SAB(s)m, The NGC Project says Sc while Seligman says SBm?. It was discovered by William Herschel on April 8, 1793. Though isn't in either Herschel 400 observing programs. Its companion on the end of its lone arm is PGC 32784 at about the same distance by redshift. It seems connected to Arp 24 by a tidal plume coming from the single arm of Arp 24. Both NED and Seligman classify it as Sm. Seligman give its size as 9,000 light-years making it a dwarf galaxy. Seligman gives the size of Arp 24 as 35,000 light-years.

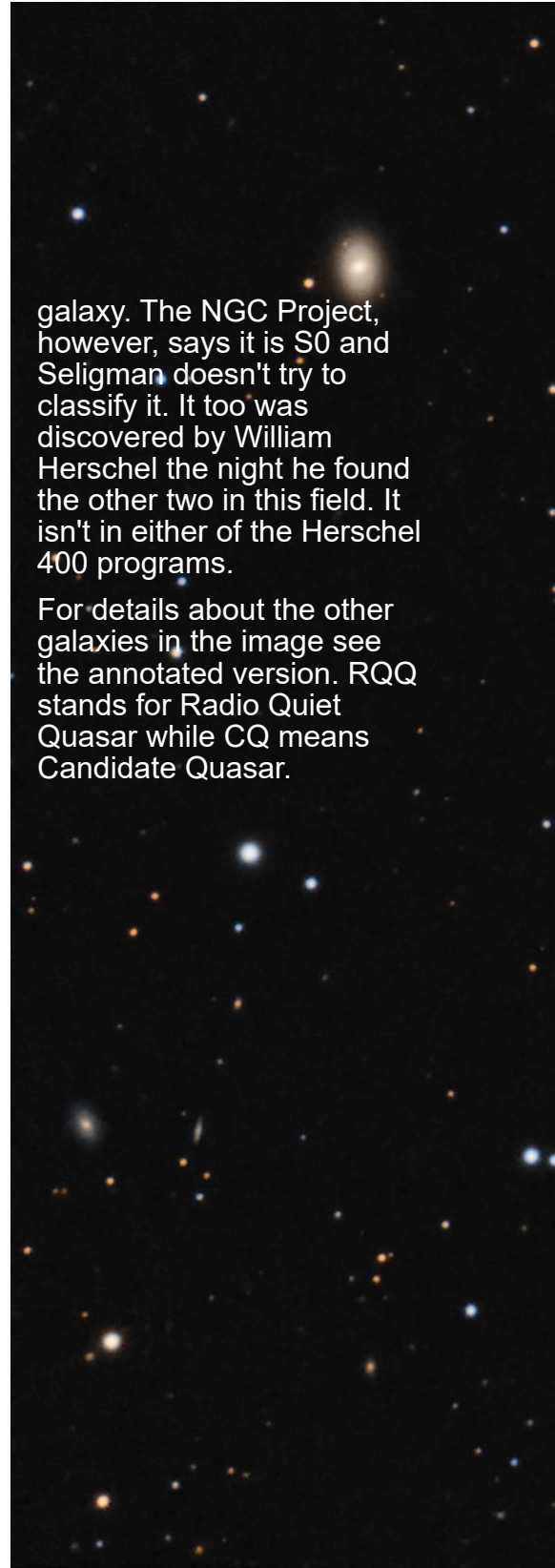
One of the other NGC galaxies in the image is NGC 3440. It is also about 100,000 light-years distant

so part of the same group as NGC 3445 and NGC 3458 discussed below. NGC 3440 appears distorted with its core region off center. NED classifies it as SBb?. The NGC Project agrees but leaves off the question mark. Seligman doesn't attempt to classify it. The galaxy has two blue blobs in the extended northeastern part of the galaxy. The brighter one is listed by NED as a separate galaxy at the same distance while the other is shown as an ultraviolet object with no distance data. If one or both of these are due to something it is digesting that could explain its off-center core. The galaxy was discovered by William Herschel on the same night he found what was to become Arp 24.

The third NGC galaxy in the image is NGC 3458. NED classifies it as SAB: I do see a very short bar in an otherwise mostly featureless blob of a

galaxy. The NGC Project, however, says it is S0 and Seligman doesn't try to classify it. It too was discovered by William Herschel the night he found the other two in this field. It isn't in either of the Herschel 400 programs.

For details about the other galaxies in the image see the annotated version. RQQ stands for Radio Quiet Quasar while CQ means Candidate Quasar.



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.



December Observing

Jim Kvasnicka



This is a partial list of objects visible for the upcoming month.

Planets

Jupiter and Saturn: The two begin the month about 2° apart and are within 1° of each other from December 12 – 29. The highlight is on December 21st when the two gas giants are just 6' apart. The last time they were this close was in 1226!

Mars: Decreases in brightness from -1.1 to -0.3 magnitude with a disk 10.5" across.

Neptune and Uranus: Neptune in Aquarius at magnitude 7.9, Uranus in Aries at 5.7.

Venus: Rises 2 hours before the Sun at magnitude -3.9.

Mercury: Just visible early in December, it is at superior conjunction on December 20th.

Meteor Showers

Geminids: Peaks the night of December 13-14 with no Moon to interfere.

Messier List

M2: Class II globular cluster in Aquarius.

M15: Class IV globular cluster in Pegasus.

M29: Open cluster in Cygnus.

M31: The Andromeda Galaxy.

M32/M110: Companion galaxies to M31.

M39: Open cluster in Cygnus.

Last Month: M27, M30, M56, M57, M71, M72, M73

Next Month: M33, M34, M52, M74, M76, M77, M103

NGC and other Deep Sky Objects

NGC 246: Planetary nebula in Cetus.

NGC 247: Elongated galaxy in Cetus.

NGC 869/884: The Double Cluster in Perseus.

NGC 972: Galaxy in Aries.

NGC 1365: Galaxy in Fornax.

Double Star Program List

Eta Cassiopeiae: Yellow primary with a rose colored secondary.

Sigma Cassiopeiae: Yellow and light blue stars.

Theta Aurigae: Bright white and pale blue pair.

1 Camelopardalis: White and pale blue stars.

32 Camelopardalis: Equal white pair.

Gamma Ceti: White primary with a pale yellow secondary.

Chi Tauri: White primary with a pale blue secondary.

118 Tauri: White and yellow stars.

Challenge Object

Arp 318 Galaxy Group: Galaxies in Cetus that includes NGC 833, NGC 835, NGC 838, and NGC 839.

Focus on Observing

Multiple Star Observing Program

Jim Kvasnicka

The purpose of the Multiple Star Observing Program is to introduce observers to 114 of the finest multiple star systems. This program is to be conducted after completing the Double Star Observing Program. The multiple star systems in this program include three or more stars.

Requirements for the program include completing the Double Star Observing Program prior to submitting for the Multiple Star Observing Program. The observer must observe 100 multiple stars from the list of 114. The list can be downloaded from the Astronomical League web

site. The objects can be sketched or imaged. The majority of objects can be observed with a small telescope but a few require a telescope of 4 inches or larger.

Some of the multiples are very close and require high magnification to separate the stars. If you can't separate the stars make a note on your observing log.

You can use your own observing logs to record your observations or download observing logs from the Double Star program. Your observations should include: object name, date and time, power, seeing, telescope used, filters

used, latitude and longitude, and your observing notes that include a drawing or image of the multiple system. Sketches of the multiple systems must show north and either east or west. The depiction of the primary star should be clear.

Once you complete the Multiple Star Observing Program you will need to submit your observing logs to me for review. I will contact the Multiple Star Observing Program chair for approval. Once I receive your certificate and pin I will present them to you at the next PAC meeting.

Potential Plumes on Europa Could Come From Water in the Crust

Scientists have theorized on the origin of the water plumes possibly erupting from Jupiter's moon Europa. Recent research adds a new potential source to the mix.

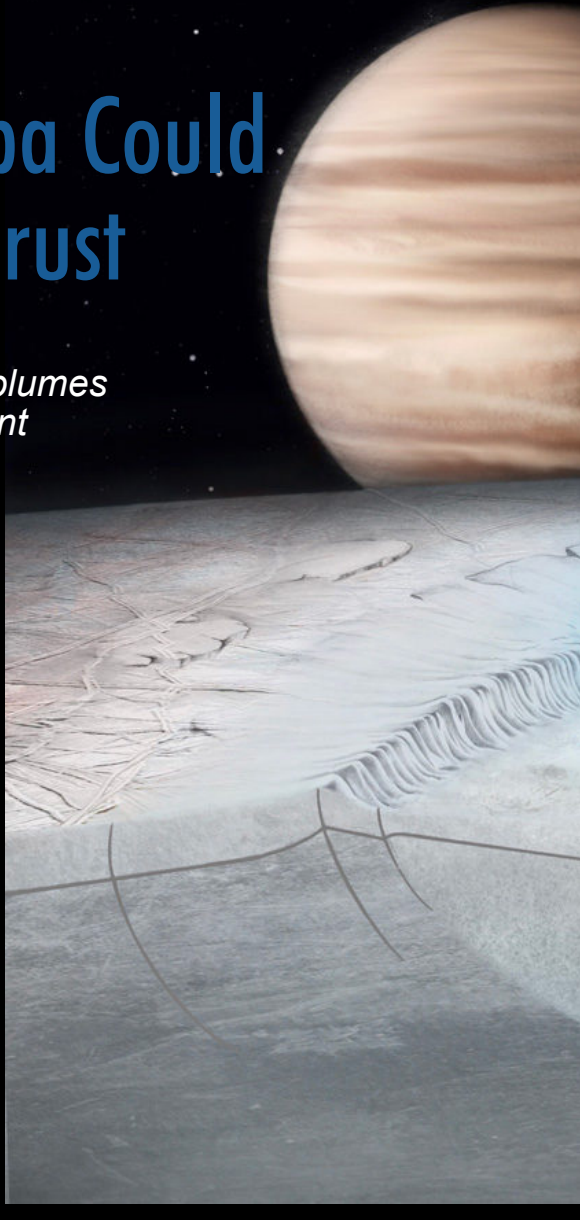
Plumes of water vapor that may be venting into space from Jupiter's moon Europa could come from within the icy crust itself, according to new research. A model outlines a process for brine, or salt-enriched water, moving around within the moon's shell and eventually forming pockets of water - even more concentrated with salt - that could erupt.

Europa scientists have considered the possible plumes on Europa a promising way to investigate the habitability of Jupiter's icy moon, especially since they offer the opportunity to be directly sampled by spacecraft flying through them. The insights into the activity and composition of the ice shell covering Europa's global, interior ocean can help determine if the ocean contains the ingredients needed to support life.

This new work that offers

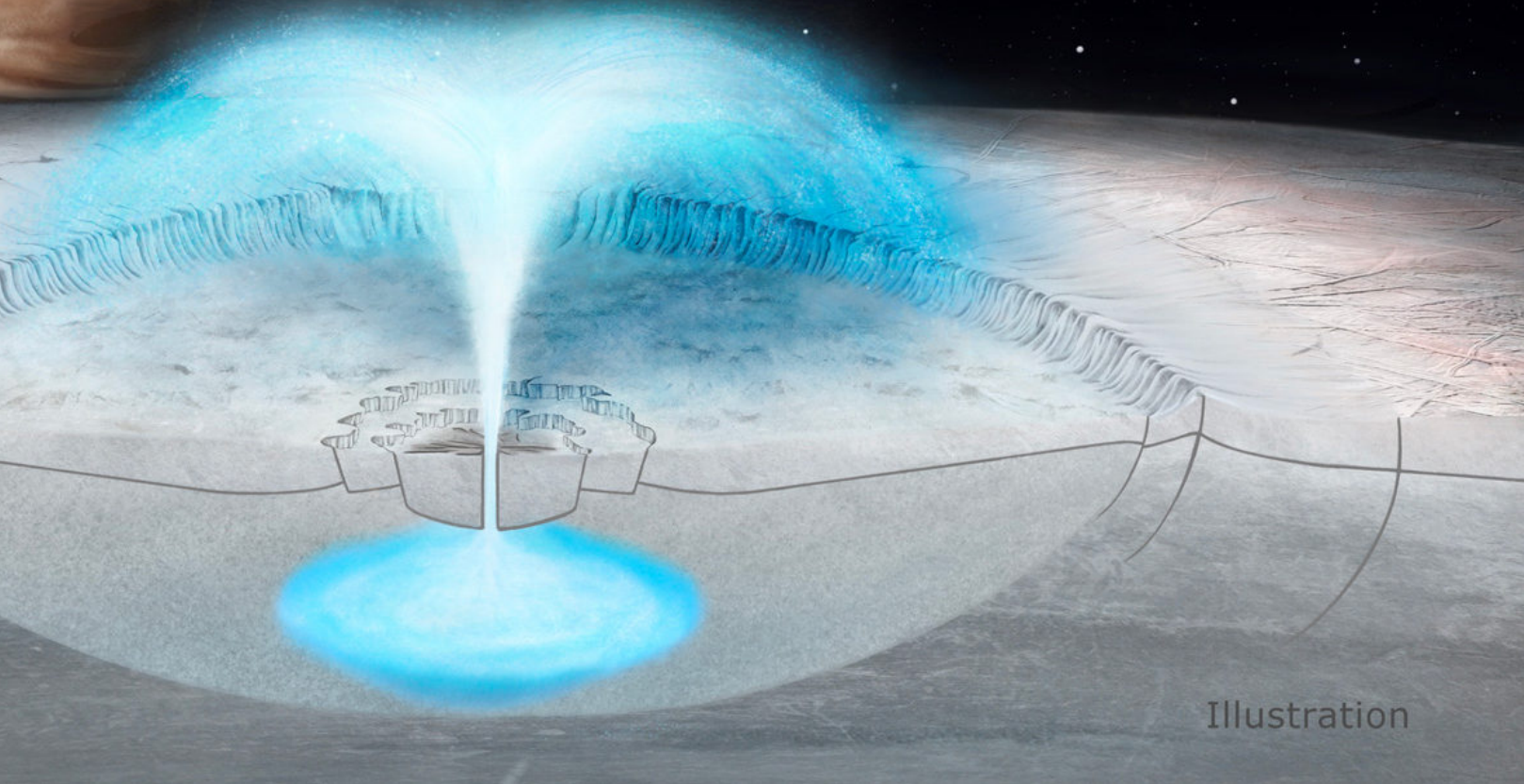
an additional scenario for some plumes proposes that they may originate from pockets of water embedded in the icy shell rather than water forced upward from the ocean below. The source of the plumes is important: Water originating from the icy crust is considered less hospitable to life than the global interior ocean because it likely lacks the energy that is a necessary ingredient for life. In Europa's ocean, that energy could come from hydrothermal vents on the sea floor.

"Understanding where these water plumes are coming from is very important for knowing whether future Europa explorers could have a chance to actually detect life from space without probing Europa's ocean," said lead author Gregor Steinbrügge, a postdoctoral researcher at Stanford's School of Earth, Energy & Environmental Sciences.



Using images collected by NASA's Galileo spacecraft, the researchers developed a model to propose how a combination of freezing and pressurization could lead to a cryovolcanic eruption, or a burst of frigid water. The results, published Nov. 10 in *Geophysical Research Letters*, may shed light on eruptions on other icy bodies in the solar system.

This illustration of Jupiter's icy moon Europa depicts a cryovolcanic eruption in which brine from within the icy shell could blast into space. A new model proposing this process may also shed light on plumes on other icy bodies. Image credit: Justice Wainwright



Illustration

The researchers focused their analyses on Manannán, an 18-mile-wide (29-kilometer-wide) crater on Europa that resulted from an impact with another celestial object tens of millions of years ago. Reasoning that such a collision would have generated tremendous heat, they modeled how the melted ice and subsequent freezing of the water pocket within the icy shell could have pressurized it and

caused the water to erupt.

"The comet or asteroid hitting the ice shell was basically a big experiment which we're using to construct hypotheses to test," said co-author Don Blankenship, senior research scientist at the University of Texas Institute for Geophysics (UTIG) and principal investigator of the radar instrument, REASON (Radar for Europa Assessment and Sounding: Ocean to Near-surface), that

will fly aboard NASA's upcoming Europa Clipper spacecraft. "Our model makes specific predictions we can test using data from the radar and other instruments on Europa Clipper."

The model indicates that as Europa's water partially froze into ice following the impact, leftover pockets of water could have been created in the moon's surface. These salty water pockets can move sideways

Europa, continued.

through Europa's ice shell by melting adjacent regions of ice and consequently become even saltier in the process.

A Salty Driving Force

The model proposes that when a migrating brine pocket reached the center of Manannán Crater, it became stuck and began freezing, generating pressure that eventually resulted in a plume, estimated to have been over a mile high (1.6 kilometers). The eruption of this plume left a distinguishing mark: a spider-shaped feature on Europa's surface that was observed by Galileo imaging and incorporated into the researchers' model.

"Even though plumes generated by brine pocket migration would not provide direct insight into Europa's ocean, our findings suggest that Europa's ice shell itself is very dynamic," said co-lead author Joana Voigt, a graduate research assistant at the University of Arizona, in Tucson.

The relatively small size of the plume that would form at Manannán indicates that impact craters probably can't explain the source of other, larger plumes on Europa that have been hypothesized based on data from Galileo and NASA's Hubble Space Telescope, researchers said. But the process modeled for the Manannán eruption could happen on other icy bodies - even without an impact event.

"The work is exciting, because it supports the growing body of research showing there could be multiple kinds of plumes on Europa," said Robert Pappalardo of NASA's Jet Propulsion Laboratory in Southern California and project scientist of the Europa Clipper mission. "Understanding plumes and their possible sources strongly contributes to Europa Clipper's goal to investigate Europa's habitability."

Missions such as Europa Clipper help 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.

More information about Europa and Europa Clipper can be found here:

europa.nasa.gov

What's Up: November

NASA/JPL

What are some skywatching highlights in November 2020? Cool autumn evenings are a great time to look for the Pleiades star cluster. You'll also have a couple of great opportunities to observe the Moon with Jupiter and Saturn. Plus, check out the phenomenon known as Earthshine.

What's Up for November? Seeking out the Pleiades, the Moon with Jupiter and Saturn, and understanding Earthshine.

Evenings in November are a good time to start looking for the Pleiades. This bright cluster of stars is a well-known sight to most stargazers, and is best enjoyed in the cooler fall and winter months in the Northern Hemisphere.

The Pleiades is what's known as an open star cluster - it's a loosely bound grouping of a couple thousand stars that formed together and are slowly drifting apart over time. A handful of the brightest stars in the cluster are visible with the unaided eye, and with binoculars or a telescope, you can see hundreds.

Astronomers estimate the age of the cluster is only about 100 million years. It's located a bit more than 400 light years away. The

brightest stars in the Pleiades are many times brighter than our own star, the Sun. In fact, if you were to visit the Pleiades and look homeward, you wouldn't even be able to see the Sun without a small telescope.

On cool November evenings, look for the Pleiades in the east in the couple of hours after dark. The cluster rises to its highest point around midnight. You can also enjoy an early morning view of the Pleiades near the Moon, before dawn on November 2nd.

On November 18th and 19th, enjoy a lovely crescent moon near Jupiter and Saturn after sunset. The two planets have been brilliant highlights of the night sky for much of this year, and are now getting closer together in advance of their super close pairing in mid-December. More about that next month, but for now, be sure to watch as they draw a little nearer to each other each week.

You may have marveled at how brightly a full moon can light up a nighttime landscape, but have you noticed how Earth can illuminate the night side of the Moon? This eerily beautiful glow is called Earthshine. It's sunlight that's been reflected off of

Earth, then bounced off the Moon and back to our eyes.

Earthshine is easiest to observe in the few days before and after the new moon, when the part of the Moon that's directly lit by the Sun appears as a slim crescent. This is partly because there's less of the bright, sunlit surface to compete with the dimmer Earthshine-lit portion, and partly because the phases of Earth and the Moon are complimentary: when the Moon is a slim crescent in our sky, Earth seen from the Moon looks nearly full.

Occasionally, NASA spacecraft use this phenomenon to make the night side of other planets and moons visible - for example Saturnshine on Saturn's moons and ringshine lighting up Saturn itself, as seen by NASA's Cassini spacecraft.

The best times to observe Earthshine in November are on the 17th through the 20th, following sunset, and before dawn on the 9th through the 12th. And for an added treat, on the 12th, the Moon, illuminated by both sunshine and Earthshine, will appear just above the "Morning Star," Venus.

[WATCH THE VIDEO](#)

Europa Glows: Radiation Does a Bright Number on Jupiter's Moon

New lab experiments re-create the environment of Europa and find that the icy moon shines, even on its nightside. The effect is more than just a cool visual.

As the icy, ocean-filled moon Europa orbits Jupiter, it withstands a relentless pummeling of radiation. Jupiter zaps Europa's surface night and day with electrons and other particles, bathing it in high-energy radiation. But as these particles pound the moon's surface, they may also be doing something otherworldly: making Europa glow in the dark.

New research from scientists at NASA's Jet Propulsion Laboratory in Southern California details for the first time what the glow would look like, and what it could reveal about the composition of ice on Europa's surface. Different salty compounds react differently to the radiation and emit their own unique glimmer. To the naked eye, this glow would look sometimes slightly green,

sometimes slightly blue or white and with varying degrees of brightness, depending on what material it is.

Scientists use a spectrometer to separate the light into wavelengths and connect the distinct "signatures," or spectra, to different compositions of ice. Most observations using a spectrometer on a moon like Europa are taken using reflected sunlight on the moon's dayside, but these new results illuminate what Europa would look like in the dark.

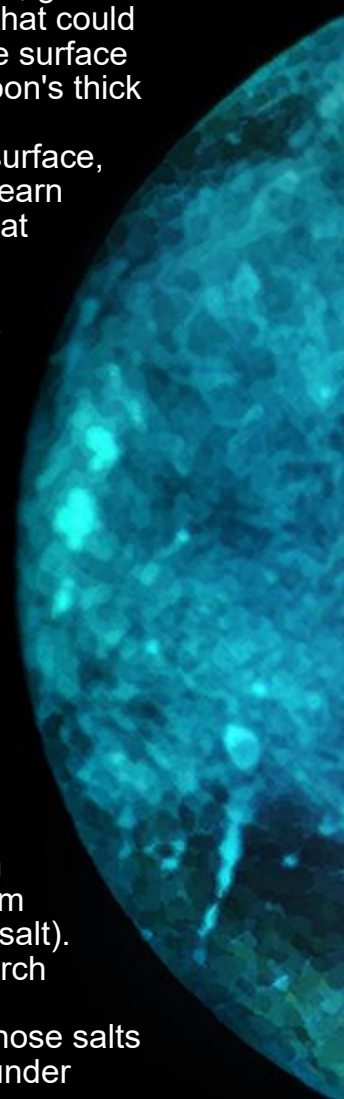
"We were able to predict that this nightside ice glow could provide additional information on Europa's surface composition. How that composition varies could give us clues about whether Europa harbors conditions suitable for life," said JPL's Murthy Gudipati, lead author of the work published Nov.

9 in *Nature Astronomy*.

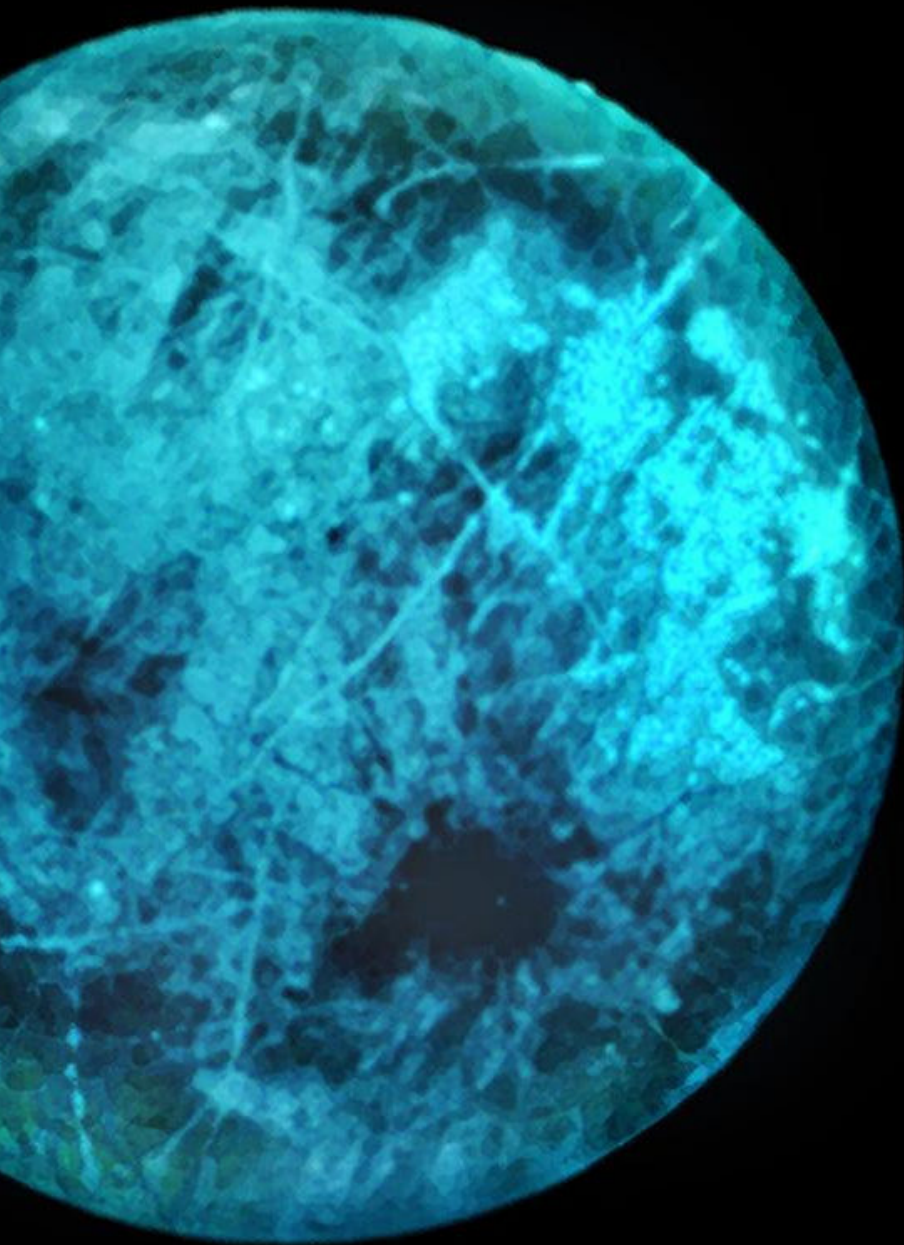
That's because Europa holds a massive, global interior ocean that could percolate to the surface through the moon's thick crust of ice. By analyzing the surface, scientists can learn more about what lies beneath.

Shining a Light

Scientists have inferred from prior observations that Europa's surface could be made of a mix of ice and commonly known salts on Earth, such as magnesium sulfate (Epsom salt) and sodium chloride (table salt). The new research shows that incorporating those salts into water ice under



*This illustration of Jupiter's moon Europa shows how the icy surface may glow on its nightside, the side facing away from the Sun. New lab experiments re-created the environment of Europa and find that the icy moon shines, even on its nightside, due to an ice glow. As Jupiter bombards Europa with radiation, the electrons penetrate the surface, energizing the molecules underneath. When those molecules relax, they release energy as visible light. Variations in the glow and the color of the glow itself could reveal information about the composition of ice on Europa's surface. Different salty compounds react differently to the radiation and emit their own unique glimmer. Color will vary based on the real composition of Europa's surface.
Image credit: NASA/JPL-Caltech*



Europa-like conditions and blasting it with radiation produces a glow.

That much was not a surprise. It's easy to imagine an irradiated surface glowing. Scientists know the shine is caused by energetic electrons penetrating the surface, energizing the molecules underneath. When those molecules relax, they release energy as visible light.

"But we never imagined that we would see what we ended up seeing," said JPL's Bryana Henderson, who co-authored the research. "When we tried new ice compositions, the glow looked different. And we all just stared at it for a while and then said, 'This is new, right? This is definitely a different glow?' So we pointed a spectrometer at it, and each type of ice had a different spectrum."

To study a laboratory mockup of Europa's surface, the JPL team built a unique instrument called

Artist's Illustration

Europa, continued.

Ice Chamber for Europa's High-Energy Electron and Radiation Environment Testing (ICE-HEART). They took ICE-HEART to a high-energy electron beam facility in Gaithersburg, Maryland, and started the experiments with an entirely different study in mind: to see how organic material under Europa ice would react to blasts of radiation.

They didn't expect to see variations in the glow itself tied to different ice compositions. It was - as the authors called it - serendipity.

"Seeing the sodium chloride brine with a significantly lower level of glow was the 'aha' moment that changed the course of the research," said Fred Bateman, co-author of the paper. He helped conduct the experiment and delivered radiation beams to the ice samples at the Medical Industrial Radiation Facility at the National Institute of Standards and Technology in Maryland.

A moon that's visible in a dark sky may not seem unusual; we see our own Moon because it reflects sunlight. But Europa's glow is caused by an

entirely different mechanism, the scientists said. Imagine a moon that glows continuously, even on its nightside - the side facing away from the Sun.

"If Europa weren't under this radiation, it would look the way our moon looks to us - dark on the shadowed side," Gudipati said. "But because it's bombarded by the radiation from Jupiter, it glows in the dark."

Set to launch in the mid-2020s, NASA's upcoming flagship mission Europa Clipper will observe the moon's surface in multiple flybys while orbiting Jupiter. Mission scientists are reviewing the authors' findings to evaluate if a glow would be detectable by the spacecraft's science instruments. It's possible that information gathered by the spacecraft could be matched with the measurements in the new research to identify the salty components on the moon's surface or narrow down what they might be.

"It's not often that you're in a lab and say, 'We might find this when we get there,'" Gudipati said. "Usually it's the other way around - you go there and find something and try to

explain it in the lab. But our prediction goes back to a simple observation, and that's what science is about."

Missions such as Europa Clipper help 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.

More information about Europa and Europa Clipper can be found here:

europa.nasa.gov

Sirenum Fossae

The linear depressions in this VIS image are part of Sirenum Fossae. These depressions are called graben, which form by the down drop of material between two parallel faults. The faults are caused by tectonic stresses in the region. The Sirenum Fossae graben are 2735km (1700 miles) long.

Orbit Number: 83249 Latitude: -27.3935 Longitude: 217.279 Instrument: VIS Captured: 2020-09-20 00:46

Please see the THEMIS Data Citation Note for details on crediting THEMIS images.

NASA's Jet Propulsion Laboratory manages the 2001 Mars Odyssey mission for NASA's Science Mission Directorate, Washington, D.C. The Thermal Emission Imaging System (THEMIS) was developed by Arizona State University, Tempe, in collaboration with Raytheon Santa Barbara Remote Sensing. The THEMIS investigation is led by Dr. Philip Christensen at Arizona State University. Lockheed Martin Astronautics, Denver, is the prime contractor for the Odyssey project, and developed and built the orbiter. Mission operations are conducted jointly from Lockheed Martin and from JPL, a division of the California Institute of Technology in Pasadena.

Image credit: NASA/JPL-Caltech/ASU



From the Archives

November, 1982

Star clusters and galaxies tend to dominate the late Autumn sky. Look about one degree south and a bit west of 12 Persei for NGC 1023, a faint galaxy that should be an easy target for a six inch. In a ten inch, it looks a bit like M31 in binoculars. Nearby (2 1/2 degrees north of 12 Persei) is a nice cluster M34. It looks a bit like M7, except that the stars are somewhat fainter than those of M7.

A much more difficult target is the faint edge on galaxy NGC 891, located three degrees east of Gamma Andromedae. It is a very faint streak of light in a six inch. It begins to show considerable detail in a ten inch including a long irregular dark lane.

Perhaps the second most difficult Messier object is M74, the face on spiral galaxy is located 1 1/3 degree east and 112 degrees north of eta Piscium. The nucleus is rather small and fairly bright. It is visible in a 2.4 inch refractor, but it looks like a fuzzy star and is frequently missed in small telescopes because of its stellar appearance. The outer portion of the galaxy shows up as a small circular haze surrounding the nucleus in my eight inch and I have never seen any other detail (even in a 12 inch).

A somewhat easier Messier galaxy is M77, located about a degree east-southeast of delta Ceti. It again has a bright almost stellar nucleus with an elliptical area of haze surrounding the core. Larger telescopes (10 inches or larger) will show a small dark arc in the hazy outer area of the galaxy.

There are a few other galaxies in the area, but they are somewhat fainter than M77. NGC 1987 is a degree southeast of M77 and shows as an elongated patch with another galaxy appearing just north of NGC 1087.

As a final target, try the small planetary NGC 1535 located 4 1/2 degrees east of gamma Eridani. My eight inch shows it as a bluish green spot of light with a slightly darker center and a very faint central star. And PLEASE come to the Star Parties we have at Hickman. I hate observing alone!

David Knisely

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

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