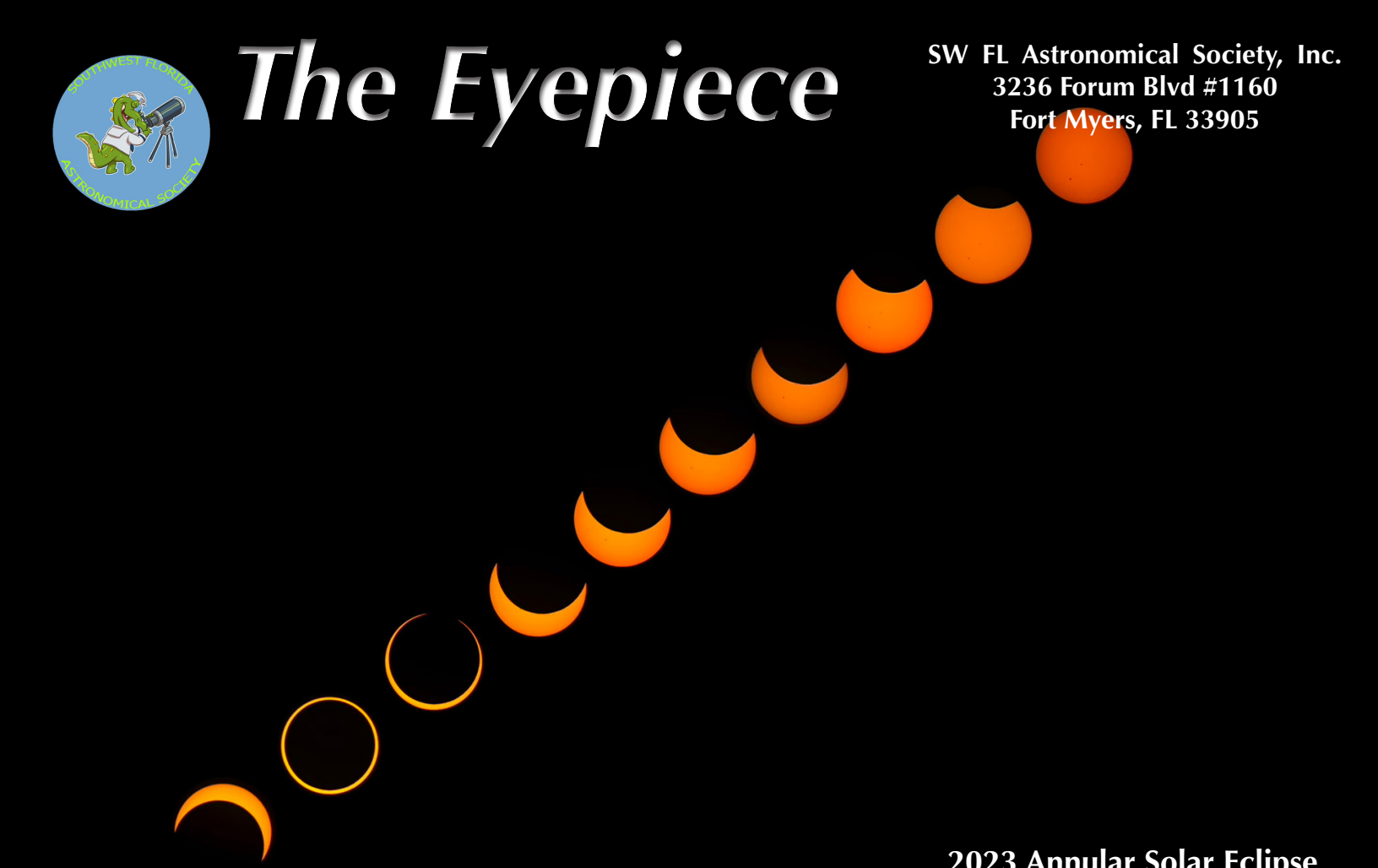
# The Eyepiece

SW FL Astronomical Society, Inc.
3236 Forum Blvd #1160
Fort Myers, FL 33905



**2023 Annular Solar Eclipse**
**by Ray Bratton**

***Editor - Mike Jensen***

Hi Everyone! WOW! I am astounded by the amount and the quality of the astro photos we have this month! Seriously, this club and our Astro SIG group produce exhibit quality images, and you get to see them every month. Also, it's quite obvious that Summer is over in Southwest Florida because ***we are imaging***! We have 17 pages of amazing astro photos this month!

In addition to the amazing photos, I've included a very relevant article on a new kilonova discovered by the JWST. This on the tail of our program speakers talk from last month.

Also, we've got some MORE great speakers coming up in the next few months, including speakers in person in Dec/January.

Also, we need you to put on your "serious member" hat for a few minutes. Nov/Dec. brings club business. And even though it can be a bit boring, it is necessary and we just need you to participate please. We are going to offer the ability to vote by website again and after the November meeting we will put up the ballot for officer elections as well as to approve the 2023 budget and dues structure.

***Table of Contents***



**Take The Member's Survey**
**We have created a member survey to gain your feedback on a variety of things important to the club. Please take a few minutes to complete it.**
**Click Here**

**Observing/Star Party Dates Announced**
Info on page 5.

## Club Officers & Positions

President/Equipment
Brian Risley
swfaspres@gmail.com
239-464-0366

Vice President/
Newsletter/Website/Astro SIG
Mike Jensen
info@jensenone.com
913-304-0495

Secretary
Dan Dannenhauer
gawomp@aol.com
239-850-7111

Treasurer/AL Coordinator
John MacLean
john.maclean@comcast.net
239-707-3365

Charlotte Event Coordinators
Tony Heiner
verahei@aol.com
941-457-9700

Thomas Segur
tsegur479@comcast.net
941-249-8726

Big Cypress Viewing Coordinator
Mike Jensen
info@jensenone.com
913-304-0495

FSW Punta Gorda Moore Observatory
Director Thomas Segur
tsegur479@comcast.net
941-249-8726

Club Librarian
Maria Berni
239-940-2935

Club Historian
Danny Secary
asecary@gmail.com
239-470-4764

Calusa Nature Center Planetarium Director Heather Preston
heather@calusanature.org
239-275-3435

## Monthly Meetings

Our monthly meetings are held on the **first Thursday of each month**. **The meetings begin at 7:00pm**.

***Each meeting is usually a combined live and Zoom meeting.***

The in person meeting is held at:
Calusa Nature Center/Planetarium
3450 Ortiz Ave,
Fort Myers, FL 33905

Each meeting will have the same Zoom link/meeting ID.

Below are the dates for the meetings of 2023:

Nov. 2, 2023
Dec. 7, 2023 Annual Bus. Mtg
Jan. 5, 2024

Link to join Zoom meeting:
https://widener.zoom.us/j/98623448643

Meeting ID: 986 2344 8643

One tap mobile:
+13052241968,,98623448643# US (or)
+13126266799,,98623448643# US

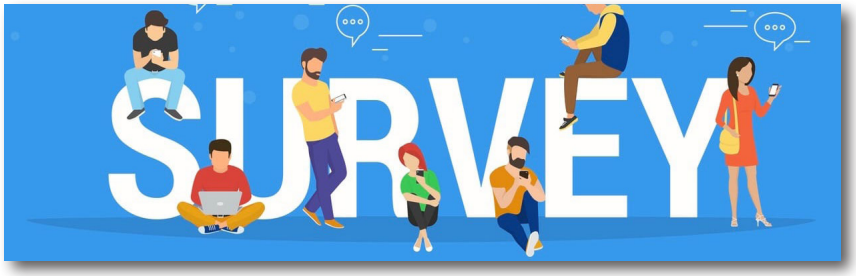
Dear Members,
In order to improve the quality of the recording of our meeting presentations, our system of muting Zoom participants will change. During a presentation, Zoom depends on sound to identify the presenter. As a result, if a participant sneezes or coughs, or any outside noise happens, that person is presented as the speaker in the Zoom video. In order to prevent this from happening, all participants must be "muted". As the host, I will "mute all" during presentations. This will prevent any extraneous noise from interfering with the presentation and a singular video of the presenter will be produced. We see this as an excellent way to improve the quality of our recordings, however, there is a "downside". After the presentation, for the "Q & A", the participant(s) will have to alert the host (me) to "unmute" by raising your hand. I will then send you a request (permission) to "unmute" yourself.
Technical note: If you mute yourself again after being "unmuted" you will have to alert the host again to unmute, since this format is locked for the Zoom session.
Thanks for your understanding, as we try to improve the quality of our presentations.

Tom K

## *WE NEED YOUR INPUT PLEASE*

We created a club survey to obtain your input as to what you like and where you would like to see the direction of the club go. We have only received about 10% of the members to provide input and we need MUCH MORE. It only takes about 5 minutes to complete.

**CLICK HERE**



## *President's Report*

Brian Risley - President

The weather cleared for the eclipse. Don Palmer and I setup at Centennial Park and had a good turnout. Tom Segur and the Charlotte crew had a good turnout at FSW Moore Observatory in Punta Gorda. Heather Preston reported that they had a good event at the Calusa Nature Center Planetarium. Don't forget we get another shot in April!

The Seahawk Park Star Party the night of the eclipse had great weather. We only had a handful of people come out however. We have additional Seahawk Park Star Parties on Nov 11th and December 16th.

The Lee County Parks and Rec Fall Festival at the North Fort Myers Rec Center Community Park on the 20th had a great turnout. We had over 1000 people come out. The moon was well placed and Saturn was great once it started to get dark.
I wasn't able to do the International Observe the Moon night on the 21st.

November 25th is Solar Observing at Gilchrist Park.
The tentative schedule for the Big Cypress Astronomy nights is: 12/9/23, 1/13/24, 2/10/24, 3/9/24. They also have a Swamp Heritage Festival on 12/2/23 (10am – 3pm) that I am planning on going to.
The Cape Coral Parks and Rec Rotary Park Star Party is Friday March 8th, 2024. (This follows the Burrowing Owl Festival on Saturday Feb 24th 2024, so we can really publicize it.)

We will be having voting on the budget and dues increase coming up along with the election of officers and we need a majority of membership response on those. If you are interested in being an officer, please contact me as we will be looking to get the election ballot information out before the December meeting. Please respond ASAP to the ballots that come out as we need a majority of members voting for them to be valid.

Our speaker this month on Zoom is Dr. Matthew Greenhouse, Project Scientist JWST - NASA Goddard Space Flight Center

## GUEST SPEAKER PRESENTATIONS SERIES

We are excited to announce the initiation of the new "SWFAS Guest Speaker Presentations" series of talks. These will cover astronomical science and space exploration along with practical astronomy and astrophotography talks by various subject matter experts. We are lining up prominent scientists and researchers to explain the science and technology behind the exciting discoveries being made in recent years in astronomy.

The following presentations are already scheduled and we will be firming up talks in 2023 on a month-to-month basis.:

| | |
|---|---|
| Nov. 2, 2023 | Dr. Matthew Greenhouse, Project Scientist JWST - NASA Goddard Space Flight Center |
| Dec. 7, 2023 | Dr. Olivia Wilkins - **Exploring the Invisible Chemical Universe With Radio Astronomy** NASA Postdoctoral Program Fellow, NASA Goddard Space Flight Center. |
| Jan. 7, 2024 | Dr. Mario Motta, Club Member speaking on **The Life and Legacy of Russell Porter and the early Stellafane years.** |

## Nov. 2, 2023

**Dr. Matthew Greenhouse**
**Project Scientist, JWST - NASA**
**Goddard Space Flight Center**
**Nov. 2, 2023**

OPEN TO ALL SWFAS MEMBERS AND THE PUBLIC - More Info & Zoom Links at https://theeyepiece.org/

# *The Astronomical League Report*

**The Astronomical League**

As a member of the Southwest Florida Astronomical Society you are automatically also a member of the Astronomical League, a nationwide affiliation of astronomy clubs. Membership in the AL provides a number of benefits for you including receipt of The Reflector, the AL's quarterly newsletter, use of the Book Service, through which you can buy astronomy related books at a 10% discount. You can also participate in the Astronomical League's Observing Clubs. The Observing Clubs offer encouragement and certificates of accomplishment for demonstrating observing skills with a variety of instruments and objects. These include the Messier Club, Binocular Messier Club, the Herschel 400 Club, the Deep Sky Binocular Club, and many others. To learn more about the Astronomical League and its benefit s for you, visit http://www.astroleague.org

**RASC 2024 Observer's handbooks & Calendars**

The Astronomical League announced in late September that the USA Version of the RASC (Royal Astronomical Society of Canada) 2024 Observer's Handbooks and Calendars are available for PRE-ORDER on the League Sales web store at
https://store.astroleague.org/
https://store.astroleague.org/index.php?main_page=index&cPath=12
The Astronomical League sells these items each fall at a fantastic price with their members in mind. tock will arrive in typically in November and typically ship in December in time for Christmas.

The League suggests ordering early to ensure availability, as stock will be limited once the order comes in. Clubs may place group orders with versions of the RASC Calendar for 6+ units and for the RASC Handbook for 10+ units, both on the League Sales web store. Free shipping and discounted prices apply.


**Reflector Magazine**
The latest September 2023 copy of the Reflector magazine was emailed on August 22. It is also available via the web at https://www.astroleague.org/reflector

**Monthly highlight of the Astronomical League Observing Programs**
**(Article prepared by SWFAS Astronomical League Coordinator John MacLean)**

The Astronomical League Urban Observing Program
Over the last two months we highlighted the Messier and Caldwell List Observing programs which cover some of the best objects available for amateurs to observe in the night sky. These programs include many targets requiring darker skies.

This month we'll discuss the Urban Observing Program which is specifically designed to offer a challenge to observe 100 objects in light polluted skies. To gain the award, all observations must be made from light polluted sites and observations made from dark sky sites are not allowed! The definition of a light polluted sky is one from which the Milky Way is not visible to the naked eye. This corresponds to a Bortle

Scale of 5 or higher on the cleardarksky chart.

**Urban Observing Program**
Two lists are provided. The first includes 87 dark sky objects including Open Clusters, Globular Clusters, Planetary Nebulas, and Galaxies. Forty-one of these objects are on the Messier List. All objects are listed in Right Ascension order so that you can view them as they rise in the East and set in the West. Information provided on each deep-sky object includes: Catalog Number, Right Ascension, Declination, Magnitude, Messier Designation (if any), Type of Object, Size, Constellation, and what chart it is located on in both the Uranometria or Sky Atlas 2000.The second list includes 12 Double Stars and the variable star Algol. Observations and magnitude estimates of Algol are required both at a minimum and any non-minimum night. The recommended minimum size scope aperture is 6 inches. Scopes between 6 and 10 inches aperture were used to validate the lists. Included on the website for this program is a useful and detailed set of Tips for Observing in a Light Polluted area. This covers optimum times (following store closures, etc.), sky and weather conditions, tips for shielding stray light, filters, and so forth. Setting circles are permitted although star-hopping with finders and Telrads is the preferred method for locating objects.

---

## Port Charlotte/Punta Gorda Observing Dates Announced

Night Sky Observing At Moore Observatory & Solar Observing In PG & PC

Our Observatory Team opens up the Moore Observatory at FSW Charlotte Campus (26000 Airport Road, Punta Gorda) on the second Friday of each month. Observation sessions typically begin about 30-45 minutes after it is dark enough to see the stars and continue as long as stargazers linger. Prior to complete darkness, visitors can not be admitted into the observatory as the equipment needs to be setup and aligned with the stars each time but early arrivers are welcome to enjoy views of the lake and the scenery of the campus from the lakeside picnic tables. The public sessions are free and held weather permitting.

Here is the schedule for 2023/24:

- Oct 13, 2023
- Nov 10, 2023
- Dec 8, 2023
- Jan 12, 2024
- Feb 9, 2024
- Mar 8, 2024
- Apr 12, 2024
- May 10, 2024

Our observing team also sets up solar telescopes on the 4th Saturday of the month (from 9am - Noon) to look at the Sun, looking for solar flares, prominences and other solar phenomena. All events are in Port Charlotte or Punta Gorda.

Solar Observing/Park

| | |
|---|---|
| Oct 28, 2023 | Bayshore Live Oak |
| Nov, 25 ,2023 | Gilchrist |
| Dec 23, 2023 | Ponce deLeon |
| Jan 27, 2024 | Bayshore Live Oak |
| Feb 24, 2024 | Gilchrist |
| Mar 23, 2024 | Ponce deLeon |
| Apr 27, 2024 | Bayshore Live Oak |
| May 25, 2024 | Gilchrist |

## ABOUT THE ASTRO SIG

*Every month we get together on a Zoom call with a pretty loose agenda and manage to have an absolute blast talking about Astrophotography. I hope you'll join us if you're interested in Astrophotography.*

### IMAGING TRIPS TO BIG CYPRESS

Big Cypress National Park is about a 75 minute drive from Ft. Myers and it is probably one of the darkest areas in the state of Florida. We have a great place to set up and frequently meet astrophotographers and observers from other parts of the state.

The best way to stay tuned in to our impromptu field trips is to get on our Astro SIG Google Groups email list. Contact Mike Jensen.

## Astro Sig Schedule 2023/24

All Meetings at 6:30pm

November 14th
December 19th
January 16th

## *The Astrophotography SIG*

Our Astro SIG group is really growing in strength. From a meeting perspective, we are small, but our email list is about 40 and of those about 10 consistently contribute images for use on our website and in the newsletter. I truly believe that some of our images are unequaled in quality.

Many of our group are out imaging almost every possible night and reporting the results on our email group.

I am especially proud at the way our group shares lessons learned and methods taken to get the best our of there gear and the best images. Please see our images beginning on the next page.

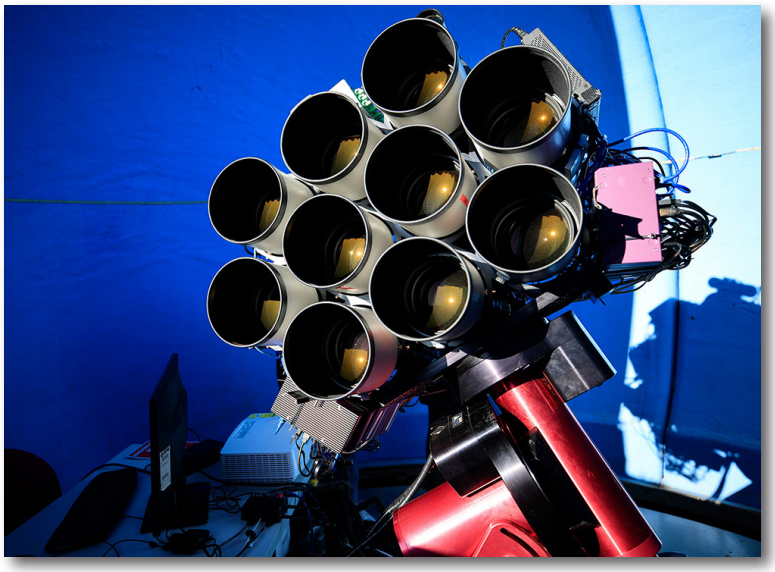
### ASTRO SIG MEETING ZOOM LINK

https://us02web.zoom.us/j/81077794455?pwd=eGpxalRET1BPckdEcmtJQ290WU5jdz09

Meeting ID: 810 7779 4455
Passcode: Phot@S!G23

## New Feature
## SIG Rig of the Month

Thanks to John Udart for the suggestion of the SIG Rig of the month. This can be as easy or complicated as you wish. We'd just like to see your rig, have you tell about it, maybe show some pics from it. It's another way to socialize and show off your stuff! I believe John will be up first (in Dec.)



## The Bubble Nebula - NGC 7635 by Dick Cogswell

Brand/Type of Telescope/Lens: Celestron 11 Edge 2800mm
Mount: AP 1100
Exposures: 94 4 minute frames; LRHOO

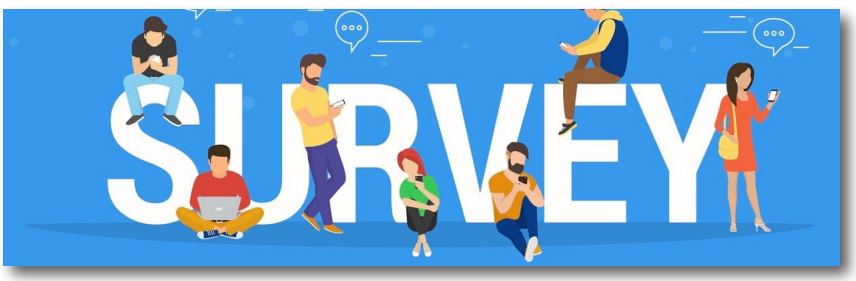
Discovered by William Herschel in 1787 using one of the biggest telescopes Celestron ever made, it was created by the stellar wind from a massive hot young central star, SAO 20575. The bubble is near a giant molecular cloud of ionized hydrogen glowing around the bubble and in the background. It is 15 x 8 arc min in apparent size, magnitude 10, and about 7100-11000 light years distant

Processing Software: APP

**Fireworks Galaxyby Dick Cogswell**
Brand/Type of Telescope/Lens: C-11 2800mm f/l
Mount: AP1100
Exposures:

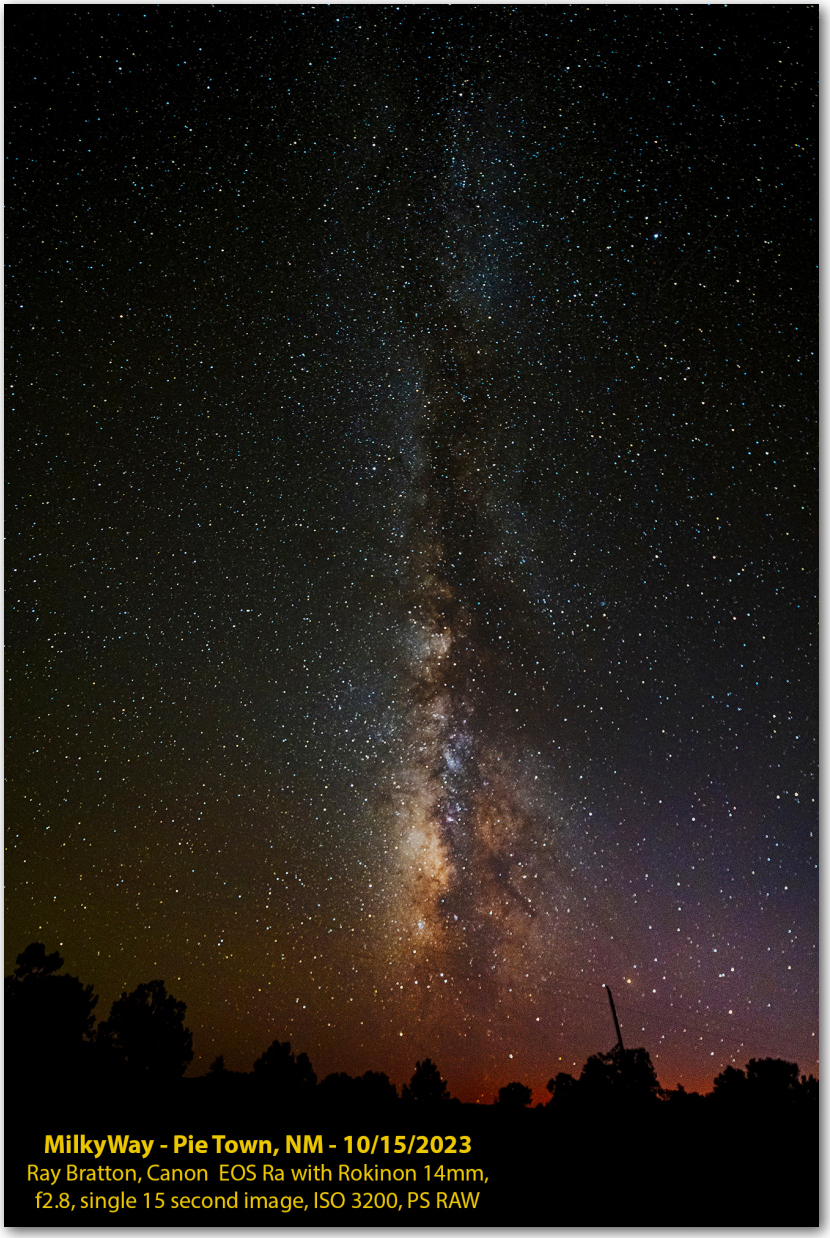
102 4-minute exposures LRGBHa

Processing Software: APP, Bx, DN



## Jupiter by Ray Bratton

Brand/Type of Telescope/Lens: ES127 FC Triplet, 952mm, Televue 2X, ASI294MC Pro,
Mount: EQ6R Pro
Exposures: AVI video ASIAIR Plus 3 minutes, 7500 frames
Processing Software: ASIAIR Stacking, PS RAW and Topaz DeNoise

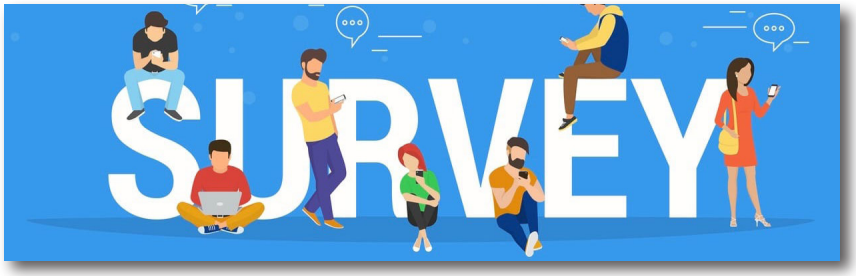


**MilkyWay - Pie Town, NM - 10/15/2023**
Ray Bratton, Canon EOS Ra with Rokinon 14mm, f2.8, single 15 second image, ISO 3200, PS RAW

**The "Heart" of the Heart Nebula - IC1805 by Mike Jensen**

Brand/Type of Telescope/Lens: Explore Scientific CF 127
Mount: EQ6 R Pro
Exposures: 30 each of RGB at 300 secs
Camera: ZWO 1600 Mono
Processing Software: PixInsight, Photoshop, Topaz DeNoise

The Heart Nebula is an emission nebula, 7500 light years away from Earth and located in the Perseus Arm of the Galaxy in the constellation Cassiopeia. It was discovered by William Herschel on 3 November 1787. It displays glowing ionized hydrogen gas (usually depicted in Red) and darker dust lanes.



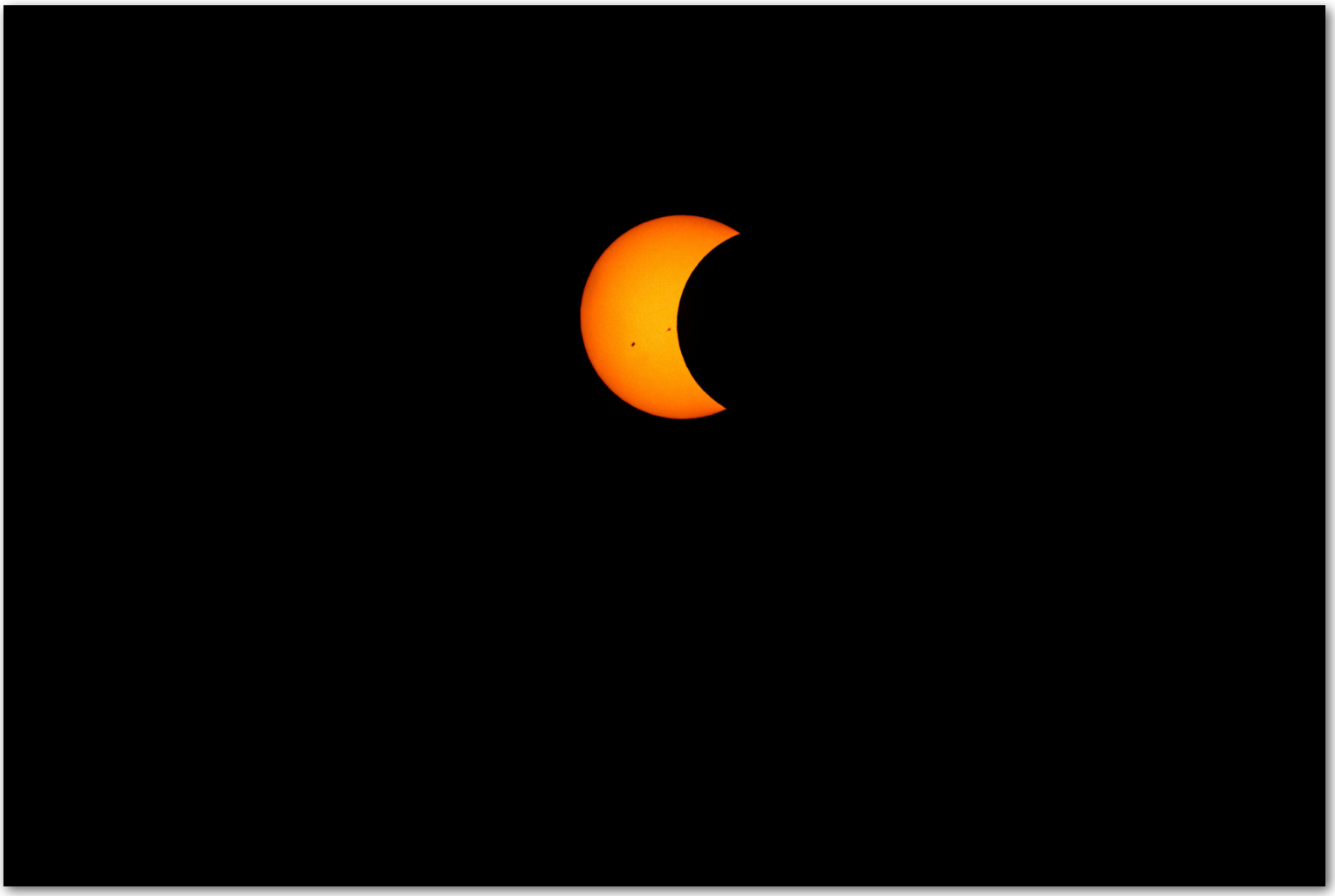
**NGC7822 Center Portion of Cosmic Question Mark Nebula by Scott Cruzen**
Brand/Type of Telescope/Lens: Astronomics Astro-Tech 80mm EDT APO refractor 480mm FL
Mount: EQ6-R Pro Equatorial
Exposures:
203 x 300sec Ha and OIII 7nM Filter
198 x 300sec SII 7 nM Filter
Processed SHO
ASI 533MC Pro imaging Camera controlled by ASIAir Plus

Processing Software: SiriL/SiriLic, GIMP, DarkTable, Topaz

**Thors Helmet by Philip Jansen**
Brand/Type of Telescope/Lens: Askar FMA230
Mount: Ioptron G28
Exposures:

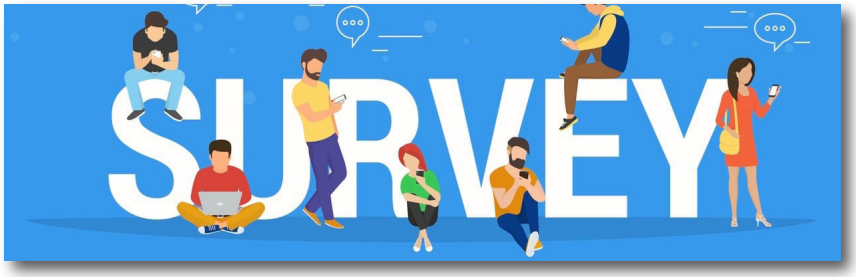
1 Exp,

Processing Software: Affinity, Topaz



**Eclipse by Phil Jansen**
Brand/Type of Telescope/Lens: Tamron 150 -600mm lens
Mount: carbon fiber tripod
Exposures: 1

Processing Software: Affinity, Topaz

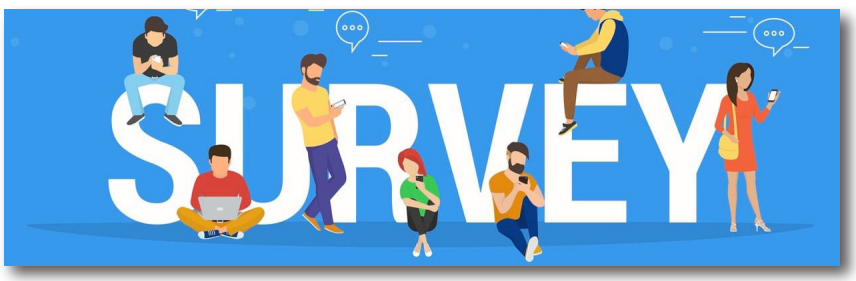


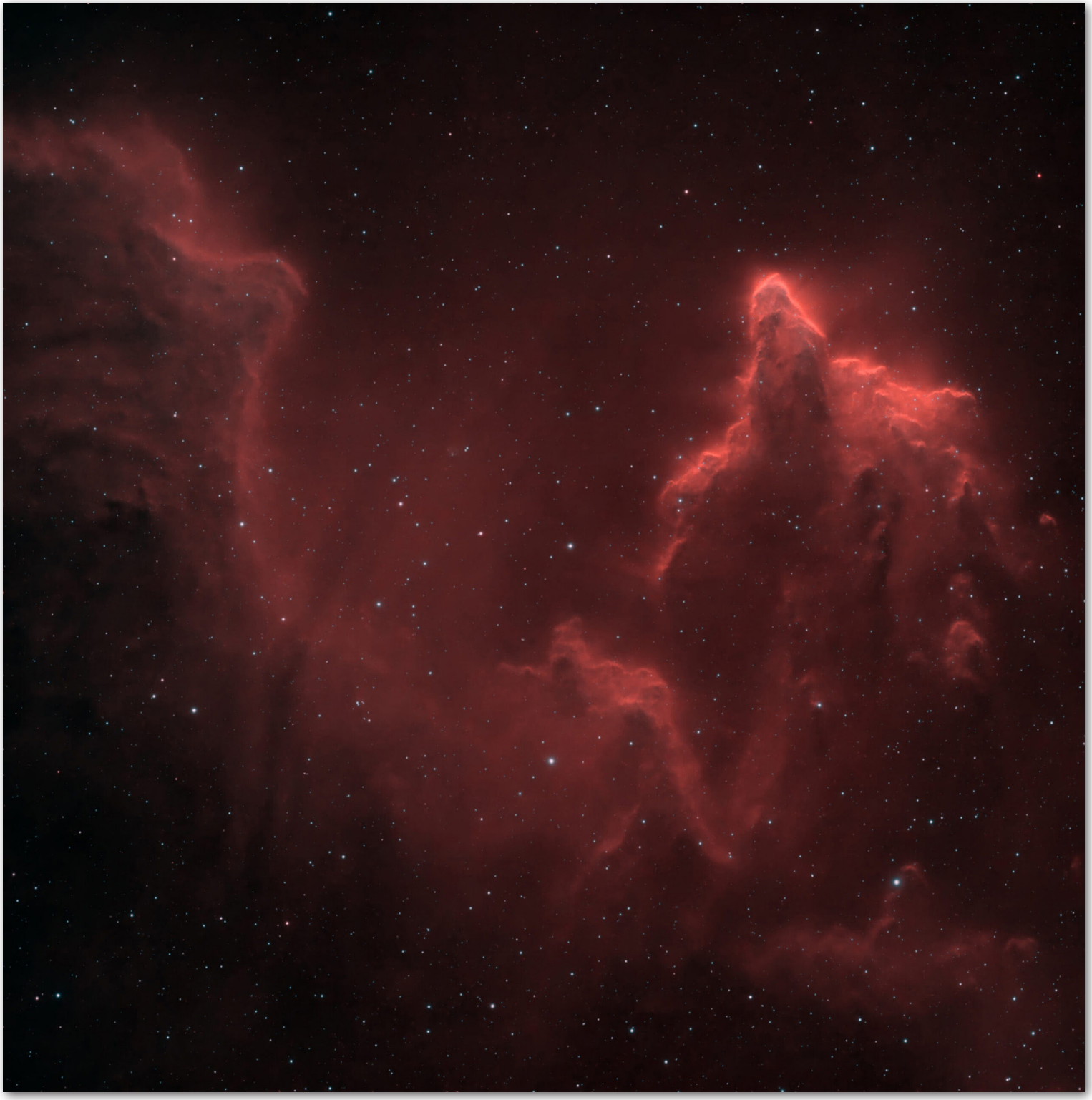

## East Veil Nebula C33 by Steven Sandor

Brand/Type of Telescope/Lens: Astrotech 115mm FL 750mm, 0.8 reducer / flattner
Mount: Skywatcher EQ6-R Pro
Exposures:

50 exposues, 90 seconds each taken with Canon D600 modified camera @ ISO 1600
SVBONY UHC filter

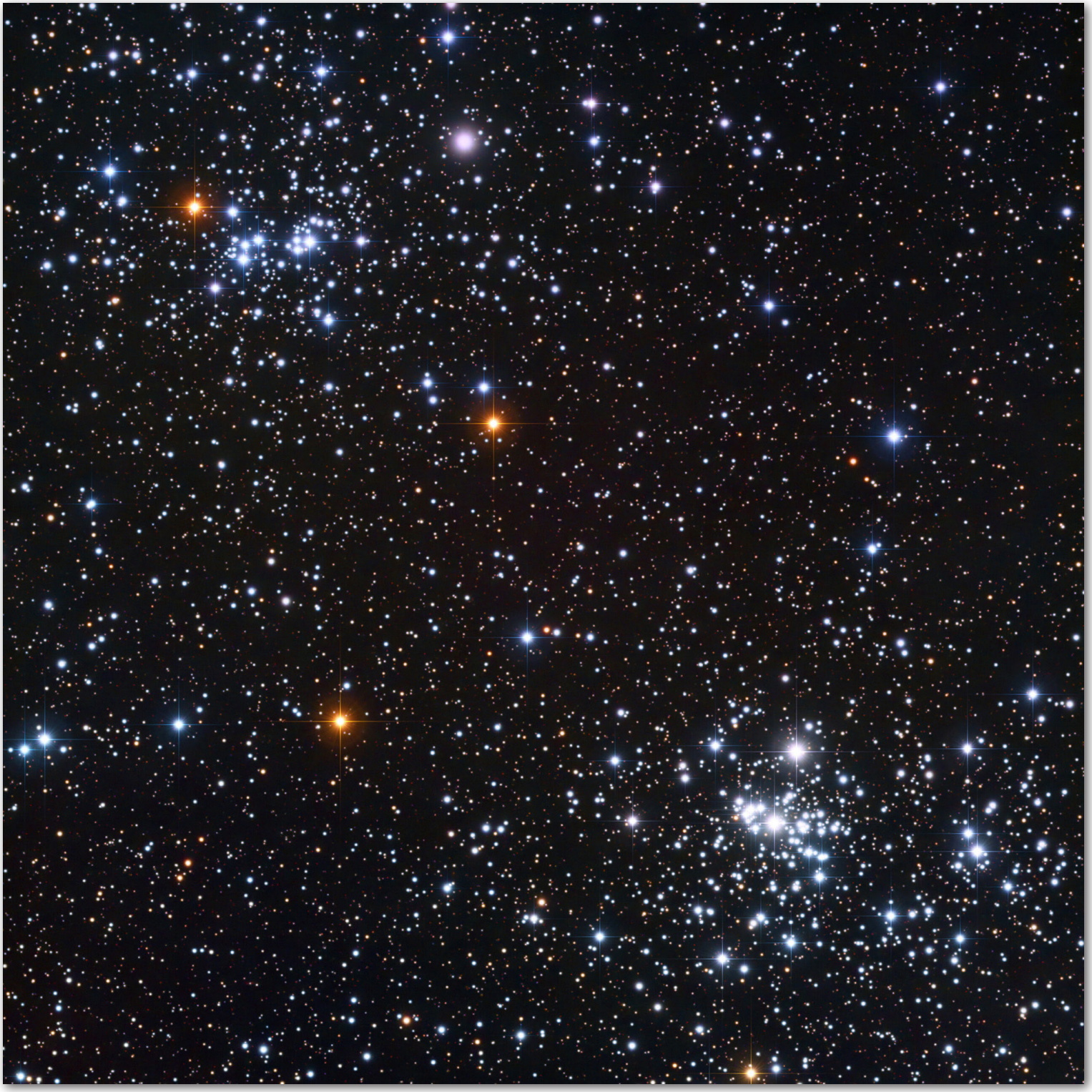
Processing Software: Siril software for pre and post processing





**Ghost of Cassiopeia by Spencer Collins**
Brand/Type of Telescope/Lens: Sky-Watcher Esprit 150 f/7
Mount: Sky-Watcher CQ350
Exposures: 4 hours Oiii, 2 hours Ha. 3nm Antlia filters used with 533mm camera.

Processing Software: Pixinsight



**Double Cluster by Spencer Collins**
Brand/Type of Telescope/Lens: Sky-Watcher Esprit 150 f/7
Mount: Sky-Watcher CQ350
Exposures: 3 hours of 30sec exposures across RGB. Antlia RGB filters with 533mm camera

Processing Software: Pixinsight

**Wizard Nebula by Spencer Collins**
Brand/Type of Telescope/Lens: Sky-Watcher Esprit 150 f/7
Mount: Sky-Watcher CQ350
Exposures:6 hours SHO, Antlia 3nm filters and 533mm camera.

Processing Software: Pixinsight

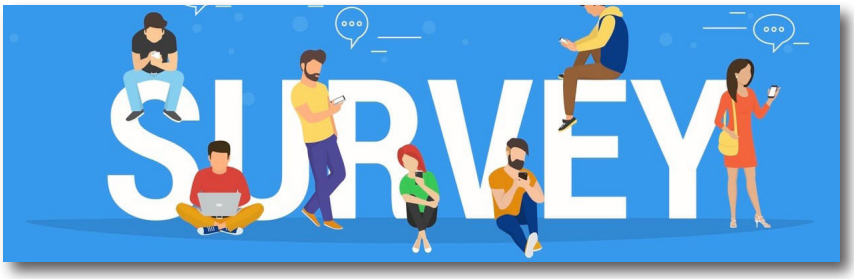
## The Moon by Spencer Collins

Brand/Type of Telescope/Lens: Sky-Watcher Esprit 150 f/7
Mount: Sky-Watcher CQ350
Exposures:

300 individual frames (100 per RGB). 533mm with Antlia filters.

Processing Software: Pixinsight & PS

**M8 Lagoon & M20 Trifid Nebula - Ray Bratton**
ESSP in Pie Town, NM, 10/18/2023
WO61ZS, ASI2600MC Duo, ZWO Duo filter,
EQ6R Pro, ASIAIR+, 15 120s (30min), 100G,
0°C, APP, PSRAW, Topaz DeNoise

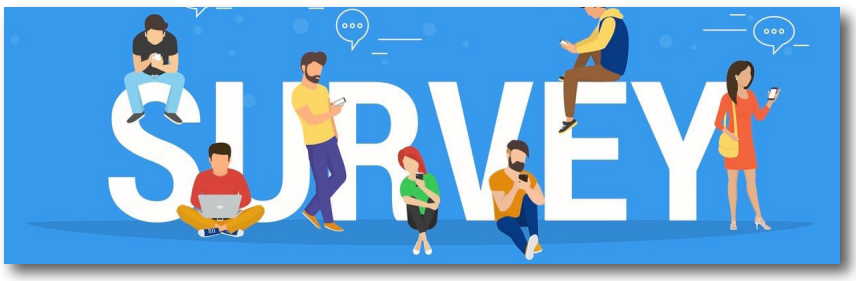


**The Cygnus Wall Redo by Don Bishop**
Brand/Type of Telescope/Lens: Stellarvue SVX-102T-R 714mm focal length
Mount: Pegasus Strain Wave NYX-101
Exposures:

This is a narrowband image in SHO with a new OIII filter that was kindly replaced by the manufacturer due to excessive halos on bright stars. The controlling computer failed during the night limiting the total exposures to 4 hours and 16 minutes.
Ha filter - 4 subs for 20 minutes
OII filter - 22 subs for 86 minutes
SII filter - 32 subs for 150 minutes

Processing Software: Processed in AstroPixelProcesser, Lightroom and Topaz denoise

**M31 Andromeda, M32, & M110 - Ray Bratton**
ESSP in Pie Town, NM, 10/18/2023
WO61ZS, ASI2600MC Duo, ZWO Duo filter, ASIAIR+,
EQ6R Pro, 12 300s (1hr), 100g, 0°C,
APP, PSRAW, Topaz DeNoise



**Cygnus Wall by Spencer Collins**
Brand/Type of Telescope/Lens: Sky-Watcher Esprit 150 f/7
Mount: Sky-Watcher CQ350
Exposures:4.5 hours of SHO with RGB stars. 533mm with Antlia 3nm filters.

Processing Software: Pixinsight

## The Iris Nebula by Dick Cogswell

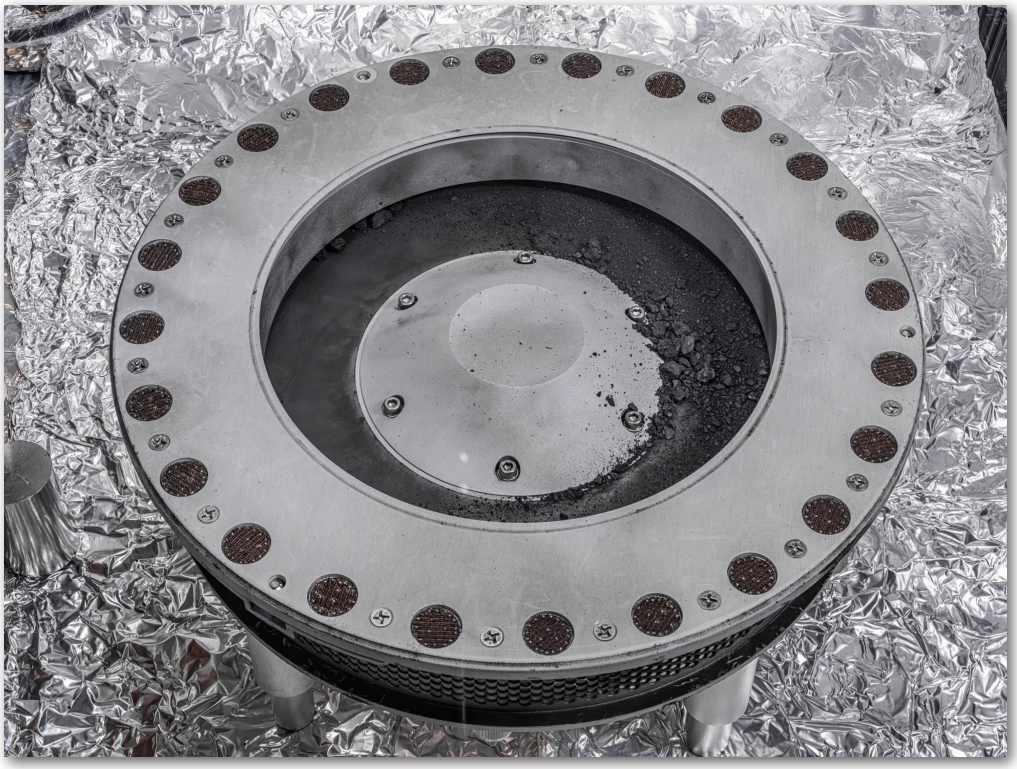
Brand/Type of Telescope/Lens: Ce;estron 11 Edge, 2800mm f/l
Mount: AP1100
Exposures:

The Iris Nebula is a reflection nebula in Cepheus. It has a designation of NGC 7023, but that is actually for the open cluster within the nebula. It is relatively bright at +6.8 illuminated by magnitude +7.4 star HD 200775.

This image was taken with my C-11 Edge at 2800mm f/l, and was made from 115 4-minute exposures processed as LRGBHOO.

Processing Software: APP, Bx, PS

# *NASA's Bennu Asteroid Sample Contains Carbon, Water*



Initial studies of the 4.5-billion-year-old asteroid Bennu sample collected in space and brought to Earth by NASA show evidence of high-carbon content and water, which together could indicate the building blocks of life on Earth may be found in the rock. NASA made the news Wednesday from its Johnson Space Center in Houston where leadership and scientists showed off the asteroid material for the first time since it landed in September.

This finding was part of a preliminary assessment of NASA's OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification and Security – Regolith Explorer) science team.

"The OSIRIS-REx sample is the biggest carbon-rich asteroid sample ever delivered to Earth and will help scientists investigate the origins of life on our own planet for generations to come," said NASA Administrator Bill Nelson. "Almost everything we do at NASA seeks to answer questions about who we are and where we come from. NASA missions like OSIRIS-REx will improve our understanding of asteroids that could threaten Earth while giving us a glimpse into what lies beyond. The sample has made it back to Earth, but there is still so much science to come – science like we've never seen before."

Although more work is needed to understand the nature of the carbon compounds found, the initial discovery bodes well for future analyses of the asteroid sample. The secrets held within the rocks and dust from the asteroid will be studied for decades to come, offering insights into how our solar system was formed, how the precursor materials to life may have been seeded on Earth, and what precautions need to be taken to avoid asteroid collisions with our home planet.

***Bonus sample material***

The goal of the OSIRIS-REx sample collection was 60 grams of asteroid material. Curation experts at NASA Johnson, working in new clean rooms built especially for the mission, have spent 10 days so far carefully disassembling the sample return hardware to obtain a glimpse at the bulk sample within. When the science canister lid was first opened, scientists discovered bonus asteroid material covering the outside of the collector head, canister lid, and base. There was so much extra material it slowed down the careful process of collecting and containing the primary sample.

"Our labs were ready for whatever Bennu had in store for us," said Vanessa Wyche, director, NASA Johnson. "We've had scientists and engineers working side-by-side for years to develop specialized gloveboxes and tools to keep the asteroid material pristine and to curate the samples so researchers now and decades from now can study this precious gift from the cosmos."

Within the first two weeks, scientists performed "quick-look" analyses of that initial material, collecting images from a scanning electron microscope, infrared measurements, X-ray diffraction, and chemical element analysis. X-ray computed tomography was also used to produce a 3D computer model of one of the particles, highlighting its diverse interior. This early glimpse provided the evidence of abundant carbon and water in the sample.

"As we peer into the ancient secrets preserved within the dust and rocks of asteroid Bennu, we are unlocking a time capsule that offers us profound insights into the origins of our solar system," said Dante Lauretta, OSIRIS-REx principal investigator, University of Arizona, Tucson. "The bounty of carbon-rich material and the abundant presence of water-bearing clay minerals are just the tip of the cosmic iceberg. These discoveries, made possible through years of dedicated collaboration and cutting-edge science, propel us on a journey to understand not only our celestial neighborhood but also the potential for life's beginnings. With each revelation from Bennu, we draw closer to unraveling the mysteries of our cosmic heritage."

For the next two years, the mission's science team will continue characterizing the samples and conduct the analysis needed to meet the mission's science goals. NASA will preserve at least 70% of the sample at Johnson for further research by scientists worldwide, including future generations of scientists. As part of OSIRIS-REx's science program, a cohort of more than 200 scientists around the world will explore the regolith's properties, including researchers from many U.S. institutions, NASA partners JAXA (Japan Aerospace Exploration Agency), CSA (Canadian Space Agency), and other scientists from around the world. Additional samples will also be loaned later this fall to the Smithsonian Institution, Space Center Houston, and the University of Arizona for public display.

NASA's Goddard Space Flight Center in Greenbelt, Maryland, provides overall mission management, systems engineering, and the safety and mission assurance for OSIRIS-REx. Lauretta, the principal investigator, leads the science team and the mission's science observation planning and data processing. Lockheed Martin Space in Littleton, Colorado, built the spacecraft, provided flight operations, and was responsible for capsule recovery. Goddard and KinetX Aerospace were responsible for navigating the OSIRIS-REx spacecraft. Curation for OSIRIS-REx, including processing the sample when it arrived on Earth, is taking place at NASA Johnson.

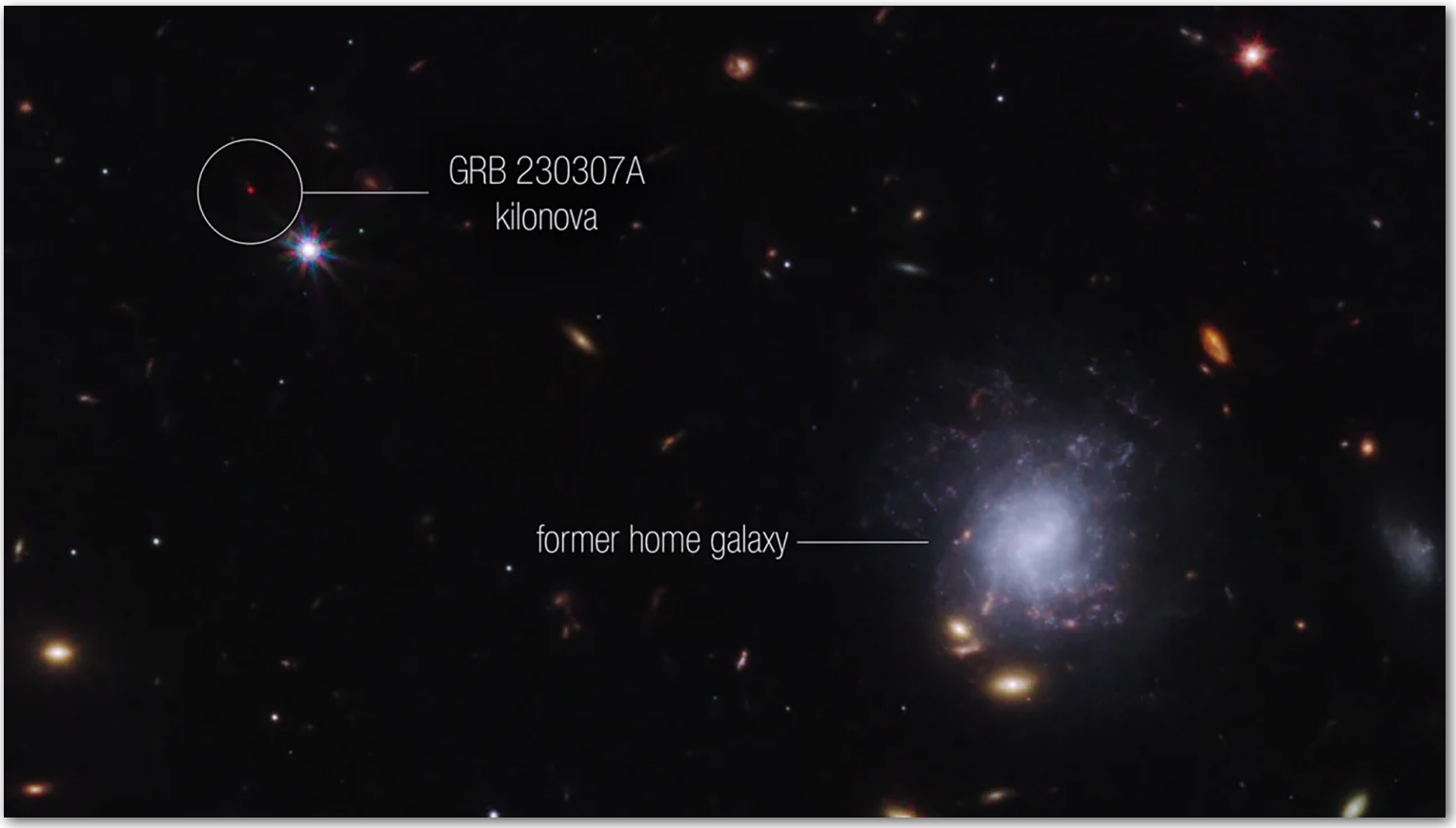
OSIRIS-REx is the third mission in NASA's New Frontiers Program, managed by NASA's Marshall Space Flight Center in Huntsville, Alabama, for the Science Mission Directorate at NASA Headquarters in Washington.

Find more information about NASA's OSIRIS-REx mission at:

https://www.nasa.gov/osiris-rex

# *JWST Discovers Kilonova*

## *Explosion 1 million times brighter than the Milky Way creates rare elements*




The James Webb Space Telescope and other observatories witnessed a massive explosion in space that created rare chemical elements, some of which are necessary for life.

The explosion, which occurred on March 7, was the second brightest gamma-ray burst ever witnessed by telescopes in more than 50 years of observations, over one million times brighter than the entire Milky Way Galaxy combined. Gamma-ray bursts are short emissions of the most energetic form of light.

This particular burst, called GRB 230307A, was likely created when two neutron stars — the incredibly dense remnants of stars after a supernova — merged in a galaxy about one billion light-years away. In addition to releasing the gamma-ray burst, the merger created a kilonova, a rare explosion that occurs when a neutron star merges with another neutron star or a black hole, according to a study published Wednesday in the journal Nature.

“There are only a mere handful of known kilonovas, and this is the first time we have been able to look at the aftermath of a kilonova with the James Webb Space Telescope,” said lead study author Andrew Levan, astrophysics professor at Radboud University in the Netherlands. Levan was also part of the team that made the first detection of a kilonova in 2013.

In addition to Webb, NASA’s Fermi Gamma-ray Space Telescope, Neil Gehrels Swift Observatory, and the Transiting Exoplanet Survey Satellite observed the burst and traced it back to the neutron star merger. Webb was also used to detect the chemical signature of tellurium within the aftermath of the explosion.

Tellurium, a rare metalloid, is used to tint glass and ceramics and has a role in the manufacturing process of

rewritable CDs and DVDs, according to the Royal Society of Chemistry. Astronomers expect that other elements close to tellurium on the periodic table, including iodine, which is necessary for much of life on Earth, is likely to be present in the material released by the kilonova.

"Just over 150 years since Dmitri Mendeleev wrote down the periodic table of elements, we are now finally in the position to start filling in those last blanks of understanding where everything was made, thanks to Webb," Levan said.

Tracking stellar explosions
Astronomers have long believed that neutron star mergers are the celestial factories that create rare elements heavier than iron. But it's been difficult to track down the evidence.

Kilonovae are rare events, which makes them difficult to observe. But astronomers look for short gamma-ray bursts, which only last about two seconds at the longest, as the telltale byproducts of the scarce events.

What was unusual about this burst is that it lasted for 200 seconds, making it a long gamma-ray burst. Such extended bursts are usually associated with supernovas created when massive stars explode.

"This burst is way into the long category. It's not near the border. But it seems to be coming from a merging neutron star," said study coauthor Eric Burns, assistant professor of physics and astronomy at Louisiana State University, in a statement.

This artist's concept shows what the exoplanet WASP-17 b could look like.

WASP-17 b, also called Ditsô, is a hot gas giant that orbits its star at a distance of just 0.051 AU (about 4.75 million miles, or one-eighth the distance between Mercury and the Sun), completing one full circuit in about 3.7 Earth-days. The system lies within the Milky Way, about 1,300 light-years from Earth, in the constellation Scorpius.

With a volume more than seven times that of Jupiter and a mass less than one-half of Jupiter, WASP-17 b is an extremely puffy planet. Its short orbital period, large size, and thick, extended atmosphere make it ideal for observation using transmission spectroscopy, which involves measuring the effects of the planet's atmosphere on the starlight filtering through it.

WASP-17 b's atmosphere is composed primarily of hydrogen and helium, along with small amounts of water vapor and hints of carbon dioxide and other molecules. Observations of 5- to 12-micron infrared light from Webb's MIRI (Mid-Infrared Instrument) show that WASP-17 b's atmosphere also contains clouds made of nanocrystals of quartz (SiO2).

WASP-17 b is tidally locked and has a retrograde orbit. Its temperature ranges from about 1,000 kelvins (1,350 degrees F or 725 degrees C) on the cooler nightside to nearly 2,000 kelvins (3,150 degrees F or 1,725 degrees C) on the side in permanent daylight.

The star, WASP-17 (also called Diwö), is an F-type star: slightly larger, more massive, hotter, and whiter than the Sun.

This artist's concept is based on new data gathered by MIRI as well as previous observations from other ground- and space-based telescopes, including NASA's Hubble and retired Spitzer space telescopes. Webb has not captured any images of the planet.
Quartz crystals detected swirling in an exoplanet's atmosphere

Fermi initially detected the gamma-ray burst, and astronomers used ground- and space-based observatories to track the changes in brightness during the aftermath of the explosion in gamma-ray, X-ray, visible, infrared and radio waves of light. The quick changes in visible and infrared light suggested it was a kilonova.

“This type of explosion is very rapid, with the material in the explosion also expanding swiftly,” said study co-author Om Sharan Salafia, a researcher at the National Institute for Astrophysics’ Brera Astronomical Observatory in Italy, in a statement. “As the whole cloud expands, the material cools off quickly and the peak of its light becomes visible in infrared, and becomes redder on timescales of days to weeks.”

The team also used Webb to trace the journey of the neutron stars before they exploded.

Once, they were two massive stars in a binary system that existed in a spiral galaxy. One of the pair exploded as a supernova, leaving behind a neutron star, and then the same thing happened to the other star. These explosive events launched the stars from their galaxy and they remained as a pair, traveling for 120,000 light-years before merging several hundred million years after being ejected from their home.

Finding cosmic elements
Astronomers have been trying to determine how chemical elements are created in the universe for decades.

Discovering more kilonovas in the future with sensitive telescopes like Webb and the Nancy Grace Roman Space Telescope, set to launch in 2027, could provide insights into which heavy elements are created and released by the rare explosions.

The researchers also want to find more mergers that create longer gamma-ray bursts to determine what drives them and whether there is any connection to the elements created in the process.

Mysterious planet-like objects can be seen for the first time in this image of the inner Orion Nebula and Trapezium Cluster.
Unprecedented discovery seems to defy fundamental astronomical theories
The violent life cycle of stars has distributed the elements found on the periodic table throughout the universe, including those necessary for life to form on Earth in the first place. The ability to study stellar explosions like kilonovas in recent years is enabling scientists to answer questions about the formation of chemical elements, allowing for a deeper understanding of how the universe has evolved over time.

“Webb provides a phenomenal boost and may find even heavier elements,” said study coauthor Ben Gompertz, assistant professor at the Institute for Gravitational Wave Astronomy and the School of Physics and Astronomy at the University of Birmingham in the United Kingdom, in a statement.

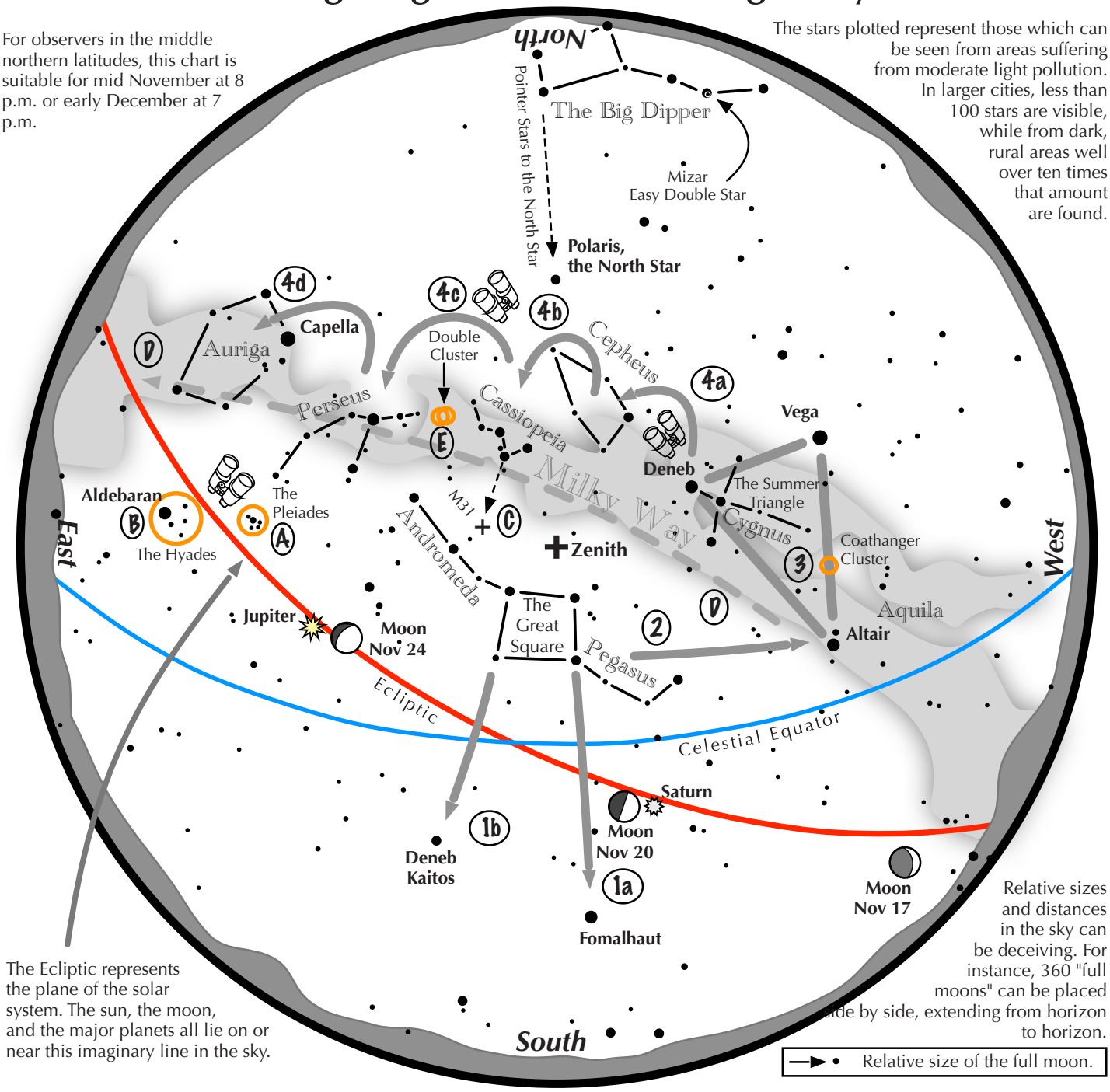
“As we get more frequent observations, the models will improve and the spectrum may evolve more in time,” Gompertz said. “Webb has certainly opened the door to do a lot more, and its abilities will be completely transformative for our understanding of the universe.”

## *Sky Chart*

# Navigating the November Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid November at 8 p.m. or early December at 7 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.




The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→• Relative size of the full moon.

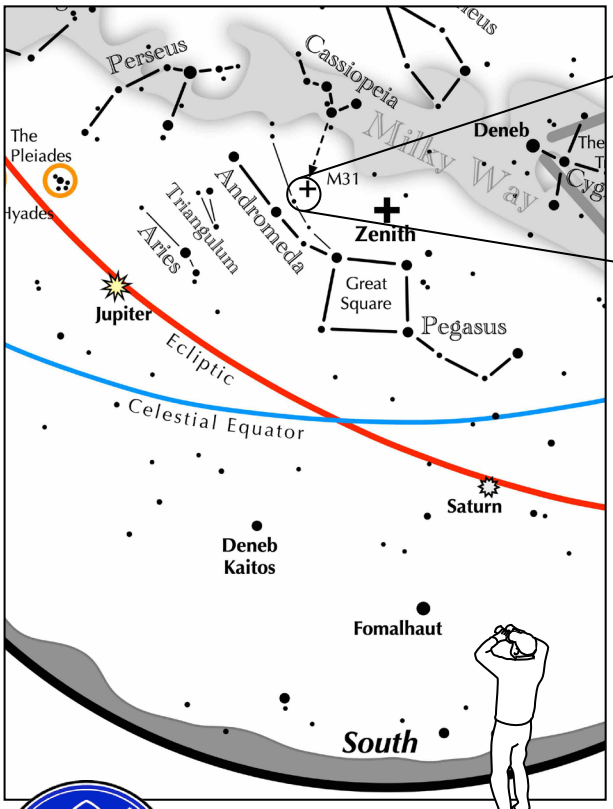
## Navigating the November night sky: Simply start with what you know or with what you can easily find.

1. Face south. Almost overhead lies the "Great Square" with four stars about the same brightness as those of the Big Dipper. Extend a line southward following the Square's two westernmost stars. The line strikes Fomalhaut, the brightest star in the south. A line extending southward from the two easternmost stars, passes Deneb Kaitos, the second brighest star in the south.
2. Draw a line westward following the southern edge of the Square until it strikes Altair, part of the "Summer Triangle."
3. Locate Vega and Deneb, the other two stars of the Summer Triangle. Vega is its brightest member, while Deneb sits in the middle of the Milky Way.
4. Jump along the Milky Way from Deneb to Cepheus, which resembles the outline of a house. Continue jumping to the "W" of Cassiopeia, then to Perseus, and finally to Auriga with its bright star Capella.

**Binocular Highlights**

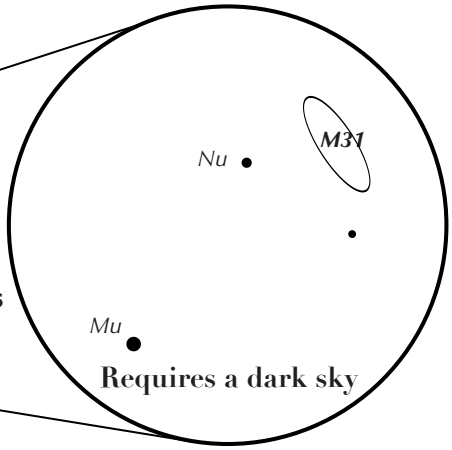
**A and B:** Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **C:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **D:** Sweep along the Milky Way from Altair, past Deneb, through Cepheus, Cassiopeia and Perseus, then to Auriga for many intriguing star clusters and nebulous areas. **E.** The Double Cluster.

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




**South**
**90 minutes after sunset**

**View through 10x50 binoculars**




## Have you seen M31, the Andromeda Galaxy?

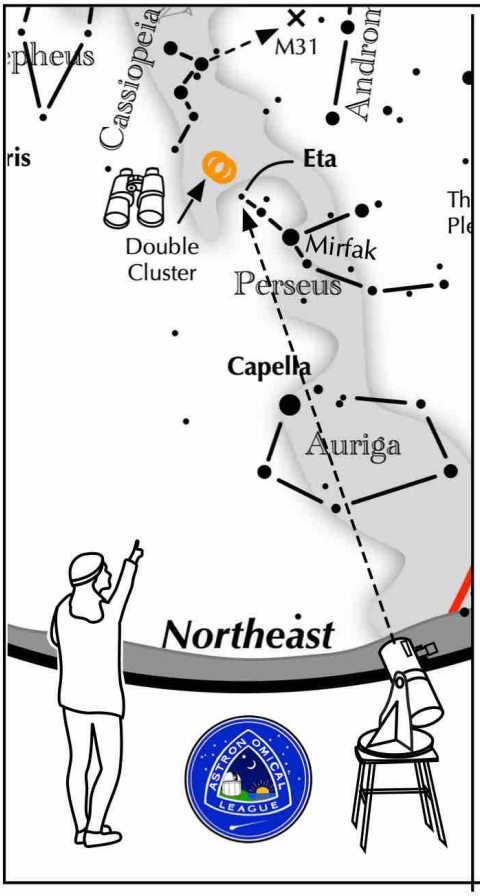
Look high in the south 90 minutes after sunset in November.

- Find the Great Square nearly at the zenith.
- Identify the line of four stars beginning at the northeast corner of the Great Square and extending northeast.
- Identify a second but dimmer line extending more northeasterly than the first line. These two lines represent Andromeda.
- Identify the third star on each line.
- A line passing through those two stars and extending northwest for the same length lands on M31.

**or ...**

- Draw an arrow pointing southward through the three westernmost stars of Cassiopeia's "W."
- Extend that line for the same length as Cassiopeia is wide.
- It ends on M31.

# ASTRONOMICAL LEAGUE Double Star Activity



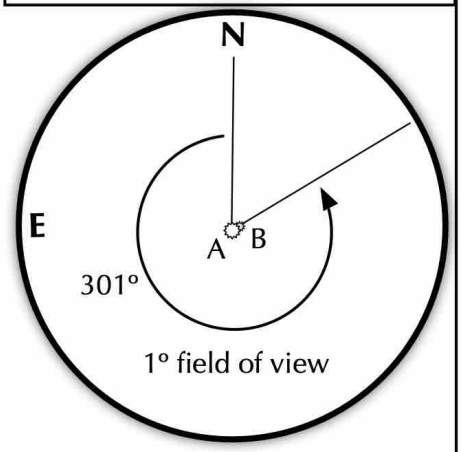

## Other Suns: Eta Persei

### How to find Eta Persei on a November evening

Face northeast. Between bright Capella and the "W" of Cassiopeia, is the constellation Perseus. Eta Persei is not quite mid way between Mirfak, the brightest star in Perseus, and the eastern edge of the "W." It lies close to the Double Cluster.

Suggested magnification: 40x
Suggested aperture: >3 inches

**Eta Persei**
A-B separation: 28 sec
A magnitude: 3.8
B magnitude: 8.5
Position Angle: 301°
A & B colors:
yellow, blue



# Meeting Minutes

Southwest Florida Astronomical Society, Inc. member minutes October 5, 2023 Calusa Nature Center Planetarium and Zoom

Opening remarks … Tom Klein opened the meeting at 7:00PM by welcoming everyone, there were 17 in the room of which two were new attendees, and 12 on zoom. Tom explaining the zoom connection process and asked John MacLean to introduce the first quest speaker. John introduced Dr. Dave Coulter of the Space Telescope Science Institute..

Program 1….. Finding the Next Kilonova…Doctor Coulter began by illustrating how the heaviest elements came to be: gravitational waves, the promise of multi messenger astrophysics through Kilonovae and the r- process with the discovery of SSS17a, and upgraded GW-EM searches (Taglon, the second BNS Merger GW 190425)….Dave explained the electromagnetic wave windows: X-ray, optical and radio as such relates to the Astronomy of Light. That gravity warped by space and time. The suspected origins of the heavy metals, illustrating how gold was formed. Tom Klein has a link recorded of Dave's presentation in the newsletter. Linwood Ferguson, John MacLean and Tom Klein all asked excellent questions with equally excellent answers by Dr. Coulter. The members applauded his presentation.

Program 2…..Einstein's Gravity Playlist….Heather Preston presented this program on the Planetarium Dome reviewing Einstein's theory of gravitational e□ects between the years 1905-1916 producing his theory of relativity which has proven to be correct even after 100 years of science. Einstein used the planet Mercury, as it is the closest to the Sun, stating that light is bent by gravity from Mercury around the Sun, all again confirmed in 1992 by scientists.
There was a review of black holes and the dense gravity surrounding them and pulling objects into them. Gravity is so dense and so strong that light is obliterated. Several questions asked and all thanked her.

Society business happenings:

Member survey……President Risley asked Vice President Jensen to report on the number of those responding and the manner of their questions and comments. Mike advised that he just returned from a 3 week vacation to South America and will report the specifics at the next meeting.

Budget voting……John MacLean advised that all have seen the 2024 budget and that he is asking for questions or comments as the Budget will be presented at the November meeting for a final vote at the December meeting.

O□cer Elections…..President Risley asked for volunteers who would want to step up for an o□cer's position. Those names will be presented to the members at the November meeting with the election being held at the December meeting. The new Bylaws state that the election of o□cers is staggered into two o□cers serving for two years and two serving for one, alternating each term so as to have continuity.

Astronomical League and Night Sky Network handouts…..Brian Risley stated that he had one item per family of solar eclipse glasses, an AL tracking map of the eclipses, and various other items. Mike Jenson was to take Tom Segur some for Charlotte county members. Brian also that he had stu□ from NSN which he is handing out.

Upcoming Outreach Events:

Punta Gorda Library…Tom Segur advised that there will be a solar viewing at 11AM on October 9th.

FSW Moore Observatory….Tom stated that there will be night viewings on the second Friday of each month depending on the weather starting on October 13th. That the Annular Eclipse will be on

October 14th beginning at 11:52AM with Center time at 1:28PM at 60% coverage ending at 3:07PM. Volunteers requested to attend.

Lee County events…..Heather will have the Annual Eclipse viewing at the planetarium on October 14th from 11AM through 3PM……

Brian will hold the Annual Eclipse viewing on the same date and time at downtown Centennial Park and he will then travel to Seahawk Park for a Star Party on that same night starting at dusk depending on the weather.

The North Fort Myers Fall Festival will be held at the Lee County Parks and Recreation Center on October 20th from 5PM until 9PM by Brian Risley who asks for volunteers….please.

International Observe the Moon Night will be held on October 21st. President Risley states that it will be held at Centennial Park depending on the weather.

O□cer Reports:

Newsletter Report….Mike Jensen again stated that he had just returned from his South American trip and had no report. But Tom Segur said….wait a minute, the members need to know that Mike's newsletter was given honorable mention in the Reflections magazine. Congratulations Mike…..good job….all applauded and thanked Mike.

Secretary's Report…..Dan Dannenhauer stated that he was absent last meeting and that Tom Klein stepped in to compile the minutes. Dan thanked Tom for always being there whenever needed. John MacLean moved that the minutes be approved, Linwood Ferguson seconded and the motion was approved unanimously.

Treasurer's Report…..John MacLean advised that the financials were in the newsletter along with the budget. Dan Dannenhauer pointed out that John had put in tons of time to craft the budget and the

financials. Dan further stated that Brian, John and Tom had worked to purchase the best camera and projector at the best price on the market. The members thanked them.

Social Membership Director….. Ava did not attend, but Mike Jensen said that he had notified the members of the evening dinner meeting at Applebee's Restaurant and some did attend. Mike said he wants to keep this active as a dinner around 5:00 PM at Applebee's. So let the members know and plan on attending. Others agreed.

Program Committee Coordinator….John MacLean advised that we have speakers and planetarium presentations booked into March of 2024. Mike Jensen has assisted and asked other members to reach out to obtain speakers.