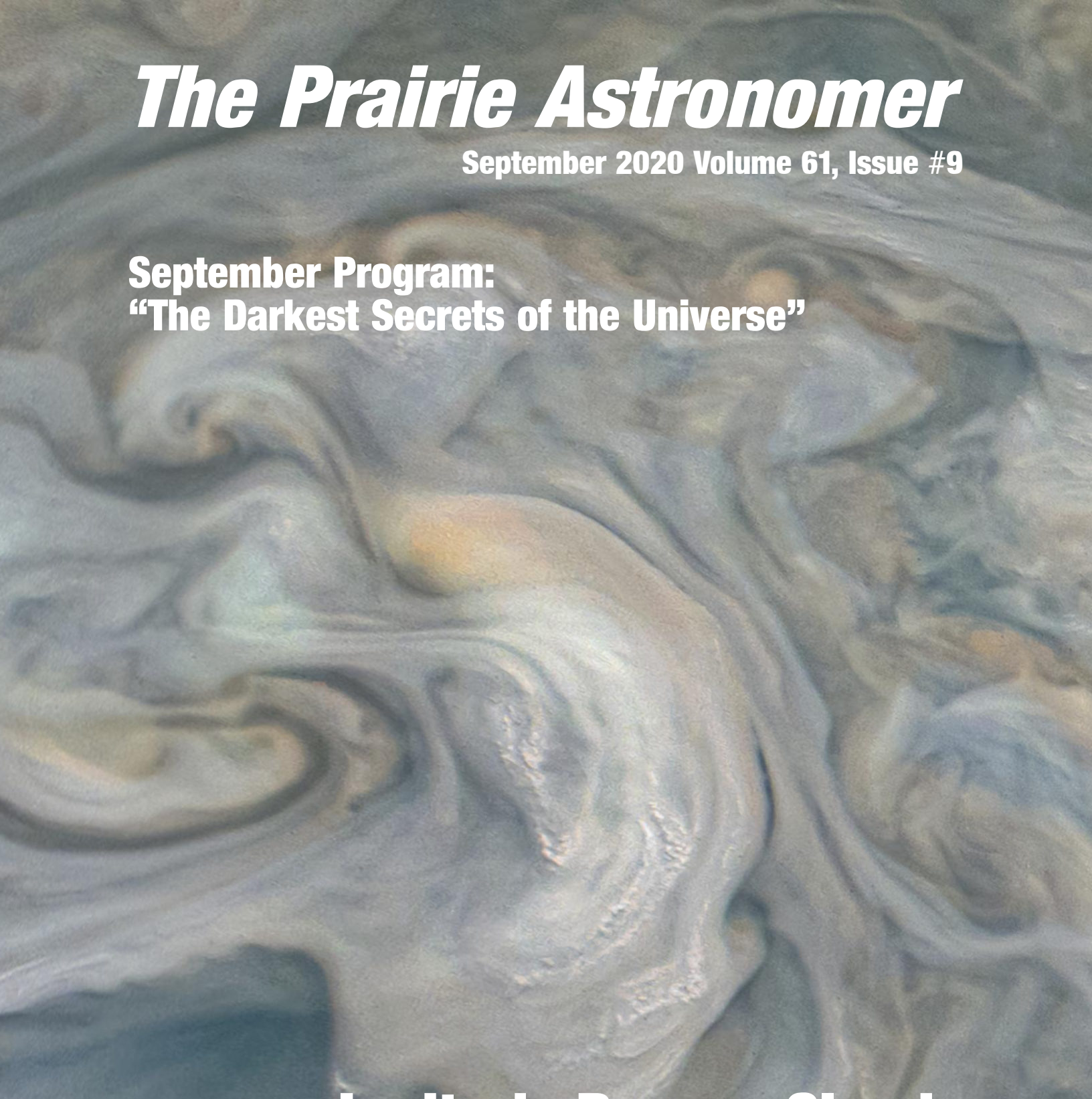
The Prairie Astronomer

September 2020 Volume 61, Issue #9

September Program:
"The Darkest Secrets of the Universe"



Jupiter's Pop-up Clouds

JunoCam reveals a complex topology in the cloudtops

The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

NEXT MEETING AND PROGRAM

September 29, 7:30pm, "The Darkest Secrets of the Universe"

From dark matter to galaxy cannibalism, black holes, time machines, gravitational waves, Schrödinger's cat, theory of inflation, and the Big Bang, Dr. Guhathakurta will weave these cosmic secrets into the story about the origin of the Periodic Table of elements and how complex life on Earth developed.

He'll present the birth and evolution of galaxies, starting from early ripples in the fabric of spacetime caused by the tiniest quantum mechanical fluctuations and their subsequent amplification by gravity, as well as the modern observational techniques that astronomers around the world are using to study the mysteries of the universe around us.

Dr. Raja Guhathakurta is Co-Chair, Professor, and Astronomer
Department of Astronomy and Astrophysics, University of California Santa Cruz.

FUTURE PROGRAMS

October - Club Viewing Night
November - How to Buy a Telescope
December - Holiday Gathering for club members

CONTENTS

Cover: Jupiter's Pop-up Clouds. This detailed, color-enhanced JunoCam image by NASA's Juno spacecraft reveals a complex topography in the cloud tops of Jupiter's northern mid-latitude region. More information about Juno is at http://www.nasa.gov/juno and http://missionjuno.swri.edu.

CALENDAR

PAC Meeting
Tuesday, September 29, 2020, 7:30pm via Zoom
"The Darkest Secrets of the Universe"
Nominations for Club Officers

PAC Meeting
Tuesday, October 27, 2020, 7:30pm
Election of Club Officers

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

IMPORTANT: ELECTION OF CLUB OFFICERS

Election of Club Officers will occur at the October meeting. If you're interested in running for office, please review the offices and duties article on page 23.

2020 STAR PARTY DATES

	Date	Date
January	17	**24**
February	14	**21**
March	13	**20**
April	17	**24**
May	15	**22**
June	12	**19**
July	10	**17**
August	14	**21**
September	11	**18**
October	9	**16**
November	6	**13**
December	**11**	27

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

CLUB OFFICERS

President	Bob Kacvinsky kacvinskyb@yahoo.com
Vice President	Rick Brown rickbrown2000@gmail.com
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Outreach Coordinator	Mike Kearns mkearns@neb.rr.com
Website and Newsletter Editor	Mark Dahmke mark@dahmke.com

amazonsmile

Shop through Amazon Smile to automatically donate to PAC: smile.amazon.com/ch/47-6044523

Night Sky Network

www.prairieastronomyclub.org

The President's Message

Bob Kacvinsky

Our PAC fall started out opposite to the BIG Football. We started out planning for 2 public outreach events. Coordinated with our partners around protocols, safety guidelines, sanitation, and dates and lined up initial members who would be willing to participate. As the first event in Nebraska City came closer, we began losing member interest and our partners became concerned about their risks and liabilities. When people view through the telescopes there are natural touch points that can't be avoided. At the end, we are presently not doing any public star party events.

We WILL continue to host PAC Star Parties for members. Since June we have successfully held four star parties (clear nights) and one Solar Party with excellent safety and sanitation controls in place. I want to especially thank Dave Churilla coordinating and presenting, Dave Knisely for helping, and Jim Kvasnicka for hosting our August Solar Star Party meeting event. We had almost 30 members and families attend the program with nine telescopes set up for viewing including three H alpha and the rest white filtered. Please check the newsletter for upcoming PAC Star Party dates and locations.

Our program for our September 29th PAC Meeting is a replay of a recent (late July) presentation by Dr. Raja Guhathakurta, Co-Chair of Astronomy Department at University of California - Santa Cruz titled "The Darkest Secrets of the Universe." His program is part of an ongoing series from the Keck Observatory series of cosmic videos. Dr. Guhathakurta is one of the top researchers on the study of dark matter and its importance in galactic development and stability. He has logged years of work using the Hubble Telescope, Keck Observatory, along with collaborations around the globe. He also is a very entertaining speaker that I found very easy to understand. I hope you can plan to attend at 7:30 PM September 29th. I will send an invite to all members via the Nightsky Network the week before.

We originally had hoped to present an update on the Artemis Earth to Moon to Mars project but too much of the materials are still under strict release controls. I hope some of you were able to join the webinar link I sent out on the Dynetics Decent Ascent Lander that will be the principle vehicle to bring humans down to the surface of the moon, act as a habitat and work station, and then return back to orbit. During the

webinar they presented the plans and 10 year timetable for the Artemis development of human presence on and around the moon, setting up permanent labs, development of fuel regeneration from the moon resources, and eventually using the base for refueling and supplying human visits to Mars. I will be working with my daughter to identify what portions of the program we can share at an upcoming meeting. The next 20 years are going to be very exciting for human space exploration.

As always, if you have any feedback, suggestions, ideas, or questions please contact one of our Board members or drop me a note. PAC is YOUR organization and we need your inputs to fulfill the needs of our members.

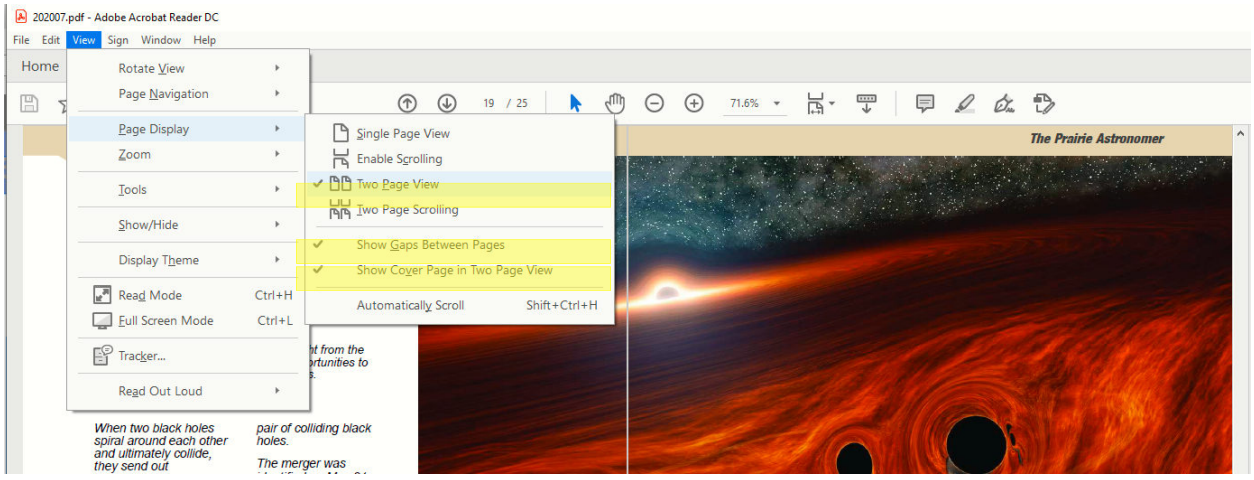
Dark, Clear, and Safe Skies,
Bob Kacvinsky
PAC-President

kacvinskyb@yahoo.com

402-840-0084

New Newsletter Format

How to Adjust Adobe Acrobat Settings for Two Page View

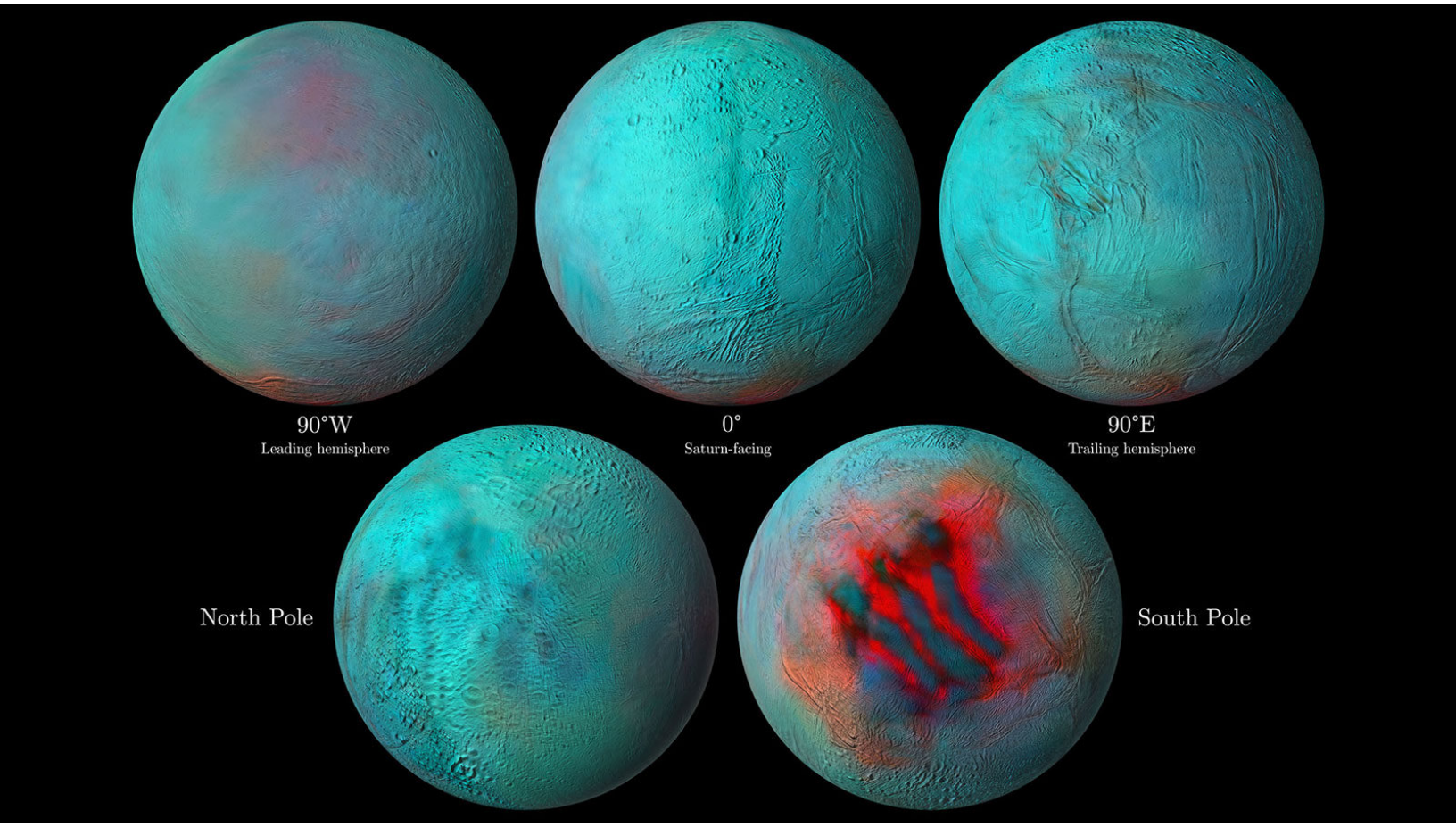


*To view this newsletter in magazine spread format in Acrobat, select **View ->Page Display->Two Page View**. Acrobat will then show two pages side by side. Also make sure the checkboxes "Show Cover Page in Two Page View" and "Show Gaps Between Pages" are checked.*

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.

Infrared Eyes on Enceladus:

Hints of Fresh Ice in Northern Hemisphere



Scientists used data gathered by NASA's Cassini spacecraft during 13 years of exploring the Saturn system to make detailed images of the icy moon - and to reveal geologic activity.

New composite images made from NASA's Cassini spacecraft are the most detailed global infrared views ever produced of Saturn's moon Enceladus. And data used to build those images provides strong evidence that the northern hemisphere of the moon has been resurfaced with ice from its interior.

Cassini's Visible and Infrared Mapping Spectrometer (VIMS) collected light reflected off Saturn, its rings and its ten major icy moons - light that is visible to humans as well as infrared light. VIMS then separated the light into its various wavelengths, information that tells scientists more about the makeup of the material reflecting it.

READ MORE HERE

Astrophotos

Mark Dahmke

Moon and International Space Station, September 7, 7:59am.

Panasonic Lumix G9 with Astro-Tech 6" RC, 2X barlow. Recorded as video, 4K at 30 frames per second, ISO 1600 with frame exposure set to 1/500 second.

xkcd.com

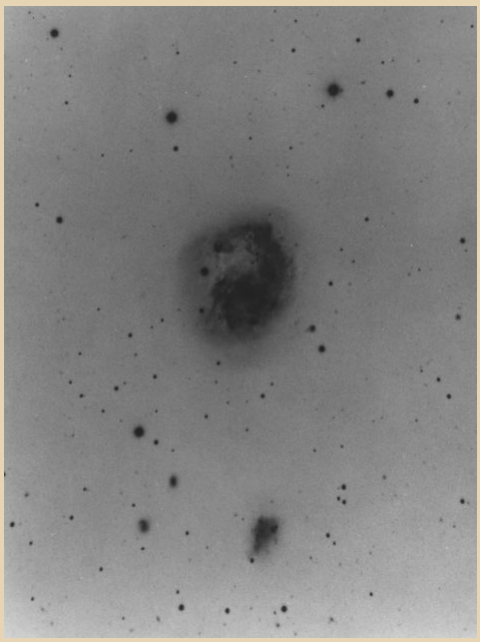
ARP 22

Rick Johnson

Arp 22/NGC 4027 is located in Corvus at a distance of 60 to 93 million light-years. It seems every place I look I get a different distance. Back to that in a bit. Arp put it in his category for one-armed spiral galaxies. One of his smallest categories with only 3 entries. His 3 armed spiral category also has 3 entries.

Actually, it has a second arm. It's short but there. So what caused the huge difference? Most now think it is the result of a merger. I found some papers saying there were some oddities in its rotational velocities though they didn't link this to a merger, just described the oddity. While possible I'm not convinced. It is part of a very famous group. The NGC 4038 group. NGC 4038-9 is better known as Arp 244 -- the Antennae Galaxies. These are in the process of merging and only about 40 minutes of

ARP's Image



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.

The Mantrap Skies Image Catalog, Continued.

arc away. Has this influenced the merger concept here?

Arp 22 actually consists of two galaxies NGC 4027 and the triangular blue dwarf NGC 4027A about 4 minutes to the south. I did find papers showing that these two are interacting. NGC 4027 has drawn a lot of HI from the dwarf into a ring about itself that is severely warped. This likely indicates the two were much closer in the past and NGC 4027 could have cannibalized more than HI stealing much of the star mass of NGC 4027A. To me, the interaction is more likely the cause of the huge arm as well as rotation issues. For more on this interaction see:

http://adsabs.harvard.edu/full/1992ApJ...400..516P

It was discovered by William Herschel on February 7, 1785 and is in the original Herschel 400 observing program. My notes from April 16, 1985 on a humid night with fair transparency using my 10" f/5 at 50x reads: "Large, irregularly lit but mostly very faint galaxy. Large size makes viewing especially difficult. 31 crater in the field doesn't help any!" I don't quite understand my "large size" description.

Unfortunately, at -19 degrees this one is well down below where I can normally image. This night was no exception. In order to get the best seeing, I have to image near the meridian when the object is highest in my skies. That puts it in my Meridian tree which blocks about 90 minutes of sky mostly to the west of the Meridian. When I realized seeing might support imaging it, seeing had been lousy but suddenly improved, I swung down to get it. I got one frame before it went into the tree. I took a second as the tree didn't seem to bother much but I was wrong about that. Now I had to wait 80 minutes for it to exit the tree. After 70 it seemed clear so took another frame. Wrong, the tree was still creating a diffraction mess with its pine needles (It's a red pine). The fourth image was clear of the tree. But now the wall of the observatory was becoming a problem and I had to stop. I took the color data the following night when seeing was poor but it was out of the meridian tree and on the east side where the wall wasn't an issue but it ran into the Meridian tree ruining one green frame so this is why only 1 rather than two were used. I saw this coming so put green last since it is of least importance with most galaxy color shots. Still, all this, especially the tube currents from rapidly falling temperatures, left me with odd diffraction spikes and flat-bottomed stars. Working this low is rare so never had a chance to retake it on a better night. All this mainly hurt bright stars not the galaxy though seeing this low is always lousy so detail is sorely lacking. I had to give it a try. Several more Arp Atlas galaxies are this low that I've never been able to image but will try if I ever get a night that allows it. One is three degrees lower so will be really difficult but if I live long enough I might get it.

Now to the distance issue. NED puts its redshift distance at 93 million light-years but gives a Tully-Fisher measurement at 83 million light-years. For 4027A it gives a red-shift distance of 97 million light-years. Since it is still feeding HI to its big brother we know they have to be very close to the same distance so can ignore this latter figure. Checking the redshift of the Antennae NED shows v92 million light-years for

the redshift distance. Good agreement. It shows no other measurements for NGC 4038. ESO has taken a very good image of NGC 4027: http://www.eso.org/public/images/potw1030a/ There they put it at 75 million light-years. Checking on other sources for the nearby Antennae Galaxies I found several at APOD. Most had no mention of distance but one did: http://apod.nasa.gov/apod/ap100507.html and put it at 60 million light-years. Since Hubble has imaged the Antennae what do they say? One place they say 62 million light-years another 60 million light-years and these two refer to the SAME image. Another image by the HST says 63 million light-years. Since Arp 22 is part of this group it's distance should be about the same. So is it in the 60, 70, 80 or 90 million light-year range? I looked at dates but there's no help there. It is more the source rather than the date that rules. You'd think with something this familiar there'd at least be some agreement between sources. Apparently not.

Normally I prepare an annotated image but there's so little on this field I'll give it a pass. Only two other galaxies have any redshift data and after the fiasco of finding a reliable distance for Arp 22 is it even worth it? Still here goes. The blue galaxy immediately east (left) of the dwarf NGC 4027A is I SZ 108A. You have to go into some rare catalogs with this field! It stands for the First Southern Zwicky list in case you were wondering. It does have a redshift which puts it at 300 million light-years distant, 3 to 5 times further that Arp 22. South of Arp 22 and very slightly west (right) is a rather orange galaxy. This is 6dF J1159269-192436 (6 degree Field Survey) with a redshift distance of 774 million light-years. And that's it. So what about the small blue galaxy above I SZ 108A? Wish I knew. NED doesn't seem to know it exists. Since there's a I SZ 108A where is I SZ 108? NED again is ignorant on the subject. Maybe it doesn't exist. If you get the feeling I went to all this work to image this guy and then find mostly ignorance when I try to look up the field, you'd be right.

The asteroid down toward the lower right that angles upward at a rather steep angle is (111121) 2001 VV8.

October Observing

Jim Kvasnicka

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

Planets

Mars: Reaches magnitude -2.6 with a disk 22" wide.
Jupiter: Shines at magnitude -2.2 with a disk 37" wide.
Saturn: Magnitude +0.6 with a disk 16.3" wide.
Uranus and Neptune: Look for Uranus in Aries and Neptune in Aquarius.
Mercury: Not visible.
Venus: Rises about 3 hours before the Sun at magnitude -4.1.

Meteor Showers

Orionids: Peaks the morning of October 21st with 15 meteors per hour.

Messier List

M11: The Wild Duck Cluster in Scutum.
M16: Open cluster in the Eagle Nebula.
M17: Omega or Swan Nebula in Sagittarius.
M18: Open cluster in Sagittarius.
M24: Small Sagittarius Star Cloud.
M25/M26: Open clusters in Sagittarius.
M55: Class XI globular cluster in Sagittarius.
M75: Class I globular cluster in Sagittarius.

Last Month: M13, M14, M22, M28, M54, M69, M70, M92
Next Month: M27, M30, M56, M57, M71, M72, M73

NGC and other Deep Sky Objects

NGC 7009: The Saturn Nebula in Aquarius.
NGC 7293: The Helix Nebula in Aquarius.
NGC 7331: Galaxy in Pegasus.
NGC 7479: Galaxy in Pegasus.
NGC 7510: Bright open cluster in Cepheus.
NGC 7606: Galaxy in Aquarius.

Double Star Program List

8 Lacerta: Four white stars.
Beta Cephei: White and blue stars.
Struve 2816: White primary with 2 blue stars.
Xi Cephei: Pair of yellow stars.
Delta Cephei: Yellow primary with a pale blue secondary.
Eta Persei: Yellow and blue stars.
Struve 331: White primary with a light blue secondary.
Epsilon Pegasi: Yellow primary with a white secondary.

Challenge Object

NGC 7769 / 7770 / 7771: Galaxy NGC 7769 is the brightest in this trio in Pegasus.

Focus on Observing

Hydrogen Alpha Solar Observing Program

Jim Kvasnicka

The Sun is one of the most exciting objects in the sky to observe. Hydrogen Alpha light is the only branch of amateur astronomy where you can see changes by the minute.

The observing program can be completed visually or by imaging. The observer will be required to make three sets of drawings or images.

The first set is 20 or more sketches or images of the whole solar disk during two solar rotations. One rotation is about 30 days. Only the main features need to be drawn: filaments, plages, flares, and sunspot umbra.

The second set is detailed sketches or images of the different forms that solar prominences take on the limb of the Sun. These MUST include: Single Arch, Broken Arch, Unconnected Arch, Straight Pillar, Curved Pillar, Inclined Pillar, Mound, Hedgerow, Pyramid, Broken Pyramid, Fork, Detached, and Anomalous.

The third set is detailed sketches or images of individual features on the disk which must include six of the following nine features: Filaments, Spicules, Flares, Elerman Bombs, Plage, Field Transition Arches, Emerging Flux Region, Sunspots, and Active Region.

Your observing logs must include the usual information: Date, Time, Location, Object Observed, Telescope, Eyepiece, Camera (imaging), Description of Object, Sketch or Image, Seeing, and Transparency.

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

Left: Bob and granddaughter Penny viewing using their 80 mm Orion Short Tube with a white filter.

Solar Star Party, August 25th

Photos by Bob Kacvinsky and John Reinert.

John Reinert and James Quach discussion the view using James' new Lunt set up with a video feed to his laptop

New member Gideon viewing through Dave's Lunt

By Bob Kacvinsky

The August Prairie Astronomy Club meeting was our annual Solar Observing night hosted at Jim Kvasnicka's and coordinated by Dave Churilla. PAC typically holds this event at Hyde during our June meeting to allow public participation but due to Hyde closure, COVID risks and public cooperation with sanitation requirements we had to postpone and relocate to a private location.

The August 25th event was attended by 28 members and family guests with 9 different telescopes set up. We began observing the sun at 6 pm and continued till sunset. At 7 PM Dave Churilla with assistance from Dave Knisely provided a short program about observing the sun using different types of filters and special solar telescopes set up to observe in H alpha. One advantage of solar observing is with a proper filters even smaller telescopes provide a very nice view as the photo below of Bob and Granddaughter Penny looking at the sun in their 80 mm Orion Short tube with a white filer attached.

The sun is presently at the minimum activity level of it's 11 year sun spot cycle. It was noted that the sun has had very few sun spots for over a year or more. On this night the 3 H alpha telescopes were able to show one very nice full arched prominence along the edge of sun. Very cool.

PAC continues to hold club member star parties, including the Solar event. Everyone wears face coverings when others are near and we can safely wipe down and sanitize the touch points for those that want to "float" around the observing area. Please note the dates in the newsletter for upcoming star parties and if it is clear please plan to attend. Prior to the western fires smoke issues we have had some great viewing nights this summer.

Dave Churilla and new member Katelyn observes through Dave's Lunt

Why Is Asteroid Bennu Ejecting Particles Into Space?

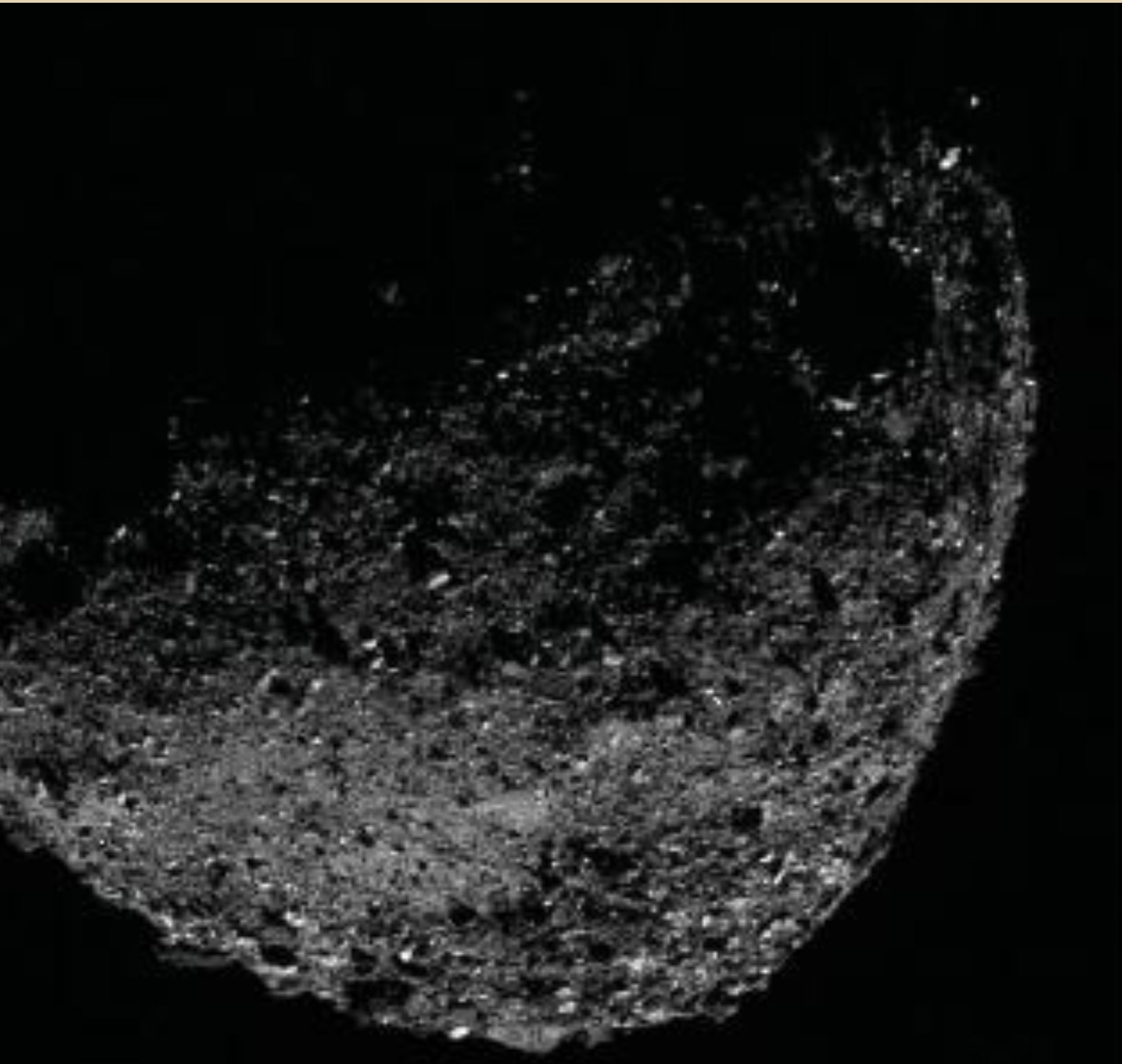
The asteroid, which is being studied by NASA's OSIRIS-REx, shows some surprising activity on its surface, and scientists are beginning to understand what might be causing it.

When NASA's OSIRIS-REx spacecraft arrived at asteroid (101955) Bennu, mission scientists knew that their spacecraft was orbiting something special. Not only was the boulder-strewn asteroid shaped like a rough diamond, its surface was crackling with activity, shedding small pieces of rock into space. Now, after more than a year and a half up close with Bennu, they're starting to better understand these dynamic particle-ejection events.

A collection of studies in a special edition of the Journal of Geophysical Research: Planets homes in on the asteroid and these enigmatic particles. The studies provide a detailed look at how these particles act when in space, possible clues as to how they're ejected, and even how their trajectories can be used to approximate Bennu's weak gravitational field.

Typically, we consider comets, not asteroids, to be the active ones. Comets are composed of ice, rock, and dust. As those ices are heated by the Sun, the vapor fizzes from the surface, dust and chunks of the comet nucleus are lost to space, and a long dusty tail forms. Asteroids, on the other hand, are composed mainly of rock and dust (and perhaps a smaller quantity of ice), but it turns out some of these space rocks can be surprisingly lively, too.

"We thought that Bennu's boulder-covered surface was the wild card discovery at the asteroid, but these particle events definitely surprised us," said Dante Lauretta, the OSIRIS-REx principal investigator and a professor at the University of Arizona. "We've spent the last year investigating Bennu's active surface, and it's provided us with a remarkable opportunity to expand our knowledge of how active asteroids



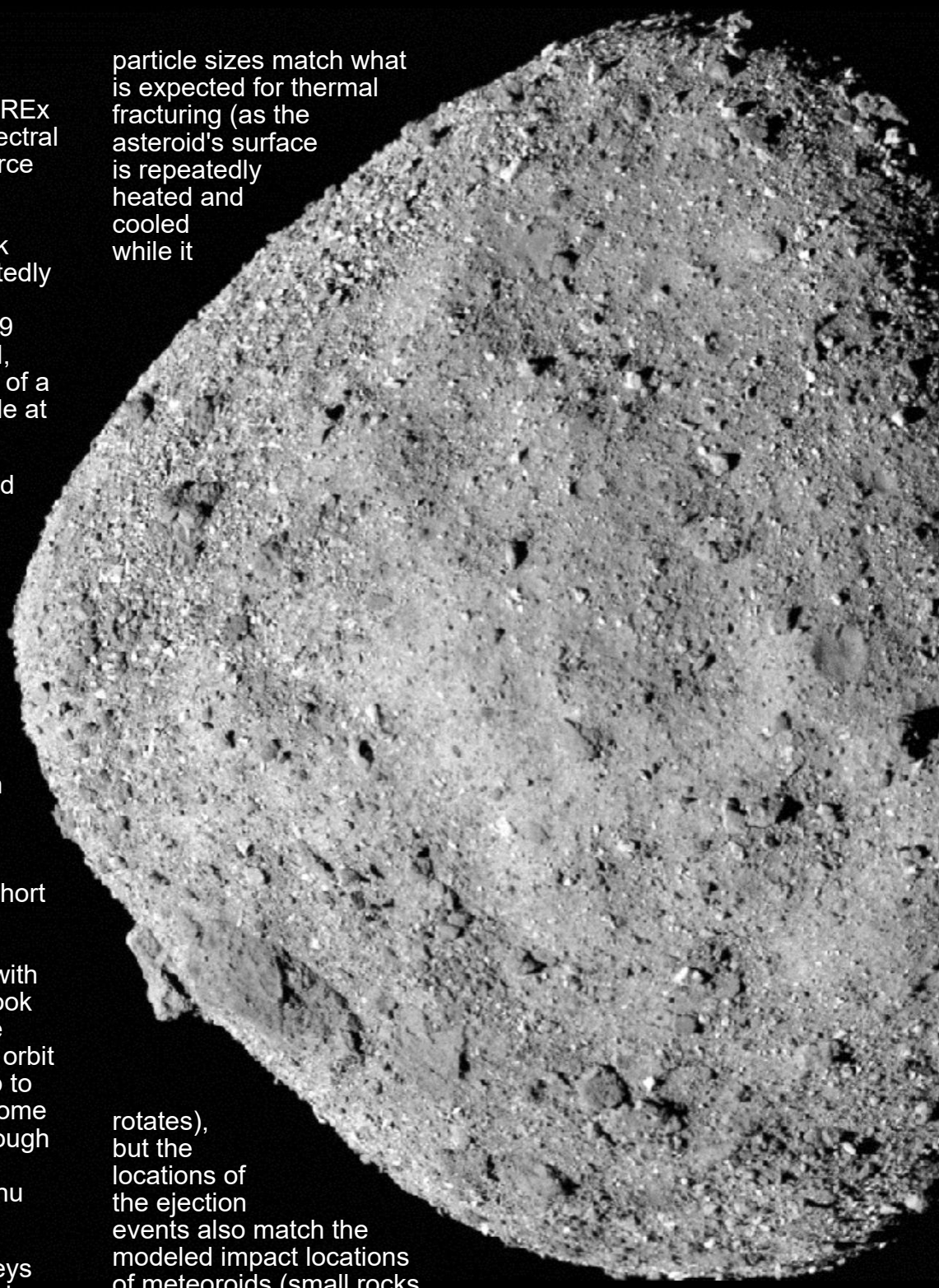
This view of asteroid Bennu ejecting particles from its surface on Jan. 6, 2019, was created by combining two images taken by the NavCam 1 imager aboard NASA's OSIRIS-REx spacecraft: a short exposure image, which shows the asteroid clearly, and a long-exposure image (five seconds), which shows the particles clearly. Other image-processing techniques were also applied, such as cropping and adjusting the brightness and contrast of each layer.

behave."

Cameras on OSIRIS-REx (short for Origins, Spectral Interpretation, Resource Identification, and Security-Regolith Explorer) spotted rock particles being repeatedly launched into space during a January 2019 survey of the asteroid, which is about a third of a mile (565 meters) wide at its equator.

One of the studies, led by senior research scientist Steve Chesley at NASA's Jet Propulsion Laboratory in Southern California, found that most of these pebble-size pieces of rock, typically measuring around a quarter-inch (7 millimeters), were pulled back to Bennu under the asteroid's weak gravity after a short hop, sometimes even ricocheting back into space after colliding with the surface. Others took longer to return to the surface, remaining in orbit for a few days and up to 16 revolutions. And some were ejected with enough oomph to completely escape from the Bennu environs.

By tracking the journeys of hundreds of ejected particles, Chesley and his collaborators were also able to better understand what might be causing the particles to launch from the surface of Bennu. The particle sizes match what is expected for thermal fracturing (as the asteroid's surface is repeatedly heated and cooled while it rotates), but the locations of the ejection events also match the modeled impact locations of meteoroids (small rocks hitting the surface of Bennu as it orbits the Sun). It may even be a combination of these phenomena, added Chesley. But to come to a definitive answer, more observations are needed.



While their very existence poses numerous scientific questions, the particles also served as high-

fidelity probes of Bennu's gravity field. Many particles were orbiting Bennu far closer than would be safe for the OSIRIS-REx spacecraft, and so their trajectories were highly sensitive to the irregular gravity of Bennu. This allowed researchers to estimate the Bennu's gravity even more precisely than was possible with OSIRIS-REx's instruments.

"The particles were an unexpected gift for gravity science at Bennu since they allowed us to see tiny variations in the asteroid's gravity field that we would not have known about otherwise," said Chesley.

On average, only one or two particles are ejected per day, and because they are in a very low-gravity environment, most are moving slowly. As such, they pose little threat to OSIRIS-REx, which will attempt to briefly touch down on the asteroid on Oct. 20 to scoop up surface material, which may even include particles that were ejected before dropping back to the surface.

If all goes as planned, the spacecraft will return to Earth in September 2023 with a cache of Bennu's material for scientists to study further.

NASA's Goddard Space Flight Center in Greenbelt, Maryland, provides overall mission management, systems engineering, and the safety and mission assurance for OSIRIS-REx. Dante Lauretta of the University of Arizona in Tucson is the principal investigator, and the University of Arizona also leads the science team and the mission's science observation planning and data processing. Lockheed Martin Space in Denver built the spacecraft and provides flight operations. Goddard and KinetX Aerospace are responsible for navigating the OSIRIS-REx spacecraft. OSIRIS-REx is the third mission in NASA's New Frontiers Program, which is managed by NASA's Marshall Space Flight Center in Huntsville, Alabama, for the agency's Science Mission Directorate in Washington.

This mosaic image of asteroid Bennu is composed of 12 images collected on Dec. 2, 2018, by the OSIRIS-REx spacecraft's PolyCam instrument from a range of 15 miles (24 kilometers). Credit: NASA/Goddard/University of Arizona

Where Are Stars Made? NASA's Spitzer Spies a Hot Spot

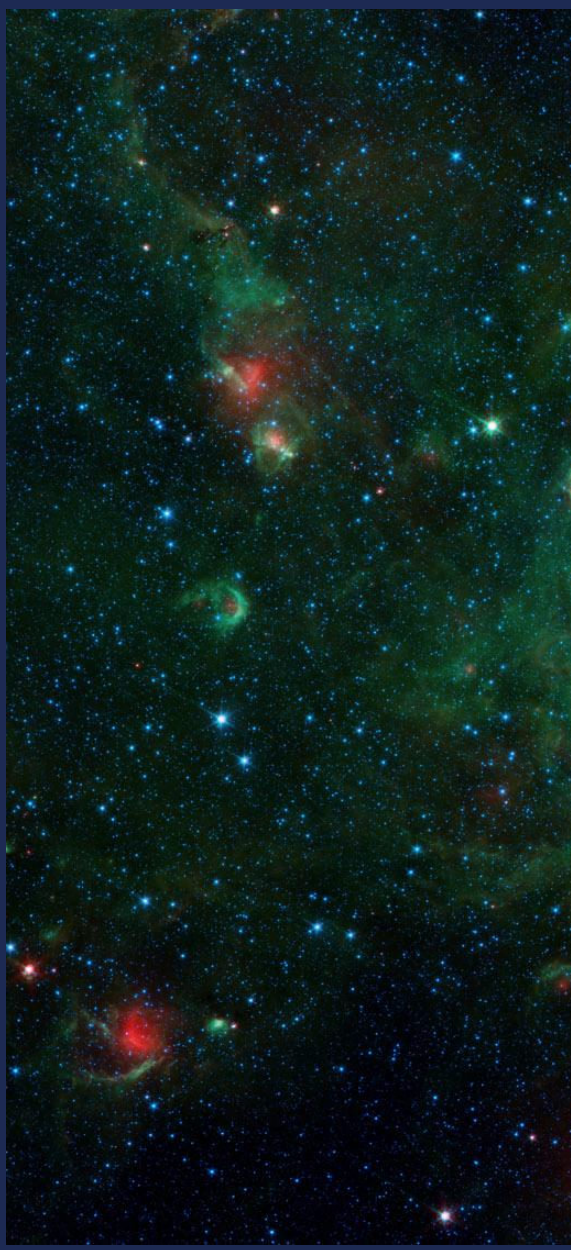
The most massive stars in the universe are born inside cosmic clouds of gas and dust, where they leave behind clues about their lives for astronomers to decode.

The nebula known as W51 is one of the most active star-forming regions in the Milky Way galaxy. First identified in 1958 by radio telescopes, it makes a rich cosmic tapestry in this image from NASA's recently retired Spitzer Space Telescope.

Located about 17,000 light-years from Earth, in the direction of the constellation Aquila in the night sky, W51 is about 350 light-years - or about 2 quadrillion miles - across. It is almost invisible to telescopes that collect visible light (the kind human eyes detect), because that light is blocked by interstellar dust clouds that lie between W51 and Earth. But longer wavelengths of light, including radio and infrared, can pass unencumbered through the dust. When viewed in infrared by Spitzer, W51 is a spectacular sight: Its total infrared emission is the equivalent of 20 million Suns.

If you could see it with your naked eye, this dense cloud of gas and dust would appear about as large as the full Moon. The Orion Nebula - another well-known star-forming region and a favorite observing target for amateur astronomers - occupies about the same size area in the sky. But W51 is actually much farther from Earth than Orion and thus much larger, and it's about 75 times more luminous. While Orion contains four known O-type stars - the most massive stars in the universe - W51 contains over 30.

"Star factories" like this one can operate for millions of years. The cavernous red region on the right side of W51 is older, evident in the way it has already been carved out by winds from generations of massive stars (those at least 10 times the mass of our Sun). The dust and gas



The star-forming nebula W51 is one of the largest "star factories" in the Milky Way galaxy. Interstellar dust blocks the visible light emitted by the region, but it is revealed by NASA's Spitzer Space Telescope, which captures infrared light that can penetrate dust clouds.

NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology, also in Pasadena. Caltech manages JPL for NASA. More information on Spitzer can be found at its website: http://www.spitzer.caltech.edu/

Spitzer, continued.

in the region are swept around even more when those stars die and explode as supernovas. On the nebula's younger left side, many stars are just beginning to clear away the gas and dust in the same way the stars in the older region have done. It's apparent that many of these young stars are in the process of forming bubbles of empty space around themselves.

This image was taken as part of a major observation campaign by Spitzer in 2004 to map the large-scale structure of the Milky Way galaxy - a considerable challenge because Earth lies inside it. Called the Galactic Legacy Infrared Mid-Plane Survey Extraordinaire (GLIMPSE), the survey also turned up valuable data on many wonders within the Milky Way, including images of multiple stellar factories like W51 that were hidden by dust from visible-light observatories.

"The really spectacular images provided by Spitzer via the GLIMPSE survey - in concert with data from many other, complementary telescopes - give us insight into how massive stars form in our Milky Way, and then how their powerful winds and radiation interact with the remaining ambient material," said Breanna Binder, an assistant professor of physics and astronomy at California State Polytechnic University, Pomona, who studies the life cycles of massive stars. "We can't observe star-forming regions in other galaxies in anywhere near the level of detail that we can in our own galaxy. So regions like W51 are really important for advancing our understanding of star formation in the Milky Way, which we can then extrapolate to how star formation proceeds in other, nearby galaxies."

NASA's Spitzer Space Telescope launched 17 years ago this week, on Aug. 25, 2003. The spacecraft was retired on Jan. 30, 2020. Though the mission has concluded, the entire body of scientific data collected by Spitzer during its lifetime is available to the public via the Spitzer data archive, housed at the Infrared Science Archive at IPAC at Caltech in Pasadena, California.

NASA's Jet Propulsion Laboratory, a division of Caltech, managed Spitzer mission operations for NASA's Science Mission Directorate in Washington. Science operations were conducted at the Spitzer Science Center at IPAC at Caltech. Spacecraft operations were based at Lockheed Martin Space in Littleton, Colorado.

Astrophotos

Jim White

This was taken as the moon was setting at the PAC star party on 8-21-2020. I believe the color was due to the smoke in the atmosphere from fires in Colorado and California at the time.

Club Offices and Duties

Nominations for next year's officers will begin at the September meeting, and remain open until election at the October meeting.

Club officer nominations are made in September and elections are held in October. The following is a list of responsibilities of each of the officers and what is required to maintain a functioning club.

As stated in the bylaws, the club has five officers: President, Vice President, Secretary, Treasurer and Second Vice President. The business of the club is managed by a Board of Directors. The Board consists of the five elected officers. Each decision of the Board requires an affirmative vote by at least three Board members. The Board can also create additional non-elected offices as required and can initiate impeachment proceedings against officers who have been negligent in performing their duties.

The Prairie Astronomy Club has a fifty year history of service to club members and the community. Potential club officers should have a good understanding of the history of the club, its formation and mission, its relationship with Hyde Observatory and the types of events, activities and outreach that is part of the tradition of the club. The most complete resource is the book *The Prairie Astronomy Club: Fifty Years of Amateur Astronomy*, which is in the club library or available as a PDF document.

President

The President organizes and directs the regular monthly meetings and all other club activities. The President also prepares the meeting agenda and PowerPoint for the meeting.

The President also officially represents the club at meetings at the regional and national level where he/she is in attendance or delegates this authority. The President has the authority to call meetings of the Board and to appoint non-elected officers.

The President should have good communication skills and be comfortable interacting with the media and public, be a good public speaker, be available to do radio and TV interviews and to deliver prepared introductions and remarks at club-sponsored events.

Another duty of the President is the annual club audit. Within 10 days of assuming office, the President must appoint a committee of three club members to perform the audit. The audit must be completed within 45 days of the close of the fiscal year which is October 31.

When assuming office, the President should hold a meeting of the Board to present his/her direction and ideas for the club for the coming year, and appoint any unfilled non-elected positions.

Vice President

The Vice President is responsible for running club meetings and other events in the absence of the President. The VP is also to be the mediator in cases of procedural dispute and must be available to assume the duties of any officer at the direction of the President. The VP also maintains control of the current inventory of all club property.

Secretary

The Secretary handles all Club correspondence, is responsible for the distribution of information received through official club correspondence and is in charge of Club publicity (often the job of Publicity or Outreach Coordinator is delegated to a non-elected member). The Secretary

also sends out membership renewal notices and delivers meeting minutes to the newsletter editor. The Secretary is responsible for maintaining an accurate club membership roster. The master copy of the roster is currently maintained on the Night Sky Network website. The bylaws also require publication of the complete roster in the newsletter on an annual basis.

Treasurer

The Treasurer is responsible for all Club funds and for keeping accurate records of all monetary transactions. The Treasurer must submit a written report of the club's monetary status at the request of the President or give a verbal report at the request of any member during regular meetings. He/she also prepares an annual financial report in November for publication in the newsletter and presentation at the November meeting. The Treasurer is also responsible for all tax filings and reporting requirements, to maintain the club's 501c3 status.

Second Vice President (and Program Chair)

The Second Vice President is responsible for the formation and presentation of the monthly club programs. Ideally the 2nd VP should try to plan ahead six months to one year to build a list of potential presenters or programs. The 2nd VP also sends out email announcements of upcoming programs to the membership, and sends a program description to the newsletter/website editors.

The club usually has several appointed positions:

The **Publications Chairperson** (or Newsletter Editor) is responsible for editing and publishing the Prairie Astronomer. The newsletter editor may also be the website manager/editor. The newsletter editor should have a good working knowledge of desktop publishing software (and computers in general), graphics, photo editing, some design and layout experience and some experience with social networking and Internet marketing. The Website editor needs to be familiar with WordPress (or similar CMS software) and HTML, graphics and word processing applications. Ideally the newsletter and website editor(s) should have prior experience with the publication of a newsletter or website, or demonstrated skills. The publications chairperson is also responsible for social networking for the club - posting Facebook and Twitter announcements for club meetings and events.

If the club has an appointed **Outreach Coordinator**, the coordinator takes on some of the roles performed by other officers – organizes outreach events, shares in media communications tasks, puts together flyers, etc.

The **Club Librarian** (often the Vice President) manages the club library. He/she keeps a current bibliographic listing of all Club library material including the archive of all back issues of The Prairie Astronomer. The Club Librarian and Secretary work together to maintain a record of club activities and regularly update the official club history.

The **Observing Chairperson** presents a monthly report at Club meetings and/or in the Prairie Astronomer. He/she keeps members informed of upcoming celestial events, sky objects of special interest and star parties.

The **Recording Secretary** (often the Club's elected Secretary) is responsible for keeping the minutes of the club meetings and filing a copy with the Club Secretary. Minutes need to be kept in a systematic fashion as they record the history and life of the club and need to be published in the Prairie Astronomer on a monthly basis.

The **Site Chairperson** (if one is appointed) is responsible for establishing a site committee to oversee the maintenance and security of the club observing site.

While not a requirement of the bylaws, all club officers and appointees should have good computer and social media skills, should be accessible and responsive via email and phone. §

From the Archives

September, 1971

In July and August of this year, the red planet Mars came closer to the earth than at any time since 1924, thus affording astronomers a uniquely good view of its surface. Not only professional astronomers were watching either. Early in September, I had the pleasure of viewing this phenomenon personally through the club 12½ incher.

May I say at this point that I had never really seen the surface of Mars before since the telescopes I have owened through the years were small and of dubious quality. The moons of Jupiter and the ring around Saturn were old familiar personal sights to me, but the surface of Mars I had only read about and looked at photos taken by others. Mars was not a conquest of mine until that first week in September. I knew that it was beginning to recede from the earth and if I were to see it in its excellent position, I'd have to make it "now or never," or at least wait another 47 years.

I went to Hickman that night, knowing pretty well what I would see, and as I trained the big scope on the brightest object in the sky, Earl began apologizing for the unsteadiness of the atmosphere that night. I don't know what magnification I was using for sure, but somewhere around 500X was all the air would allow.

At first I was disappointed in what I saw, or rather didn't see. Under low power, the image was bright, sharp, steady, and too small to allow any detail to be visible. High power produced a basketball sized image which appeared murky, indistinct, and in constant motion from the unsteady air that night. I chose a medium-high power after a few discouraging moments and began to study the image of Mars as it swam across the field of vision.

All at once and for only a second, the air steadied and I got a good look at the planet's surface. I was amazed, and continued to scrutinize the image hoping the same thing would happen again. After a minute or two, it did, and I got another glimpse of Mars' surface with some real detail. Fascinating, and rather satisfying after all these years.

The polar cap was a brilliant white, but very small, appearing to cover only about 5% of the surface. The majority of the planet is a light orange color, and scrawled across its face were the so-called canals making an outline vaguely resembling the continents of Asia and Europe joined in their normal Rand-McNally way. After I knew what I was looking at, each time I got another clear, sharp glimpse, I saw something I had missed the time before. I'm sure that the last glimpse I got was no better than the first, but I could see a lot of real detail half an hour after I started observing that I could not be sure of 30 minutes before. I discovered Mars the only way any observer really can--with my own eyes.

By the way, that telescope is still down there in Hickman waiting for the membership to discover it. You all helped pay for this fine instrument, and Earl loves company just about any hours of the night. Why not avail yourself of the benefits of your club; an organization which many communities lack and we are fortunate to have.

--Lawrence Pilgram

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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The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular $30/yr, Family $35/yr**. Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585**. For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505 or** mark@dahmke.com**,** no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.