

# *The Prairie Astronomer*

May 2022 Volume 63, Issue #5

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Lord Ranch Star Party  
Solving the Mystery of Frost Hiding on Mars  
Hubble Reveals Surviving Companion Star in  
Aftermath of Supernova



May Program

Kevin Gallagher:  
Introduction to the  
James Webb Space  
Telescope



**Night Sky Network**



The Newsletter of the Prairie Astronomy Club

# *The Prairie Astronomer*



## NEXT MEETING AND PROGRAM

May 31, 7:30pm: Introduction to the James Webb Space Telescope: Unlocking the Distant Universe.

Our speaker will be Kevin Gallagher from NASA. The new JWST is both bigger and better than the Hubble. Its larger mirror and specialized instruments that will allow it to see further into the infrared means that we can expect to see further back in time. How much further back? Hopefully to the first galaxies that formed at the Cosmic Dawn of the Universe.

The meeting will be at Hyde Observatory and also via Zoom.

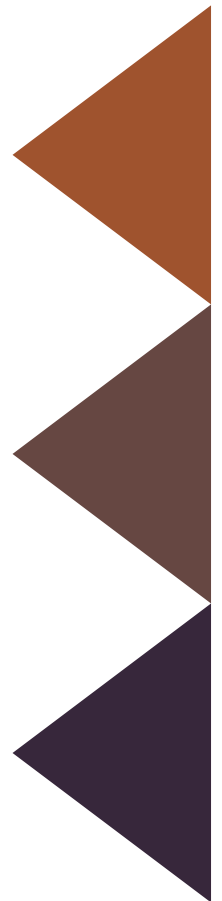
## FUTURE PROGRAMS

June: Solar Observing Party  
August: Review of NSP  
September: JWST Images (tentative)  
October: Club Viewing Night  
November: How To Buy a Telescope  
December: Holiday gathering

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Cover: Lunar Eclipse Composite at the Boller-Sivill Observatory, by Brett Boller.



# CALENDAR

PAC Meeting  
 May 31, 7:30pm at Hyde Observatory  
 Speaker: Kevin Gallagher (via Zoom)

Midstates Astronomical League Conference, June 3-5, St. Louis, Missouri

PAC Meeting  
 June 28, 6:00pm at Hyde Observatory  
 Solar Observing Party

Nebraska Star Party  
 July 24-29, Merritt Reservoir, Valentine, NE

NO PAC Meeting in July

ALCON, New Mexico, July 28-30

## 2022 STAR PARTY DATES

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

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

## CLUB OFFICERS

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[www.prairieastronomyclub.org](http://www.prairieastronomyclub.org)

# Meeting Minutes

*Jim White*

Bob Kacvinsky called the meeting to order at 7:33 PM. Tonight's meeting is being held in person at Hyde Observatory and also on-line through Zoom. Tonight's speaker is Dr. Emily Moravec who works in Radio Astronomy at the Green Bank Observatory in West Virginia, she will be joining us live via Zoom. Bob turned the meeting over to Jim for his observing report at 7:37 PM.

The first item on Jim Kvasnicka's observing report for the month of May is that there is an upcoming club star party scheduled for this Friday, April 29th although the weather forecast is not looking favorable. There is a total lunar eclipse coming up on the evening of May 15th, beginning at 9:28 with the total eclipse beginning at 10:29 and ending at 11:54 and the partial phase ending at 12:56 AM on May 16th. Hyde Observatory is planning on being open for the lunar eclipse. Some club members were at Lord's Ranch south of Valentine during the week of April 20th and two members completed observing programs while there. Dan Delzell completed his Herschel

400 program and Mike Kerns completed his Messier program. Jim's complete observing report is available in this newsletter along with a look ahead at June. Jim turned the meeting back over to Bob at 7:42 PM.

PAC has been selected as one of the first image sites for the James Webb Space Telescope, there are going to be major events from May through next fall. PAC is going to have some kind of coordinated event with Hyde Observatory and will have several entities within Lincoln and Omaha that we will be working with, we have a committee of five members that are going to get together on May 17th and start discussing the materials as we receive them and what we may be able to do. It's a good opportunity to get PAC out into the public again and get astronomy back in people's eyes as we open back up from the last two years of COVID. At this time we are not sure when the first James Webb images will be released.

Bob shared some pictures of Lord's Ranch to give people an idea of the remoteness of the Ranch

and described the incredible dark skies. There were a total of ten people that went to the Ranch, one from Omaha, one from Chicago and eight from Lincoln and the surrounding area. Hyde opened last Saturday, the first time it has been open to the public since being closed due to COVID. We still have the special star challenge for the twelve objects going on so if you have any questions let Jim know, we are trying to get as many members as possible to complete the challenge if they so desire. If you are doing the challenge get your logs turned in to Jim and we will try to submit them all as a club. May's meeting will be with Kevin Gallagher, a NASA Ambassador and he is going to discuss the James Webb Telescope and the great expectations of it and share the background of the telescope.

June will be our observing program for solar and Dave Churilla will be managing it. We always do this in June because it gives us the longest daylight of our monthly meetings for the year. In July we will not have a meeting because it will be



during NSP. Hopefully in August or September we will have photos from James Webb and in August we will probably be sharing pictures from NSP.

Astrophotography class is coming up on May 5th from 7 PM to 8 PM at Hyde and is being put on by Mark Dahmke, Brett Boller and Jason O'Flaherty. John Reinert is not available for tonight's meeting to give the clubs financial report.

Upcoming events, ALCON will be July 28th to 30th in Albuquerque, New Mexico which overlaps NSP (Nebraska Star Party). MSRAL (Mid States Region of the

Astronomical League) is June 1st to 3rd just outside of Columbia, Missouri. Bob is going to MSRAL to represent PAC and if anyone else would like to attend please contact Bob. Rocky Mountain Star Stare (<https://rmss.org>) is June 22nd to 26th and is outside of Colorado Springs at around 7600 ft. Bob Kacvinsky, Jim Kvasnicka and Mike Kearns are planning to attend so if anyone else is interested feel free to get in touch with Bob, Jim or Mike. Okie-Tex Star Party is September 23rd to October 1st.

PAC has several events coming up but they will be later in the summer and

early fall. New business for the club is renewal of the mowing and site rental for the year for the clubs observing site. Bob asked that someone would move the motion forward, it was moved by John and seconded by Ron. It was asked what mowing and rental was, Jim stated that it is \$300.00 for mowing and \$200.00 for rental of the site. The motion was approved and Bob is going to let John know that it is okay to pay for the mowing and rental. The meeting was adjourned at 7:54 and turned over to our guest speaker Dr. Emily Moravec.

# The President's Message

*Bob Kacvinsky*



Welcome to summer – or at least summer-like temps have begun to dot the weekly planners. Spring kicks off our focus on public and club star parties. If you have not been to one in a while, this summer is a great time to check one out. Bring your telescope, binoculars, or just a little Astronomy curiosity and enjoy our great Nebraska night skies.

PAC's next meeting will be Tuesday, May 31st at 7:30 pm. We are fortunate to have Kevin Gallagher, a NASA Ambassador, present an introduction to the Webb Space Telescope. Kevin will share how Webb will open up our ability to reach deeper into the earliest galaxies and for the first time capture images of exoplanets. This will be a great kick off for events coming up later this summer as PAC has been selected as a host for Webb First Images release. PAC has successfully reached out to coordinate our activities with the Hyde Board, Branched Oak

Observatory, LPS, Nebraska Lead Up Program, and potentially OAS. If you would like to be part of the planning process please let any PAC officer know.

The June 28th PAC Meeting will be our annual Solar Observing at Hyde starting around 6 PM. Bring your solar telescopes/white filters and join in the fun. Dave Churilla will host a brief discussion. If the weather does not cooperate, we are planning to use a NASA link inside Hyde so please plan to attend regardless of weather. This will be our regular PAC monthly meeting.

If you are completing the AL Special Galaxy Challenge, please be sure to turn in your observing logs to Jim Kvasnicka for submission. If you have not yet finished the program, don't fret, the program runs through to the end of June. Most observers have been able to finish the program in a single evening session (2-3 hours). The program requires observing just 12

bright spring objects from a list of 22 provided by the AL. If you need a copy of the observing list or an observing log sheet, please contact Jim Kvasnicka for a copy.

Hyde Observatory is open for viewing! If you would like to help out please let us know. There are high school volunteers that operate the telescopes with only a little basic training, so you don't need to be a rocket scientist to help. Most volunteers only participate once every six weeks, so the time commitment is minimal. Come give it a try, you will find it is a lot of fun seeing the expressions of a five-year-old seeing Saturn's rings for the first time.

The new PAC Shed is painted and the PAC equipment has migrated to its new home. Katelyn Farneth has offered to share her artistic talents to add a little "space" to the final outside view. Rick Littrell has taken on the management of the

equipment loaning coordination. We will share an update at the May PAC meeting. If you would like to test out different telescope styles before you buy the loaner program is a great way to see which style best fits your needs.

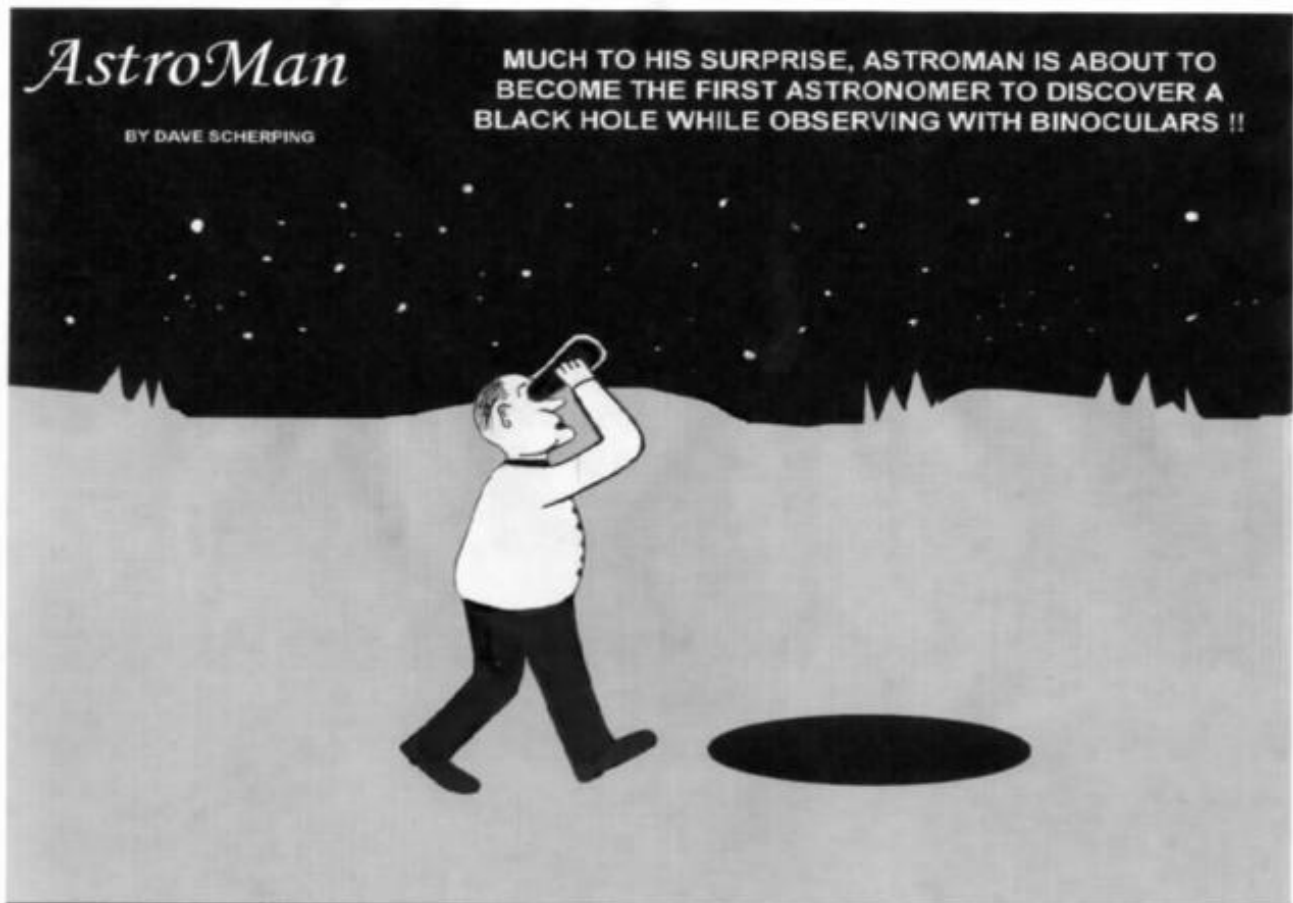
Checkout this newsletter for upcoming observing

events including early June MSRAL in St Louis, late June Rocky Mountain Star Stare west of Colorado Springs (4 members attending to date), NSP at the end of July, to mention a few. If you want to get out and observe there are a lot of great options available including our monthly star parties. Look forward to

seeing you at an upcoming event.

Wish you all Clear Dark Skies.

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



# 29<sup>th</sup> Annual Nebraska Star Party



Photo Credit: Fred Hultstrand History in Pictures Collection, NDSU, Fargo, N.D.

Join us this summer as families from all over the US and around the world gather in the sparsely populated sand hills of North Central Nebraska to spend a good week under a galaxy of stars.

**July 24-29 at Merritt Reservoir, Valentine,  
Nebraska**

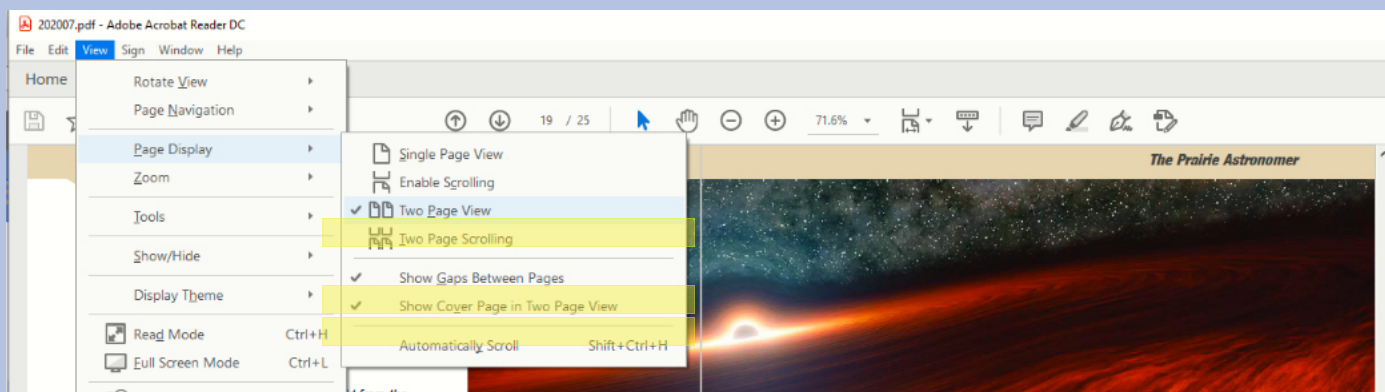
[Online Registration is now open](#)



# Notices

## 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.

To post messages to the list, send to this address: [pac-list@googlegroups.com](mailto:pac-list@googlegroups.com)





*Rick Johnson*

# ARP 43

Arp 43, IC 607 is a spiral galaxy in Arp's class: Spiral Galaxies with Low Surface Brightness Companions on Arms. The "companion" is 2MASX J10241018+1643557/ASK 647046.0, the blue blob on the southeast edge of the galaxy. Arp 43 is about 230 million light-years distant in the constellation of Leo just a degree southwest of Arp 263, the much closer, highly irregular loon-like galaxy. It was discovered on March 29, 1889 by Lewis Swift.

Unfortunately, with no redshift data on the "companion", I've put it in quotes since there's no way to tell if it really is a companion. Possibly just a line of sight alignment. Arp's comment reads: "One side of ring obscured or disrupted; other side has low surface brightness companion." This means that if there is distortion to Arp 43 it is on the wrong side! Everything is normal on the side with the "companion". Could be the

"companion" passed the other side hundreds of millions of years ago and now, while seen near the other side it now too far away to cause further distortion. But then why isn't it distorted? It would be nice to have more information on this pair. I found very little though with all the snow I've been dealing with lately I haven't had much time to look. A similar blue blob of a galaxy is seen 3 minutes northeast of Arp 43, is it related? There is a hint of a possible tidal tail from Arp 43 going down to the south-southeast to a very red galaxy, 2MASX J10241324+1642567/ASK 647046.0. Again, no redshift data. This is more likely noise as the image is noisier than many due to winter airglow and ice in the atmosphere which greatly increases my sky noise.

Edit: Since this was written the SDSS has had additional data releases which show redshift for



# *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](http://www.mantrapskies.com).*



## ARP 43, continued.

many galaxies in this image (see the annotated image). This shows it is not a true companion as its redshift puts it nearly 7 times the distance of IC 607.

While NED shows some 2280 galaxies within this image only Arp 43 has any redshift data. (see edit above as this has changed) I don't know why so I can't prepare my normal distance annotated image.

However, there are 8 asteroids in the image, all but one very faint. Since many are hard to spot I've prepared an annotated asteroid image for them. Looking at the image you will see it happened yet again. An unknown asteroid seems to have slipped into the image. Being that it was taken last February it is a bit late to try and pick it up again so it will have to remain unknown until one of the automated asteroid hunting scopes picks it up again. I've listed the estimated magnitudes of known asteroids by the Minor Planet Center. These are rough estimates it would seem. Some rated brighter than others appear fainter in

my image. Some asteroids are very red. My camera is not very red sensitive. This could

2008 SW129 at an estimated magnitude of 20.4. I've updated the annotated image.



partly explain the differences but doubt it explains all of it as such asteroids aren't all that common.

Edit: Actually the asteroid had been discovered when I took this image. Why I was unable to identify it at the time I don't know. It is (388920)

As I couldn't find a linkable Sloan image of this one I've posted one. It shows no hint of a connection to the red galaxy so think it most likely doesn't exist.

# Focus on Constellations

## Libra

*Jim Kvasnicka*

The word “Zodiac” comes from an ancient Greek phrase meaning “Circle of Animals”. Libra the Scales is the only inanimate object in the Zodiac. Libra is just west and northwest of the Scorpius Milky Way. It lacks such Milky Way objects as open clusters and nebulae. It is fairly rich in galaxies as are most off Milky Way constellations. Libra contains several attractive double stars and a very loose Class XI globular cluster.

### Showpiece Objects

Galaxies: NGC 5728, NGC 5792, NGC 5812, NGC 5878, NGC 5898, NGC 5903

### Mythology

The celestial scales are of very high antiquity. An ancient Mesopotamian carving from about 2200 B.C. shows a priest holding a balance-beam scale over an altar in front of the sun god Shamash

who was also the god of justice. Even at this early date scales symbolized the “weighing of justice.” This idea was inherited by the Greeks who in Greek mythology was goddess Astraea, who held the Scales of Justice.

Number of Objects Magnitude 12.0 and Brighter

Galaxies: 14

Globular Clusters: 1

Open Clusters: 0

Planetary Nebulae: 1

Dark Nebulae: 0

Bright Nebulae: 0

SNREM: 0





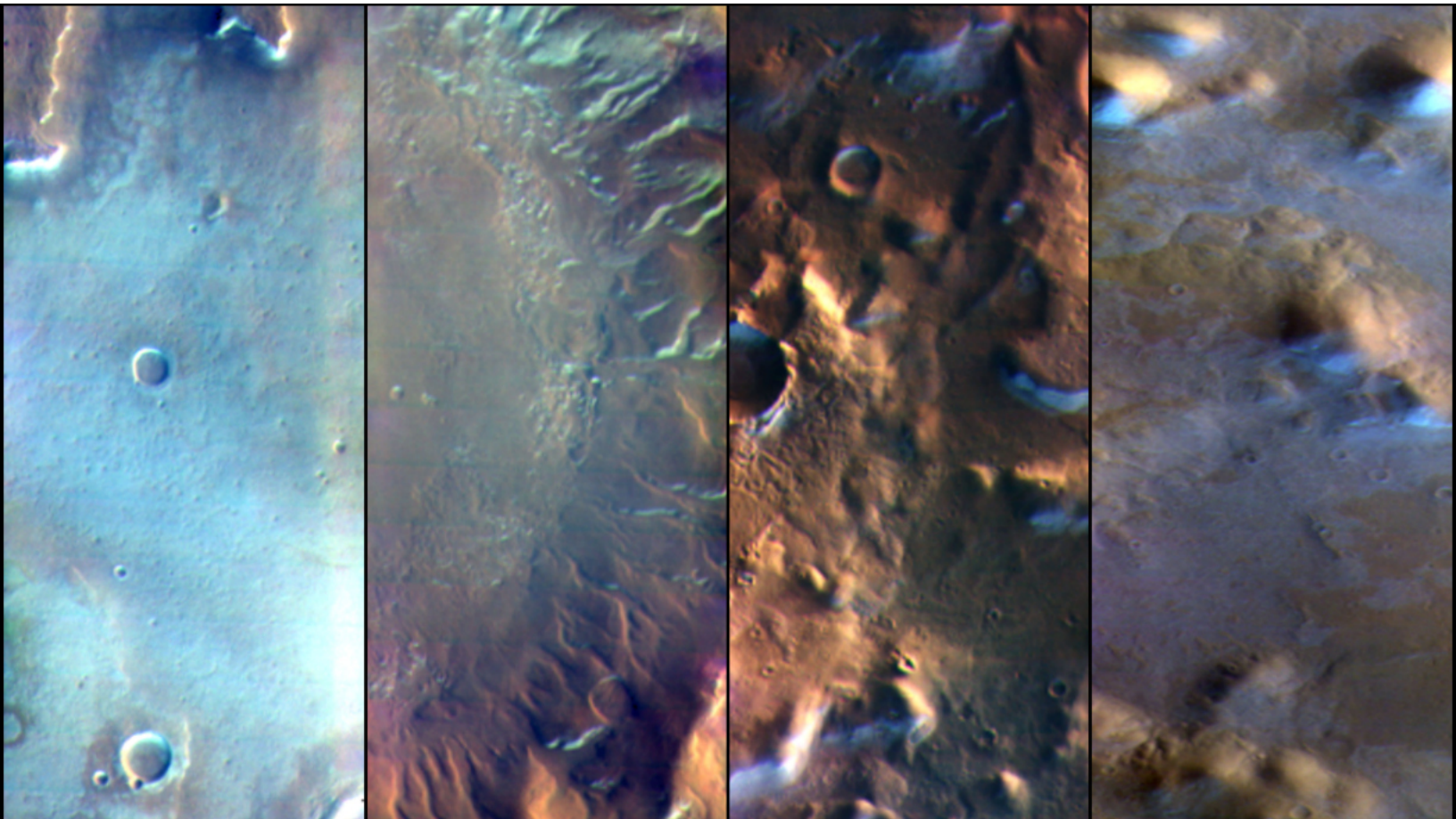
# Science at Sunrise: Solving the Mystery of Frost Hiding on Mars

*A new study using data from NASA's Mars Odyssey orbiter may explain why Martian frost can be invisible to the naked eye and why dust avalanches appear on some slopes.*

Scientists were baffled last year when studying images of the Martian surface taken at dawn by NASA's Mars Odyssey orbiter. When they looked at the surface using visible light – the kind that the human eye perceives

– they could see ghostly, blue-white morning frost illuminated by the rising Sun. But using the orbiter's heat-sensitive camera, the frost appeared more widely, including in areas where none was visible.

The scientists knew they were looking at frost that forms overnight and is made mostly of carbon dioxide – essentially, dry ice, which often appears as frost on the Red Planet rather than as water ice. But why was this dry ice



*Martian surface frost, made up largely of carbon dioxide, appears blueish-white in these images from the Thermal Emission Imaging System (THEMIS) camera aboard NASA's 2001 Odyssey orbiter. THEMIS takes images in both visible light perceptible to the human eye and heat-sensitive infrared. Credit: NASA/JPL-Caltech/ASU*



frost visible in some places and not others?

In a paper published last month in the *Journal of Geophysical Research: Planets*, these scientists proposed a surprising answer that may also explain how dust avalanches, which are reshaping the planet, are triggered after sunrise.

### From Frost to Vapor

Launched in 2001, *Odyssey* is NASA's longest-lived Mars mission and carries the Thermal Emission Imaging System (THEMIS), an infrared, or temperature-sensitive, camera that provides a one-of-a-kind view of the Martian surface. *Odyssey*'s current orbit provides a unique look at the planet at 7 a.m. local Mars time.

"*Odyssey*'s morning orbit produces spectacular pictures," said Sylvain Piqueux of NASA's Jet Propulsion Laboratory in Southern California, who led the paper. "We can see the long shadows of sunrise as they stretch across the surface."

Because Mars has so little atmosphere (just 1% the density of Earth's), the Sun quickly warms frost that builds up overnight. Instead of melting, dry ice vaporizes into the atmosphere within minutes.



*These dark streaks, also known as "slope streaks," resulted from dust avalanches on Mars. The HiRISE camera aboard NASA's Mars Reconnaissance Orbiter captured them on Dec. 26, 2017. Credit: NASA/JPL-Caltech/UArizona*

Lucas Lange, a JPL intern working with Piqueux, first noticed the cold-temperature signature of frost in many places where it couldn't be seen on the surface. These temperatures were appearing just tens of microns underground – less than the width of a human hair "below" the surface.

"Our first thought was ice could be buried there," Lange said. "Dry ice is plentiful near Mars' poles, but we were looking closer to the equator of the planet, where it's generally too warm for dry ice frost to form."

In their paper, the authors propose they were seeing "dirty frost" – dry ice frost

mixed with fine grains of dust that obscured it in visible light but not in infrared images.

### Thawing Frost and Avalanches

The phenomenon led the scientists to suspect dirty frost might also explain some of the dark streaks that can stretch 3,300 feet (1,000 meters) or more down Martian slopes. They knew the streaks resulted from, essentially, dust avalanches that slowly reshape mountainsides across the planet. Scientists think these dust avalanches probably look something like a ground-hugging river of dust releasing a trail of fluffy material behind. As the dust

## Frost, continued.

travels downhill over several hours, it exposes streaks of darker material underneath.

These dark streaks are not the same as a better-documented variety called recurring slope lineae, which recur in the same places, season after season, for weeks (instead of hours) at a time. Once thought to result from briny water slowly seeping from mountainsides, recurring slope lineae are now generally believed to result from flows of dry

sand or dust.

Mapping the slopes streaks for their recent study, the authors found they tend to appear in places with morning frost. The researchers propose the streaks resulted from the vaporizing frost creating just enough pressure to loosen the dust grains, causing an avalanche.

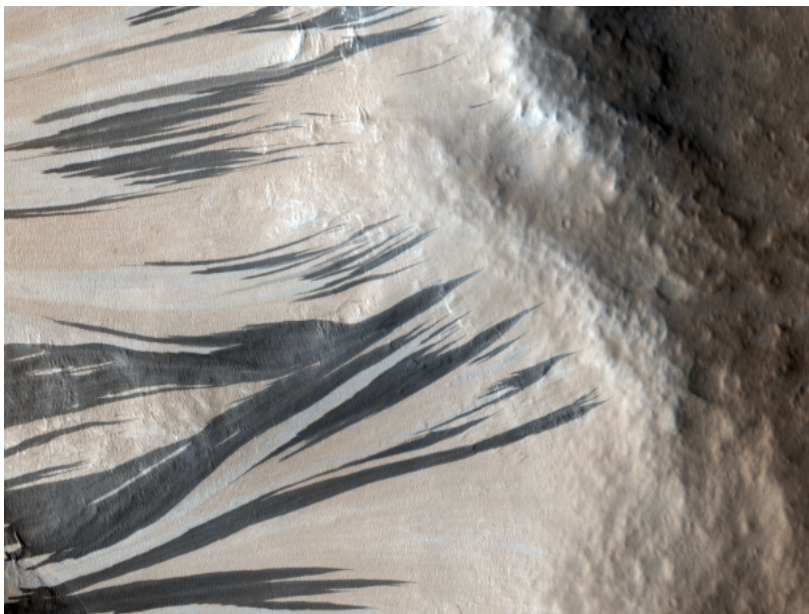
The hypotheses are further evidence of just how surprising the Red Planet can be.

“Every time we send a mission to Mars, we discover exotic new processes,” said Chris Edwards, a paper co-author at Northern Arizona University in Flagstaff. “We don’t have anything exactly like a slope streak on Earth. You have to think beyond your experiences on Earth to understand Mars.” More About the Mission

JPL manages the 2001 Mars Odyssey mission for NASA’s Science Mission Directorate in Washington. The Thermal Emission Imaging System (THEMIS) was developed by Arizona State University. The THEMIS investigation is led by Dr. Philip Christensen at ASU. Lockheed Martin Space in 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 Caltech in Pasadena.

For more information:

<https://mars.nasa.gov/odyssey>



*These dark streaks, also known as “slope streaks,” resulted from dust avalanches in an area of Mars called Acheron Fossae. The HiRISE camera aboard NASA’s Mars Reconnaissance Orbiter captured them on Dec. 3, 2006. Credit: NASA/JPL-Caltech/UAArizona*



# June Observing

*Jim Kvasnicka*



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

## Planets

Mercury, Venus, Mars, Jupiter, and Saturn: All five planets are in the morning before sunrise. On the morning of June 4th at dawn all five naked eye planets are aligned from east to south. They appear in the same sequence as they are in their orbits around the Sun. From Mercury to Saturn spans  $91^\circ$  in the sky. It's been about 100 years since such a configuration has occurred. The next time they will align like this is in 2041.

Neptune and Uranus: On June 24th you can add these two planets to the group of five naked eye planets giving us all seven planets in a line spanning  $107^\circ$  in the sky.

## Messier List

M58: Galaxy in Virgo.

M59/M60: Galaxies in Virgo that fit in the same FOV.

M84/M86: Galaxies in Virgo that fit in the same FOV.

M87: Round galaxy in Virgo.

M88: Oval shaped galaxy in Coma Berenices.

M89/M90: Galaxies in Virgo that fit in the same FOV.

M91/M98: Galaxies in Coma Berenices.

M99/M100: Galaxies in Coma Berenices.

Last Month: M49, M51, M61, M63, M64, M85, M94, M101, M102, M104

Next Month: M3, M4, M5, M53, M68, M80, M83

## NGC and other Deep Sky Objects

NGC 5172: Elongated galaxy in Coma Berenices.

NGC 5248: Oval shaped galaxy in Bootes.

NGC 5676: Oval shaped galaxy in Bootes.

NGC 5689: Elongated galaxy in Bootes.

NGC 5927: Class VIII globular cluster in Lupus.

NGC 5986: Class VII globular cluster in Lupus.

## Double Star Program List

Sigma Corona Borealis: Yellow stars.

16/17 Draconis: Equal pair of white stars.

Mu Draconis: Close pair of white stars.

Kappa Herculis: Pair of yellow stars.

Alpha Herculis: Orange primary with a greenish colored secondary.

Delta Herculis: White primary with a blue-purple secondary.

Rho Herculis: Two white stars.

95 Herculis: Light yellow pair.

Alpha Librae: Wide pair of yellow-white stars.

## Challenge Object

NGC 5673 and IC 1029: Two galaxies in Bootes that fit in the same FOV.

# Lunar Eclipse at Hyde Observatory

Jason O'Flaherty



At least 300 visitors observed the May 15<sup>th</sup> eclipse at Hyde Observatory. Many stayed to watch a video.

I set up my DSLR and ran a feed out to my iPad (Displaying my DSLR output on an iPad).

There was one family that enjoyed it so much they started getting artsy with it taking a photo of a phone taking a photo of a phone taking a photo of my iPad taking a photo of the moon.



Below: panoramic of Hyde by Mark Dahmke

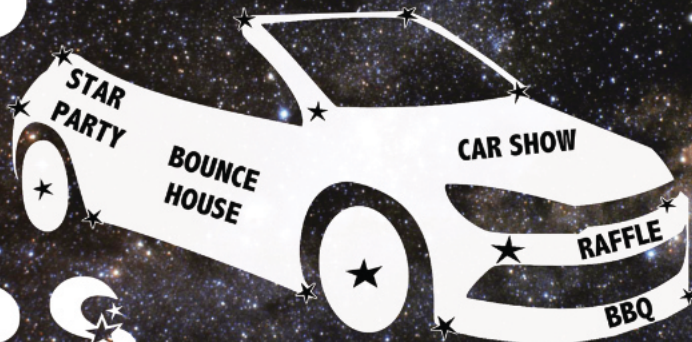




*Security First Bank Presents:*

**JUNE  
18th**

**CARS  
AND  
STARS**



Got a cool ride to show? Register  
at <https://tinyurl.com/carsNstars>

A fun and FREE event for the entire family at Branched Oak Observatory!

• Car Show • BBQ Food Truck • Raffle Prizes • Family Fun • Star Party

**5:00-7:30PM** - Safe Solar Viewing / Hands-on Science Activities In The Classroom.

**5:00-8:00PM** - Show & Shine Car Show

**5:00-8:00PM** - Boxcar BBQ Food Truck Open For Dinner (optional purchase).

**5:00-8:00PM** - Raffle Tickets For Sale (optional purchase). Winners announced @ 8pm

**5:00-9:00PM** - Super Castle Bounce House & Slide Open For The Kids.

**9:00-11PM** - Star Party. Explore The Universe Through Observatory Telescopes!

Event at Branched Oak Observatory  
1/2 mile south of the state park and lake.  
14300 NW 98th St., Raymond.



BRANCHED OAK  
OBSERVATORY



Security  
First  
Bank  
A relationship you can count on.



# Lord Ranch Star Party

*Bob Kacvinsky*

On April 20-25 a group of PAC members and Friends met up near Valentine, NE to enjoy the pristine dark skies of NW Nebraska. We set up at Lord Ranch where 5 cabins are located midway between Hwy 97 and 83 on the northern end of the Valentine National Wildlife Refuge. A tar road winds 12 miles off Hwy 83 where you turn onto a ranch

drive. After driving through a couple cattle gates and pastured animals for about a mile, just before you feel you have made a bad turn, you find a row of cabins. The cabins are equipped with kitchenettes and ready for comfort and quiet solitude.

Four PAC members arrived on April 20th, Dan Delzell, Mike Kearns, Jim

Kvasnicka, and Bob Kacvinsky, setting up for observing. April 20th proved to be a true “best NSP” type night with both transparency and seeing reaching a best 4-5 scale. A light breeze helped keep any misquotes/bugs away but we were not alone with a continuous chorus of frogs, geese, ducks, and coyotes providing a serenade.



*Photo: backdrop showing rolling hills to the north horizon.  
Valentine is 25 miles to the North.*



Dark skies finally came around 9:30 pm and we viewed until after 2:30 am when the moon came up and washed out the skies. During the night we collectively logged 77 objects. Dan Delzell, 16" Tetter, completed the last of his Hershel Observing Program. Mike Kearns, brand new 15" Tetter, finished all but 3 of his last Messier Observing Program. Jim, 16" Tetter, logged 13 of his Arp peculiar galaxies list and Bob, 16" Lightbridge, logged 25 of the Hershel II Observing Program. We also took in several of the typical favorites between our hunting expeditions. A common theme with such dark skies was "how do

you decide which galaxy is the right one to log when there are 4-5 in the view". Faint fuzzy stars became small galaxies and background nebulosity provided a distinctive curtain backdrop to many of the views. Objects under most skies would be only dim hints of gray scale blending into the background.

On Thursday to rest of the attendees arrived including John Speck (Chicago), Eric Balcom (OAS/PAC), Jim White, Brett Boller, Jason O'Flaherty, and Chad Tolly. Unfortunately for the rest of the weekend it was a Bolo Brewery and disc

game event as high winds and cloudy skies remained. We experienced temps in high 90's Friday night and a high of 38 degrees on Saturday with cold N winds. Regardless of the lack of clear viewing, everyone had a get time getting together sharing and creating stories best not repeated in writing.

This was the 4th fall or spring trip to Lord Ranch to capture "off season" observing. If you would like to experience really dark skies, it is tough to beat the area near Valentine Nebraska.

Dark Clear Skies to all.



*Mike Kearns with his beautiful new 15" Tetter Custom Telescope*





*L to R – Mike Kearns; Dan Delzell; Jim Kvasnicka; Bob Kacvinsky. Set up outside of cabins.  
Below: Facing South showing range land and lakes of the Valentine National Wildlife Refuge.*







Photos taken at Lord Ranch by Jason O'Flaherty





# Astrophotography

*The Moon by Dave Knisely. 9.25 inch f/10 SCT at prime focus, ISO1600, 1/500th second exposure on an old Canon EOS Rebel XT camera.*





# Astrophotography



*Lunar eclipse composite by Mark Dahmke, May 15, 2022. This sequence was created in Photoshop using auto-blend.*

*Left: Earth's shadow at 10:29pm.*

## Lunar Eclipse at Branched Oak Observatory



*Photos by Brett Boller, (taken handheld with a Samsung Note 9)*



# Astrophotography for Beginners Class

The beginning astrophotography class was held on May 5<sup>th</sup> at Hyde Observatory. The presenters were Brett Boller, Jason O'Flaherty and Mark Dahmke. Jason introduced the speakers and gave an overview of the Prairie Astronomy Club for guests. The class covered the following topics: what types of cameras to use, image sensor basics, types of mounts and tripods, software tools and techniques. It covered wide-field, planetary and

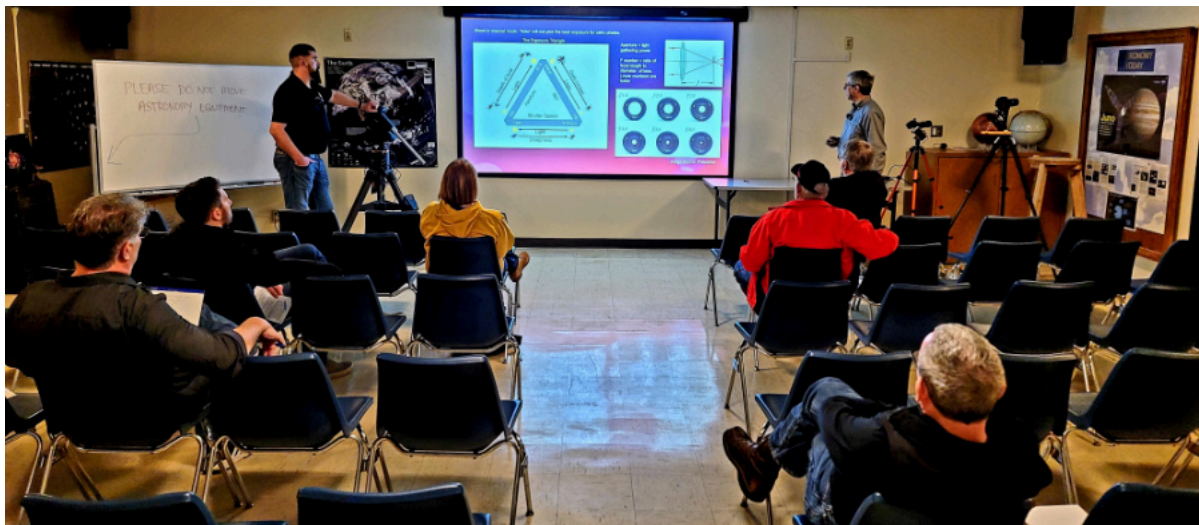
deep sky photography, image stacking and panoramas.

The entire presentation was recorded and is available on YouTube and through the PAC website at:

<https://www.prairieastronomyclub.org/astrophotography-for-beginners/>

The YouTube URL is:

<https://youtu.be/u-HA53m9HDg>



*Photos by John Reinert*



## Club Member Profile: Brett Boller



*Brett has been a member of PAC since 2009*

I grew up on a farm a few miles East of Dorchester NE. I have one younger sister. I am currently the Director of Radiology and IT coordinator at Friend Community Healthcare System in Friend, NE. I have worked there since 2010. I am certified in X-ray, CT, and Radiation Therapy. I currently have four employees that I supervise. I currently sit on the board of directors for the Warren Memorial Hospital Foundation and Renew Dorchester. Brian Sivill and I built a roll-off observatory at Branched Oak Observatory so we could have a permanent place for astrophotography. We have four piers with three being used right now. We have been part of Branched Oak Observatory for almost six years now. Along with astronomy and astrophotography I enjoy woodworking. I currently have a CNC and laser cutter along with plenty of tools to make just about anything you can think of.

Another hobby is gardening. I sell peppers, tomatoes, melons, pumpkins etc. I usually plant over 800 peppers and 600 tomatoes each year to sell and plant in my garden.

I officially joined PAC around April 2009 but started attending meetings a few months before that. I was the secretary in the club shortly after joining and after a few years in the club Jack Dunn asked me to be VP. I held that position for a few years but I no longer hold a position on the PAC board.

I had bought my first telescope and wanted to find out more about the hobby of astronomy. My first telescope was a Celestron 130 SLT reflector. I had it about a year and a half before I bought a Celestron 11" CPC Schmidt cassegrain fork mount telescope. When I bought that telescope I found that

putting a camera on it was going to be very addicting. I wish I would have had a wider field telescope to start my astrophotography endeavor. Other telescopes I have are an 11" CGE from Celestron, I share an 150mm Skywatcher Esprit, a small refractor, and multiple small 80mm finder scopes. I am mostly dedicated to astrophotography vs visual observing now. It has progressed to building my own observatory with Brian Sivill. We have 3 permanently mounted telescopes in a roll-off style observatory. We hope to have it completely remote controlled within the year.

I attended my first NSP in 2010 and have gone every year since. I am on the planning committee for NSP as well. The dark skies of the sandhills are amazing and unparalleled when taking images. Seeing friends at NSP is a great time especially when that is the only time

## Brett Boller, continued.

you see them all year long. I have not been to any other star parties besides NSP.

I have completed seven observing challenges so far. They are the Globular Cluster, Planetary transit for Venus and Mercury, Solar eclipse 2017, NASA

observing challenge, Outreach award, and Binocular messier. I am currently working on the open clusters astro league observing challenge. Depending on how many I can get this spring I am going to start on the flat galaxy club as well.

If anyone is interested in getting into astrophotography please let me know and I can show you the telescopes and equipment at Boller-Sivill Observatory and can help you get started.



*Brett Boller at the Boller-Sivill Observatory*



# Hubble Reveals Surviving Companion Star in Aftermath of Supernova

*The discovery helps explain the puzzle of hydrogen loss pre-supernova, and supports the theory that most massive stars are paired.*

*It's not unheard of to find a surviving star at the scene of a titanic supernova explosion, which would be expected to obliterate everything around it, but the latest research from the Hubble Space Telescope has provided a long-awaited clue to a specific type of stellar death. In some supernova cases, astronomers find no trace of the former star's outermost layer of hydrogen. What happened to the hydrogen? Suspicions that companion stars are responsible—siphoning away their partners' outer shell before their death—are supported by Hubble's identification of a surviving companion star on the scene of supernova 2013ge. The discovery also lends support to the theory that the majority of massive stars form and evolve as binary systems. It could also be the prequel to another cosmic drama: In time, the surviving, massive companion star will also undergo a supernova, and if both the stars' remnant cores are not flung from the system, they will eventually merge and produce gravitational waves, shaking the fabric of space itself.*

NASA's Hubble Space Telescope has uncovered a witness at the scene of a star's explosive death: a companion star previously hidden in the glare of its partner's supernova. The discovery is a first for a particular type of supernova—one in which the star was stripped of its entire outer gas envelope before exploding.

The finding provides crucial insight into the binary nature of massive stars, as well as the

potential prequel to the ultimate merger of the companion stars that would rattle across the universe as gravitational waves, ripples in the fabric of spacetime itself.

Astronomers detect the signature of various elements in supernova explosions. These elements are layered like an onion pre-supernova. Hydrogen is found in the outermost layer of a star, and if no hydrogen is detected in the aftermath

of the supernova, that means it was stripped away before the explosion occurred.

The cause of the hydrogen loss had been a mystery, and astronomers have been using Hubble to search for clues and test theories to explain these stripped supernovae. The new Hubble observations provide the best evidence yet to support the theory that an unseen companion star siphons

off the gas envelope from its partner star before it explodes.

"This was the moment we had been waiting for, finally seeing the evidence for a binary system progenitor of a fully stripped supernova," said astronomer Ori Fox of the Space Telescope Science Institute in Baltimore, Maryland, lead investigator on the Hubble research program. "The goal is to move this area of study from theory to working with data and seeing what these systems really look like."

Fox's team used Hubble's Wide Field Camera 3 to study the region of supernova (SN) 2013ge

in ultraviolet light, as well as previous Hubble observations in the Barbara A. Mikulski Archive for Space Telescopes (MAST). Astronomers saw the light of the supernova fading over time from 2016 to 2020—but another nearby source of ultraviolet light at the same position maintained its brightness. This underlying source of ultraviolet emission is what the team proposes is the surviving binary companion to SN 2013ge.

Two by two?

Previously, scientists theorized that a massive progenitor star's strong winds could blow away its hydrogen gas envelope,

but observational evidence didn't support that. To explain the disconnect, astronomers developed theories and models in which a binary companion siphons off the hydrogen.

"In recent years many different lines of evidence have told us that stripped supernovae are likely formed in binaries, but we had yet to actually see the companion. So much of studying cosmic explosions is like forensic science—searching for clues and seeing what theories match. Thanks to Hubble, we are able to see this directly," said Maria Drout of the University of Toronto, a member of the Hubble



## Aftermath of Supernova, continued.

research team.

In prior observations of SN 2013ge, Hubble saw two peaks in the ultraviolet light, rather than just the one typically seen in most supernovae. Fox said that one explanation for this double brightening was that the second peak shows when

the supernova's shock wave hit a companion star, a possibility that now seems much more likely. Hubble's latest observations indicate that while the companion star was significantly jostled, including the hydrogen gas it had siphoned off its partner, it was not destroyed. Fox likens the

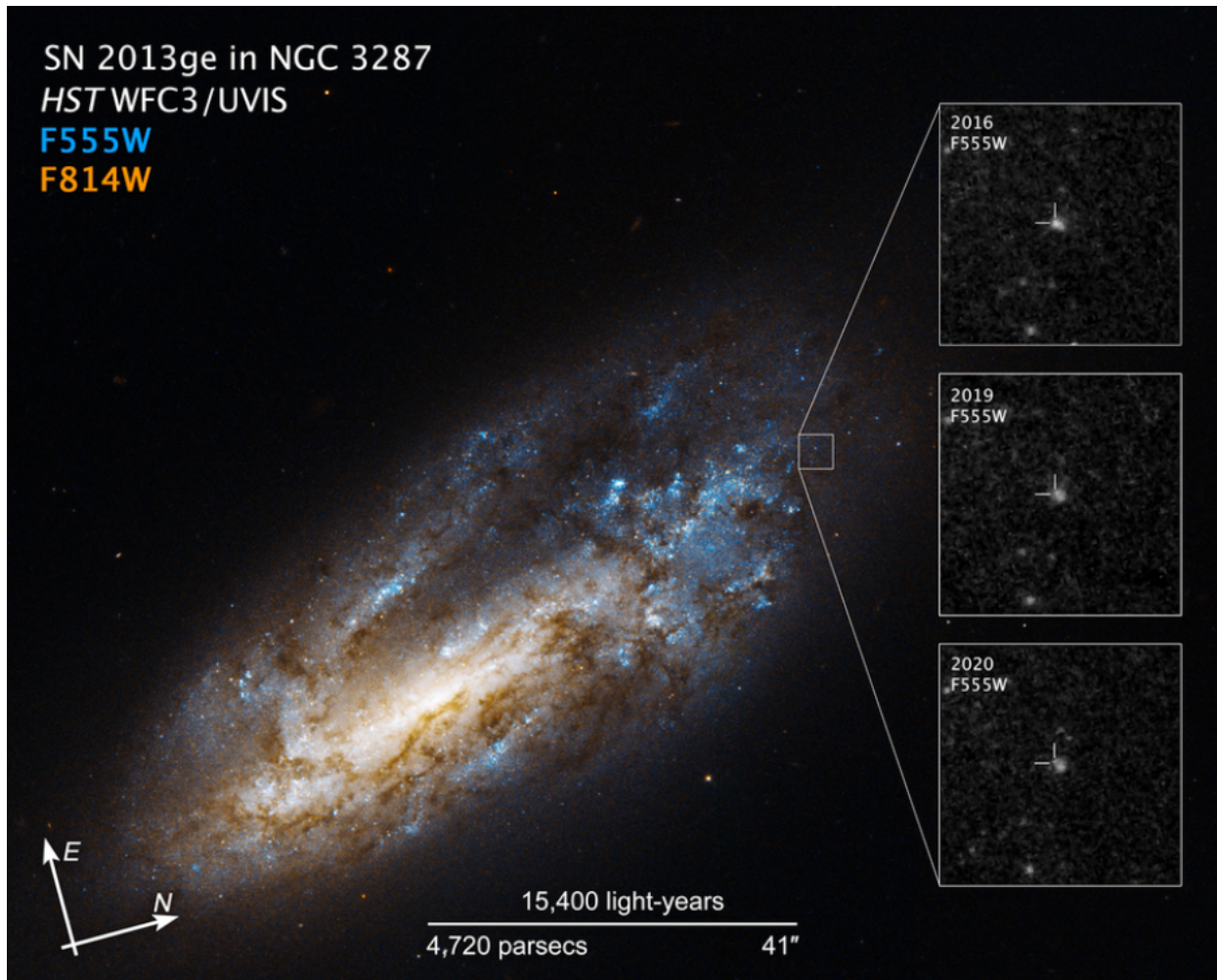
effect to a jiggling bowl of jelly, which will eventually settle back to its original form.

While additional confirmation and similar supporting discoveries need to be found, Fox said that the implications of the discovery are still substantial, lending



*This infographic shows the evolution astronomers propose for supernova (SN) 2013ge. Panels 1-3 show what has already occurred, and panels 4-6 show what may take place in the future. 1) A binary pair of massive stars orbit one another. 2) One star ages into its red giant stage, getting a puffy outer envelope of hydrogen that its companion star siphons off with gravity. Astronomers propose this is why Hubble found no trace of hydrogen in the supernova debris. 3) The stripped-envelope star goes supernova (SN 2013ge), jostling but not destroying its companion star. After the supernova, the dense core of the former massive star remains either as neutron star or black hole. 4) Eventually the companion star also ages into a red giant, maintaining its outer envelope, some of which came from its companion. 5) The companion star also undergoes a supernova. 6) If the stars were close enough to each other not to be flung from their orbits by the supernova blast wave, the remnant cores will continue to orbit one another and eventually merge, creating gravitational waves in the process. Credits: ILLUSTRATION: NASA, ESA, Leah Hustak (STScI)*

Hubble images of galaxy NGC 3287 show supernova 2013ge fading over time, revealing the steady source of ultraviolet light astronomers have identified as its binary companion star. Credits: SCIENCE: NASA, ESA, Ori Fox (STScI) IMAGE PROCESSING: Joseph DePasquale (STScI)



support to theories that the majority of massive stars form and evolve as binary systems.

### One to Watch

Unlike supernovae that have a puffy shell of gas to light up, the progenitors of fully stripped-envelope supernovae have proven difficult to identify in pre-explosion images. Now that astronomers have been lucky enough to identify the surviving

companion star, they can use it to work backward and determine characteristics of the star that exploded, as well as the unprecedented opportunity to watch the aftermath unfold with the survivor.

As a massive star itself, SN 2013ge's companion is also destined to undergo a supernova. Its former partner is now likely a compact object, such as a neutron star or

black hole, and the companion will likely go that route as well.

The closeness of the original companion stars will determine if they stay together. If the distance is too great, the companion star will be flung out of the system to wander alone across our galaxy, a fate that could explain many seemingly solitary supernovae.

However, if the stars were



## Aftermath of Supernova, continued.

close enough to each other pre-supernova, they will continue orbiting each other as black holes or neutron stars. In that case, they would eventually spiral toward each other and merge, creating gravitational waves in the process.

That is an exciting prospect for astronomers, as gravitational waves are a branch of astrophysics that has only begun to be explored. They are waves or ripples in the fabric of spacetime itself, predicted by Albert Einstein in the early 20th century. Gravitational waves were first directly observed by the Laser Interferometer Gravitational-Wave Observatory (LIGO).

"With the surviving companion of SN 2013ge, we could potentially be seeing the prequel to a gravitational wave event, although such an event would still be about a billion years in the future," Fox said.

Fox and his collaborators will be working with Hubble to build up a larger sample of surviving companion stars to other supernovae, in effect giving SN 2013ge some company again.

"There is great potential beyond just understanding the supernova itself. Since we now know most massive stars in the universe form in binary pairs, observations of surviving companion stars are necessary to help understand the details behind binary formation, material-swapping, and co-evolutionary development. It's an exciting time to be studying the stars," Fox said.

"Understanding the lifecycle of massive stars is particularly important to us because all heavy elements are forged in their cores and through their supernovae. Those elements make up much of the observable

universe, including life as we know it," added co-author Alex Filippenko of the University of California at Berkeley.

The results are published in *The Astrophysical Journal Letters*.

The Hubble Space Telescope is a project of international cooperation between NASA and ESA (European Space Agency). NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the telescope. The Space Telescope Science Institute (STScI) in Baltimore, Maryland, conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy in Washington, D.C.

# From the Archives

May, 1981

## *The President's Report - Ron Veys*

First, a quick thank you to Russ Genzmer for all his hard work in making Astronomy Day 1981 a well—planned success.

Now, a few words about the A. L. Regional Convention. The details are contained in the inserted sections of this newsletter, but I want to stress a few things.

Please make sure register for the convention. It only costs \$8.00, but for that you get to participate in all activities, get an 8 x 10 group photo, and are eligible for door prizes. (Prizes will be given away at each paper session, but you must be present and registered to win. ) Also,

consider buying the meal ticket to eat your meals in the University cafeteria—it's only \$10.80 for the five meals. The greatest enjoyment to be received from a convention like this is in meeting and talking to the other amateurs interested in the same things you are. And a lot of this conversation and exchanging of information takes place at mealtimes when everyone is together in an information atmosphere. You won't want to miss this opportunity.

I would also like to ask our club members to please wear your club shirts when you attend the activities On Friday and

Saturday (especially for the group photo).

Our club should have a good turnout, and a lot of visibility what with our shirts and our displays. We have a fine club and we want everyone else to know about!

This convention is an opportunity for you to attend, right here at home, a gathering of astronomers from all over this region. I'm really looking forward to it as I hope you are.

See you there.

- RON VEYS



*Astronomy Day 1986  
at Gateway Mall*



## 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](http://lulu.com).

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