The Eyepiece

Seahawk Star Parties
April 22nd
May 20th
Sept 16th
Oct 14th
Nov 11th
Dec 16th
Click here for more info

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

SH2-308 Dolphin Nebula image by Dick Cogswell

Editor - Mike Jensen

Hi Everyone! You didn't expect me to go to Egypt and not come back without a picture of me on a camel, right? Wow! That was an experience! If you get the opportunity, do it! This issue is packed full of great info on a WIDE array of topics. We've got 12 astro images from our amazing Astro SIG group, and if you're a newbie, or just want to learn some basics, go to page 27.

There's a lot going on behind the scenes also. We're working on ways to get you more social (and not on FB), to learn each other's names (what a concept), to get your dues paid (seriously, you need to get that done if you haven't already). It's time to clean up our membership records so if you haven't renewed or joined, it's time to fish or cut bait!

Flashlights! If you attend in person you might want to bring a flashlight for leaving at night, it's DARK! The Nature Center took a hit to its lighting from the hurricane. A cell phone light works fine, just be prepared.

Dinner Before? Yes, we now have a Social Director! And she's coordinating dinner before our meetings. See page 2 for more info.

April 2023

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Club Officers & Positions

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

Vice President
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

Newsletter/Website
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 next six meetings of 2023:

April 6, 2023
May 4, 2023
June 1, 2023
July 6, 2023
August 3, 2023
Sept. 7, 2023

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

Observing Program Dates

Below are the schedules for our Friday public nights at the FSW Observatory (3rd Friday of the month) and the Saturday Solar Observing events (1st Saturday of the month) at county parks.

FSW Observatory

4-21-23
5-19-23

Solar Observing/Park

4-1-23 / Ponce de Leon
5-6-23 / Bayshore Live Oak

Pre-Meeting Dinner
5pm
April 6th

If you are a paid member, you will be on the email list for notification as to the restaurant we will be visiting for our pre meeting dinner.

Two months ago we met for the first time for a pre-meeting dinner. It was success, we were 15 and so engaged in our stories and conversations that we almost forgot to attend the meeting. Many members asked whether we will turn this into a tradition, hence we are announcing that we will meet for a pre-meeting dinner at the Texas Roadhouse in Fort Myers on the 04/06/2023 (Thursday) at 5pm. Eva will take care of the reservation, so please send her your RSVP to af@avafrank.com latest this Friday 03/31/2023. Eva will send you a separate email with more instructions.

President's Report

Have you paid your 2023 Membership dues? Only $25 for great programs, great fellowship, observing and imaging advice and much much more!
Click here to pay online!

A lot has been happening. Eva Frank is now our Social Director who will be coordinating social events such as dinner before the meeting as well as greeting visitors at our meetings. Thank you Eva for helping us with this very important job!

On Mar. 25th, we had about 20 people come out to the Seahawk Park Star Party. Weather was on our side and few bugs. Our next Seahawk Star Party is April 22nd.

This month we have Dr. Derek Buzasi from FGCU as out speaker in the planetarium. We will be sending his presentation out on Zoom. This is our first speaker live at the planetarium and on zoom so hopefully everything works ok.

We are looking for a few members to help with the Bylaw committee to update our Bylaws. This will entail a few meetings/zoom conferences to fine tune them and make sure we have covered any issues that membership may have.

We are enforcing the dues renewal for the calendar year to be handled by the end of March. After the April meeting, if you are not an active paid member, you will be taken off our mailing lists. I am also setting up the Prospects mailing list to keep anyone interested in seeing what we do on it for just 3 months. If you are in hardship paying dues, please contact an officer and we will review your situation and determine your status as a hardship. As dues can now be paid electronically anyone can pay at any time.

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.:

April 6, 2023	Dr. Derek Buzasi, Florida Gulf Coast University The Music of the Stars: What it tells us about stars and exoplanets.
May 4, 2023	Michael Corvese - Where Did The Moon Come From?

April 6, 2023

Dr. Derek Buzasi - Florida Gulf Coast University

The Music of the Stars: What it tells us about stars and exoplanets.

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

Reflector Magazine

You should have received an email from the Astronomical League allowing you to download your latest quarterly digital copy of the Reflector magazine on around March 19. It is also available via the web at https://www.astroleague.org/reflector

ALCON 2023

The ALCON conference for 2023 will be held July 26 – 29 in Baton Rouge, LA. Details are available at: What's Up with the Astro League March 2023 | The Astronomical League

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

This month we will summarize five of the most advanced deep-sky programs available along with the variable star observing program.

Active Galactic Nuclei Observing Program This requires the observation or imaging of a minimum of 30 Active Galactic Nuclei (AGNs) including Quasars, BL Lacertae Objects (BLOs), and Seyfert Galaxies. A 13 – 15 inch instrument is required for visual observers but a 4 inch will suffice for imaging.

ARP Peculiar Galaxies Observing Program This program is based on the 338 objects found in the Arp catalog named after Halton C. Arp. Observation of a minimum of 100 objects is required and the minimum suggested instrument size is 12.5 inches.

Dark Nebulae Observing Program These are amongst the most difficult deep-sky objects to find. A range of telescopes is required to optimally find and observe them ranging from 4 – 6 inch rich field instruments to 8 inch scopes for the fainter objects. A total of 70 dark nebulae are required for program completion.
Flat Galaxies Observing Program Minimum instrument size is 15 inches and observation of 50 flat galaxies is required.

Local Galaxy Group and Neighborhood Observing Program The Local Group is dominated by three spiral galaxies, Andromeda, the Milky Way, and M33. However, there are a host of dimmer, lesser galaxies involved. A total of 88 objects are required to be observed for the award.

Variable Star Observing Program This program is coordinated with AAVSO. Observation of 100 variable stars is required and a complete cycle of a long period variable must be documented. This program does not require large aperture instruments and is appropriate even for beginning observers.

The Night Sky Network

This article is distributed by NASA Night Sky Network
The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Solar Eclipses Are Coming!
David Prosper

Have you ever witnessed a total solar eclipse? What about an **annular solar eclipse?** If not, then you are in luck if you live in North America: the next twelve months will see two solar eclipses darken the skies for observers in the continental United States, Mexico, and Canada!

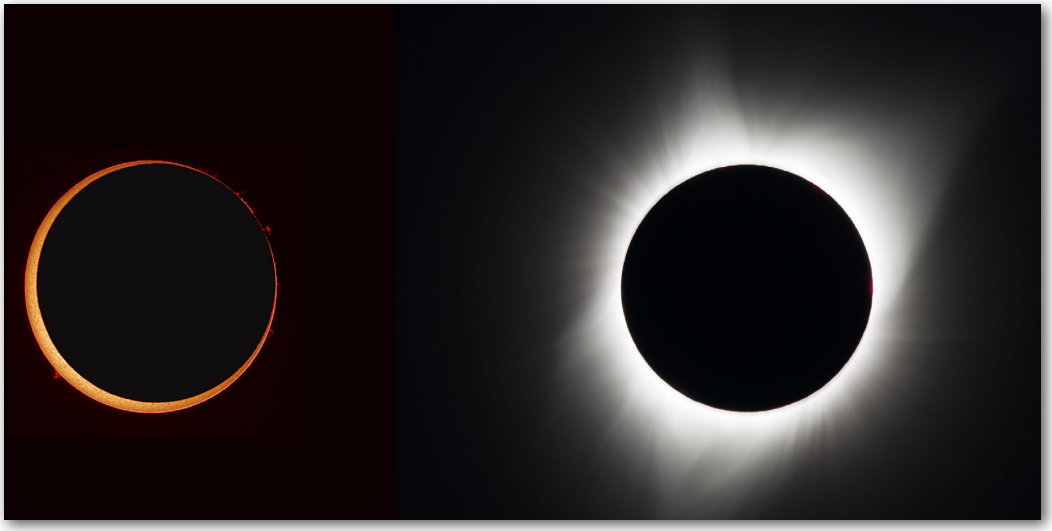
Solar eclipse fans get a chance to witness an annular eclipse this fall. On **Saturday, October 14, 2023**, the Moon will move exactly in front of the Sun from the point of view of observers along a narrow strip of land stretching across the United States from Oregon to Texas and continuing on to Central and South America. Since the Moon will be at its furthest point in its orbit from Earth at that time (known as apogee), it won't completely block the Sun; instead, a dramatic "ring" effect will be seen as the bright edge of the Sun will be visible around the black silhouette of the Moon. The distinct appearance of this style of eclipse is why it's called an annular eclipse, as annular means ring-like. If you are standing under a tree or behind a screen you will see thousands of ring-like shadows projected everywhere during maximum eclipse, and the light may take on a wan note, but it won't actually get dark outside; it will be similar to the brightness of a cloudy day. This eclipse must only be observed with properly certified eclipse glasses, or other safe observation methods like pinhole projection or shielded solar telescopes. Even during the peak of the eclipse, the tiny bit of the Sun seen via the "ring" can damage your retinas and even blind you.

Just six months later, a dramatic **total solar eclipse** will darken the skies from Mexico to northeast Canada, casting its shadow across the USA in a strip approximately 124 miles (200 km) wide, on **Monday, April 8, 2024**. While protection must be worn to safely observe most of this eclipse, it's not needed to witness totality itself, the brief amount of time when the Moon blocks the entire surface of the Sun from view. And if you try to view totality through your eclipse viewer, you won't actually be able to see anything! The Moon's shadow will dramatically darken the skies into something resembling early evening, confusing animals and delighting human observers. You will even be able to see bright stars and planets - provided you are able to take your eyes off the majesty of the total eclipse! While the darkness and accompanying chilly breeze will be a thrill, the most spectacular observation of all will be the Sun's magnificent corona! Totality is the only time you can observe the corona, which is actually the beautiful outer fringes of the Sun's atmosphere. For observers in the middle of the

path, they will get to experience the deepest portion of the eclipse, which will last over four minutes - twice as long as 2017's total solar eclipse over North America.

While some folks may be lucky enough to witness both eclipses in full – especially the residents of San Antonio, Texas, whose city lies at the crossroads of both paths – everyone off the paths of maximum eclipse can still catch sight of beautiful partial eclipses if the skies are clear. The Eclipse Ambassadors program is recruiting volunteers across the USA to prepare communities off the central paths in advance of this amazing cosmic ballet. Find more information and apply to share the excitement at eclipseambassadors.org. NASA has published a fantastic Solar Eclipse Safety Guide which can help you plan your viewing at bit.ly/nasaeclipsesafety. And you can find a large collection of solar eclipse resources, activities, visualizations, photos, and more from NASA at solarsystem.nasa.gov/eclipses

This detailed solar eclipse map shows the paths of where and when the Moon's shadow will cross the USA for the upcoming 2023 annular solar eclipse and 2024 total solar eclipse, made using data compiled from multiple NASA missions. Where will you be? This map is very detailed, so if you would like to download a larger copy of the image, you can do so and find out more about its features at: https://svs.gsfc.nasa.gov/5073 Credits: NASA/Scientific Visualization Studio/Michala Garrison; eclipse calculations by Ernie Wright, NASA Goddard Space Flight Center.



Photos of an annular total solar eclipse (left) and a total solar eclipse (right). Note that the annular eclipse is shown with a dark background, as it is only safe to view with protection – you can see how a small portion of the Sun is still visible as the ring around the Moon. On the right, you can see the Sun's wispy corona, visible only during totality itself, when the Moon completely – or totally - hides the Sun from view. A total solar eclipse is only safe to view without protection during totality itself; it is absolutely necessary to protect your eyes throughout the rest of the eclipse! Credits: Left, Annular Eclipse: Stefan Seip (Oct 3, 2005). Right, Total Eclipse, NASA/Aubrey Gemignani (August 21, 2017)

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.

Join us in April (18th) as we have booked Dr. Mario Motta to give a talk on his work with WD 1145, A research effort over 2 years with the Harvard Cfa team, and we discovered the first white dwarf eating it's planets(others have been found since).

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

All Meetings at 6:30pm

April 18th
May 16th
June 20th
July 18th
August 15th
September 19th
October 17th
November 21st
December 19th

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.

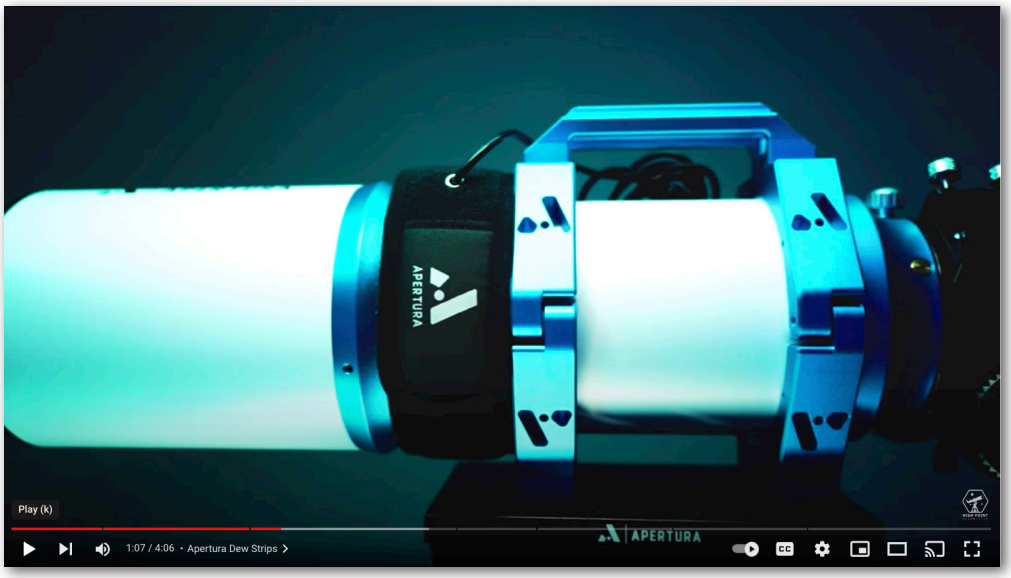
I am especially proud at the way our group shares lessons learned and methods taken to get the best our of there gear and the best images. Please see our images beginning on the next page.

ASTRO SIG MEETING ZOOM LINK

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

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

Dew Season is Here - I found this video from Hightpoint that features a new dew removal/preventer system I thought you might like to see. Click on the image to go to the video.



M83 - By Mario Motta

"One of my favorite galaxies in the sky." I did 3 hours imaging over 2 nights last week with my C14, came out "nice" but not same level of detail in a LUM only image from my 32 inch a few years back, but up north too low in sky for multiple night perfect imaging weather in April, so.. combined C14 data with my 32 image.

IC434 - The Horsehead and Flame Nebula In Narrowband by Mike Jensen

This image represents over 300 x 300sec subs along with Darks, Flats and Bias frames for calibration. I processed each channel following the same process, then worked through various versions of color. Then Tiff files were exported from PixInsight. Stars were extracted using StarXterminator and then blended back in in Photoshop.

Bode and the Cigar (M81, M82, Multiresolution) by Linwood Ferguson

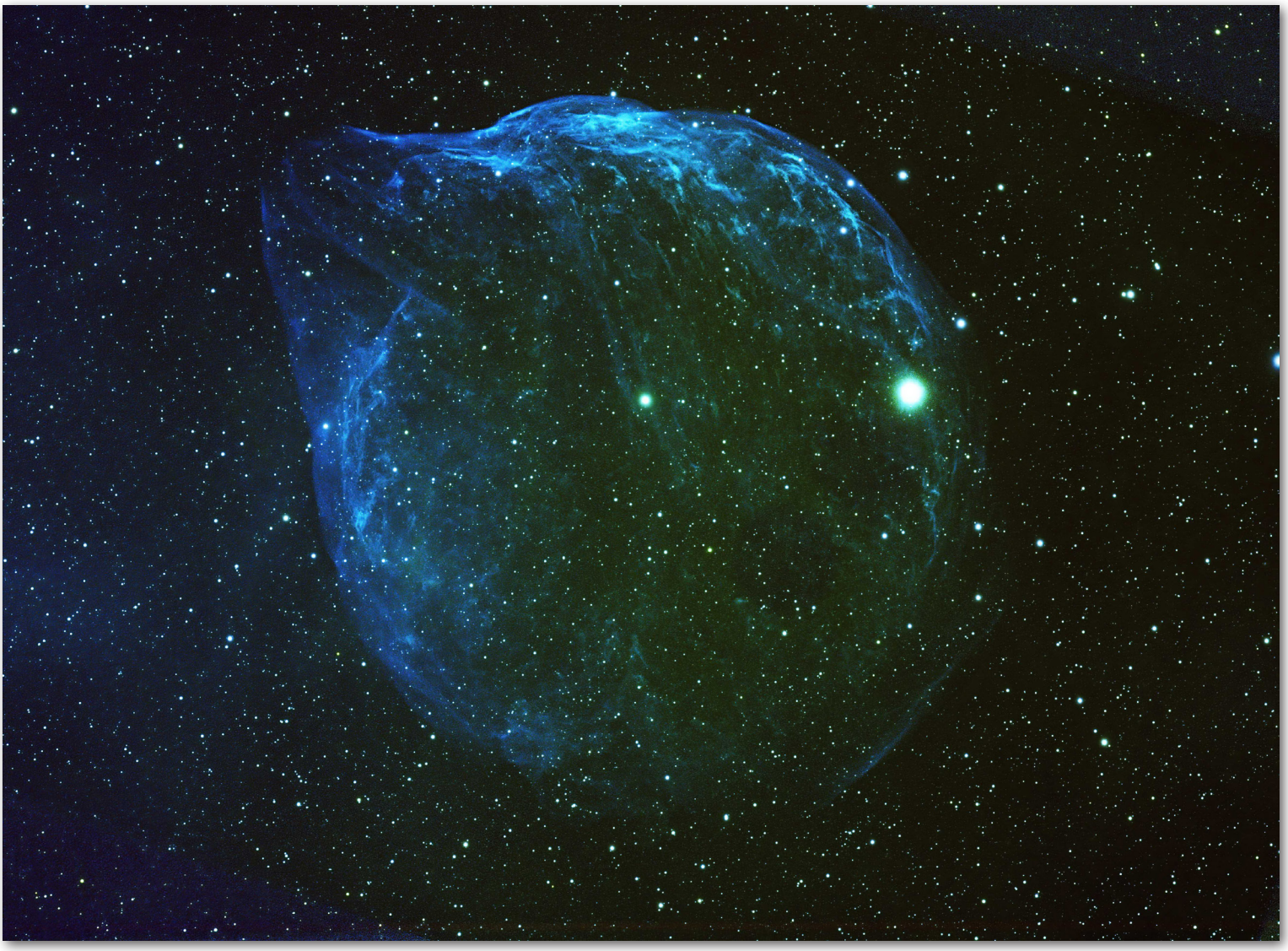
I had M81 and M82 from a C11 Edge at 2800mm, separately. I also did both targets with an SVX152T. This is a combination of these stacked together, but not done as a mosaic. The idea is by stacking on the targets I get the combined integration time and less noise. The M81 was just a bit more time, but for M82 I had quite a lot of additional time.

What I also got were two ugly rectangles from different sky backgrounds. As I was giving up, @eigenVector was kind enough to provide some multi-scale magic that got me going.

The background has about 41 hours, M81 collectively then only 48 hours, and M82 about 90 hours.

This was taken almost entirely from my B-7 back yard, with one night on the 152 at a B-3 site at Big Cypress.

Please do consider looking at the SVX152T (only) version at 1200mm: https://www.astrobin.com/q1ovbu/



SH2 - 308 The Dolphin Head Nebula by Dick Cogswell

This nebula is very large, but so dim it is invisible in luminance, red, blue or green, and barely seen in Ha or OIII. I had to frame it using the background star pattern, and one night I screwed up and only got half of it after a meridian flip reversed the star pattern. I did this in SHO, sort of, with ultra-narrow band Ha, SII and OIII.

The story about it is: Blown by fast winds from a hot, massive star, this cosmic bubble is huge. Cataloged as Sharpless 2-308 it lies some 5,000 light-years away toward the constellation of the Big Dog (Canis Major) and covers slightly more of the sky than a Full Moon. That corresponds to a diameter of 60 light-years at its estimated distance. The massive star that created the bubble, a Wolf-Rayet star, is the bright one near the center of the nebula. Wolf-Rayet stars have over 20 times the mass of the Sun and are thought to be in a brief, pre-supernova phase of massive star evolution. Fast winds from this Wolf-Rayet star create the bubble-shaped nebula as they sweep up slower moving material from an earlier phase of evolution. The windblown nebula has an age of about 70,000 years.

This image was made from 109 4-minute exposures taken over the past few weeks with my Istar 140, processed by APP, PI, PS and Topaz DN.

The Hidden Galaxy, IC 342 by Dick Cogswell

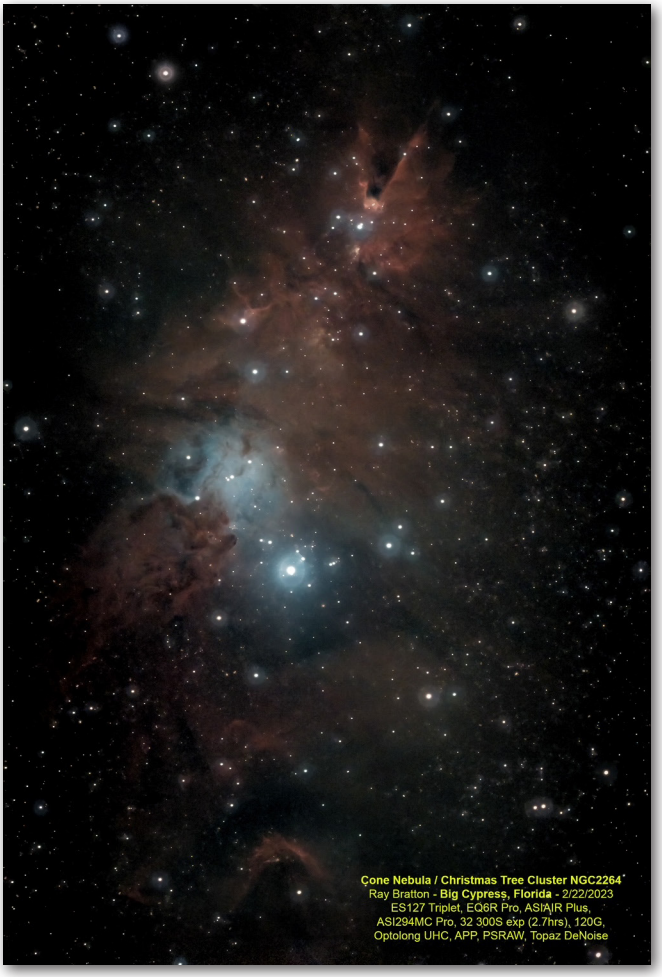
This is about 42 hours in LRGBHa, collected since early January, processed in APP.

C49 in Narrowband by John Udart

This is an image we featured earlier this year, but I added data to it using my new ZWO EAF (auto focuser). I imaged for 14 hours more with the ZWO EAF and used 7 hours (of the best data) for this redo image.


SH2-261 Lower's Nebula -3/11/2023
Ray Bratton - Fort Myers, Florida
ES127 FCD Triplet, ASI294MC Pro,
ASIAIR Plus, EQ6R Pro,120G, 0°C,
36 300s exp, (3hrs),Optolong L Enhance,
APP, PSRAW, Topaz DeNoise


M78 Nebula in Orion
Ray Bratton - Fort Myers, Florida - 2/27/2023
ES127 Triplet, EQ6R Pro, ASIAIR Plus,
ASI294MC Pro, 38 300S exp (3.1hrs), 120G,
Optolong UHC, APP, PSRAW, Topaz DeNoise


Cone Nebula / Christmas Tree Cluster NGC2264
Ray Bratton - Big Cypress, Florida - 2/22/2023
ES127 Triplet, EQ6R Pro, ASIAIR Plus,
ASI294MC Pro, 32 300S exp (2.7hrs), 120G,
Optolong UHC, APP, PSRAW, Topaz DeNoise


Leo Triplet - M65, M66, NGC 3623
Ray Bratton 3/15&20/2023, Fort Myers, Florida
ES127 FCD Triplet, ASI294MC Pro, 120G,
78.300s exp (6.5hrs), ASIAIR Plus, EQ6R Pro,
0°C, Optolong L enhance, APP, PSRAW

The Philae Temple by Mike Jensen

The Philae temple complex is an island-based temple complex in the reservoir of the Aswan Low Dam, downstream of the Aswan Dam and Lake Nasser, Egypt on the Nile River.

We were on a Viking cruise and this opportunity just opened up. I hadn't packed my normal tripod but I had a travel tripod which kept the camera steady enough. The African continent is one of the darkest in the world but the Nile river is where most of the people live and thus, light pollution. I'd wager about a Bortle class 4 in this location. This is a single exposure for the temple and about 10 x 20 second exposures for the stars.

C49 The Rosette Nebula by Mike Jensen

This is actually a “test shot” after the Fall/Winter months I usually switch my imaging train over to my larger telescope for shooting galaxies. After I moved over all the gear and made the necessary adjustments I needed to test my focus so I pointed it at a fan favorite, The Rosette Nebula.

This is 2.25 hours of photons collected through Red, Green, Blue and Hydrogen filters. I did my post processing in PixInsight, Photoshop and Topaz DeNoise. See John Udarts image of this same target (on page 13) done over much more time in Narrowband.

For you newbie astrophotographers, this is a great subject to target with a DSLR and longer prime lens or a wide angle lens on a star tracker. Enjoy!

New Moon Spacesuit Revealed

NASA and Axiom Space Do a Partial Reveal of the Spacesuit That Will be Worn on the Moon

NASA and Axiom Space Inc. provided a first, limited look at the new spacesuits that will be worn by the next astronauts to land on the Moon. The Axiom Extravehicular Mobility Unit (AxEMU) spacesuit that will be worn for the Artemis missions was only partially revealed at an event at Johnson Space Center in Houston, in order not to give away any proprietary information about the suit.

"Since a spacesuit worn on the Moon must be white to reflect heat and protect astronauts from extreme high temperatures," Axiom Space said in a press release, "a cover layer is currently being used for display purposes only to conceal the suit's proprietary design."

What was one display, however, was the improved functionality, performance and capability the new suit has, compared to the Apollo suits and even the current spacesuits worn by astronauts on the International Space Station when they do an EVA.

"We have not had a new suit for 40 years, since the suits designed for the Space Shuttle program," said Vanessa Wyche, the Director of NASA's Johnson Space Center, speaking at the reveal event. "Axiom Space has taken the data and research that NASA has provided and has come up with a more functional suit. We'll continue to work together with them to make sure we have a safe suit."

Axiom Space engineer Jim Stein wore a prototype of the new suit, walking around, doing squats, lunges, kneeling down and more, as well as displaying how much flexibility the arms of the new suit provide.

"This represents a huge improvement over the Apollo suits," said Russell Ralston, deputy program manager for Extravehicular Activity at Axiom Space. "The Artemis astronauts will be more comfortable and have an easier time maneuvering, such as being able to easily reach down to pick up rocks."

NASA said the spacesuit builds on the agency's spacesuit prototype developments and incorporates the latest technology, enhanced mobility, and added protection from hazards at the Moon. NASA also said the development of these next-generation spacesuits by Axiom Space is a "significant milestone … in space exploration and enabling a deeper understanding of the solar system and beyond."

The Artemis program intends to land the first woman and the first person of color on the Moon. The Artemis III mission is scheduled to land near the lunar south pole in 2025.

Unlike the previous NASA suits, the new AxEMU is a one-piece suit with a 'hatch' on the back – a back entry design — that allows the astronauts to step into the suit from behind. It has a hard torso that provides the core

structure of the suit, with arms and legs that have a variety of mobility joints. The arms and legs can be changed out for custom fitting. The portable life support system, aka, the backpack on the rear of the suit provides life support systems for heat and cooling, air to breath and even food and water.

A helmet bubble is mounted to the hard upper torso, and on top is the visor assembly that includes lights to allow astronauts to see in shadowed areas or during lunar night. There will be HD video cameras to record and transmit the EVAs so those of us back on Earth can follow along. Ralston said new gloves are a critical part of the design, as working long hours on the lunar surface requires flexibility and durability. The new boots are fully insulated, as working in the permanently shadowed craters on the lunar south pole will be especially cold.

Ten years of research was conducted by NASA's Extravehicular Activity and Human Surface Mobility Program office at JSC, and shared with the suit designers at Axiom.

"We had a lot of tough requirements," said Lara Kearney, manager of that program. "The Moon is a hostile place and the south pole is going to be a challenge, especially with thermal requirements. We were also looking for more mobility so the Artemis astronauts can move more effectively than during Apollo. But we brought all our knowledge and experience to the table to provide expertise, advice and guidance for Axiom Space."

The JWST Did What?

Prelude to a Supernova: The James Webb Captures a Rare Wolf-Rayet Star

Massive stars are sprinters. It might seem counterintuitive that stars 100 or 200 times more massive than our Sun could only survive for as few as 10 million years. Especially since smaller stars like our Sun can last 10 billion years. Massive stars have huge reservoirs of hydrogen to burn through, but their massive size means fusion eats through their hydrogen much more quickly.

These massive stars are destined to reach the finish line quickly and explode as supernovae. There's no other conclusion for them. But before they explode, some of them become Wolf-Rayet stars. That stage doesn't last long, and the James Webb Space Telescope caught one in the act.

Wolf-Rayet (WR) stars exhibit powerful stellar winds that have blown away much of their mass, their surfaces are enriched with heavy elements, and they're much hotter than most other stars. Some of them have lost their outer hydrogen layer and are fusing helium and other heavier elements in their cores. WR stars are rare, and though there are different types and sub-classes, they all have one thing in common: they're stars in transition.

WR 124 is a well-studied Wolf-Rayet star about 15,000 light-years away in the constellation Sagitta. The star is visually stunning and is surrounded by a nebula of expelled material called M1-67. M1-67 is about six light-years across and is about 20,000 years old.

The James Webb Space Telescope imaged WR 124 as one of its first images in 2022. The JWST's infrared observing capability revealed more detail in the nebular halo of gas and dust that surrounds the doomed star than other telescopes have. The star's extreme stellar winds are at work blast-

JWST From previous page

ing material away into space, creating the short-lived nebula. The beautiful nebula is a warning sign, heralding WR 124's explosion as a supernova in a few hundred thousand years.

But WR 124's demise also marks a new beginning. The star and its massive brethren are responsible for the heavy elements in the Universe. Elements like carbon, oxygen, and nitrogen are created by massive stars like WR 124 stars and ejected into the cosmos when they explode as supernovae.

WR 124 and its nebula teeter on the brink of massive—and in astronomical terms—rapid change. While it teeters, it's an irresistible object for astronomers. Researchers have observed it over the years with multiple telescopes.

In 2016, a paper based on Herschel Space Telescope images of WR 124 showed that it had an initial stellar mass of 32 solar masses. It also showed that the nebula was ejected during a previous phase of the star's evolution when it was either a Red Supergiant or a Yellow Supergiant.

While the nebula from other WR stars is more uniform, M1-67 is knotted and clumpy, probably from interactions with the interstellar medium. The nebula is both gaseous and dusty, with clumps of material 30 times more massive than Earth. The clumps are so large they would reach from the Sun to Saturn if they were in our Solar System. The gas in M1-67 is moving rapidly and is also extremely hot. It moves at about 160,000 km/h (100,000 mph.) So far, WR 124 has ejected about 10 solar masses of material to create the nebula.

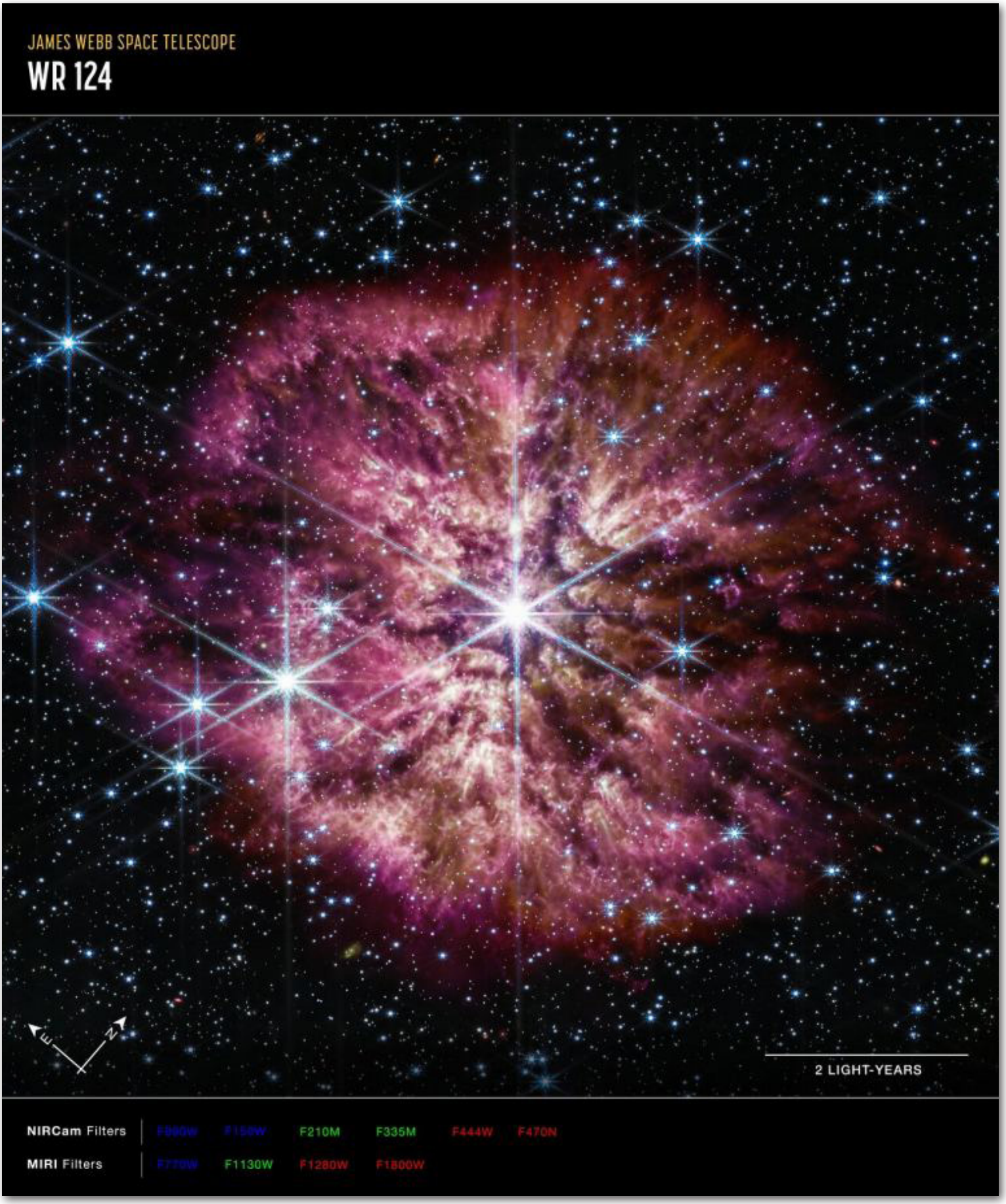
A 2008 paper based on Very Large Array (VLA) observations of WR 124 and its nebula found a pair of cavities in the gas surrounding the star. The star is situated in the middle of one of the cavities while the other is offset. Like other cavities around other stars, they result from the bow shock created by the star's stellar wind. Though they appear disconnected, they're not. Instead, their unusual arrangement is because of WR 124's rapid velocity through space, according to the paper.

The massive amount of dust coming from WR 124 is of great interest to scientists. Stars like WR 124 play a role in the Universe's dust budget, something that researchers are keen to understand more thoroughly. Without dust, there are no planets like Earth and no life. One of the JWST's science goals is to understand the dust budget more clearly, and the space telescope's images of Wolf-Rayet stars are part of that effort.

Cosmic dust makes only a tiny contribution to the Universe's baryonic mass, only about 0.1%. But it plays an outsize role in the Universe's physics and chemistry. In particular, dust plays an important role in star formation, where it's sometimes called 'hydrogen's wingman.'

When a cloud of gas and dust collapses and forms a star, it all happens inside a whirling maelstrom of matter. Hydrogen atoms find each other and bond together to form molecular hydrogen. But as the cloud collapses, the pressure and the temperature rise and the hydrogen atoms start moving too quickly to bond with one another. Inside all that chaos, the individual atoms have an easier time latching onto a speck of relatively cool, slow-moving dust. Multiple hydrogen atoms find each other on the surface of the dust, where they can bond together into molecular hydrogen, leading to star formation.

Dust plays another role in star formation, too. Once a new young star bursts to life in fusion, its powerful UV radiation can prevent gas in nearby clouds from forming the necessary hydrogen bonds, stopping more new stars from forming. But dust can act as a shield, absorbing UV and emitting it as infrared light. In this way, the UV can't stop the hydrogen from forming molecules and, eventually, stars.


JAMES WEBB SPACE TELESCOPE
WR 124
E
N
2 LIGHT-YEARS
NIRCam Filters
F150W
F210M
F335M
F444W
F470N
MIRI Filters
F770W
F1130W
F1280W
F1800W

JWST From previous page

Some evidence shows that WR stars could be responsible for this abundance of dust, partly through interactions with binary companions. (WR 124 doesn't have a binary companion, but it still holds clues to the dust mystery.) But because these stars are so hot and so luminous, it's difficult to observe the dust in great detail. That's where the JWST comes in.

"What we refer to as the 'dust budget crisis' is the major problem in astronomy of not being able to account for all the dust that's observed in galaxies, both in the nearby and distant, early universe," said Ryan Lau of the Japan Aerospace Exploration Agency. "The mid-infrared light that Webb can detect is exactly the wavelength of light we want to look at to study the dust and its chemical composition." Lau is part of the JWST's effort to study dust-producing WR stars.
The problem is there's a dust budget crisis in cosmology. Observations show that there's far more dust in galaxies than theories can explain. One of the JWST's jobs is to shed light on this mystery, and by imaging WR 124 and other WR stars, the telescope should start to explain why dust is so abundant.

"Understanding the formation of dust is critical for us to trace our own cosmic origins," Lau says. "Webb is one of the most powerful scientific tools ever built in the quest to find answers to these fundamental questions."

Wolf-Rayet stars have blown away most of their hydrogen, which can't form dust. Instead, they shed other elements from deeper inside their structure, like carbon, which can form dust. As the JWST gives scientists a better look at WR stars like WR 124, they should gain a better understanding of WR stars and the dust they create and eject into the Universe.

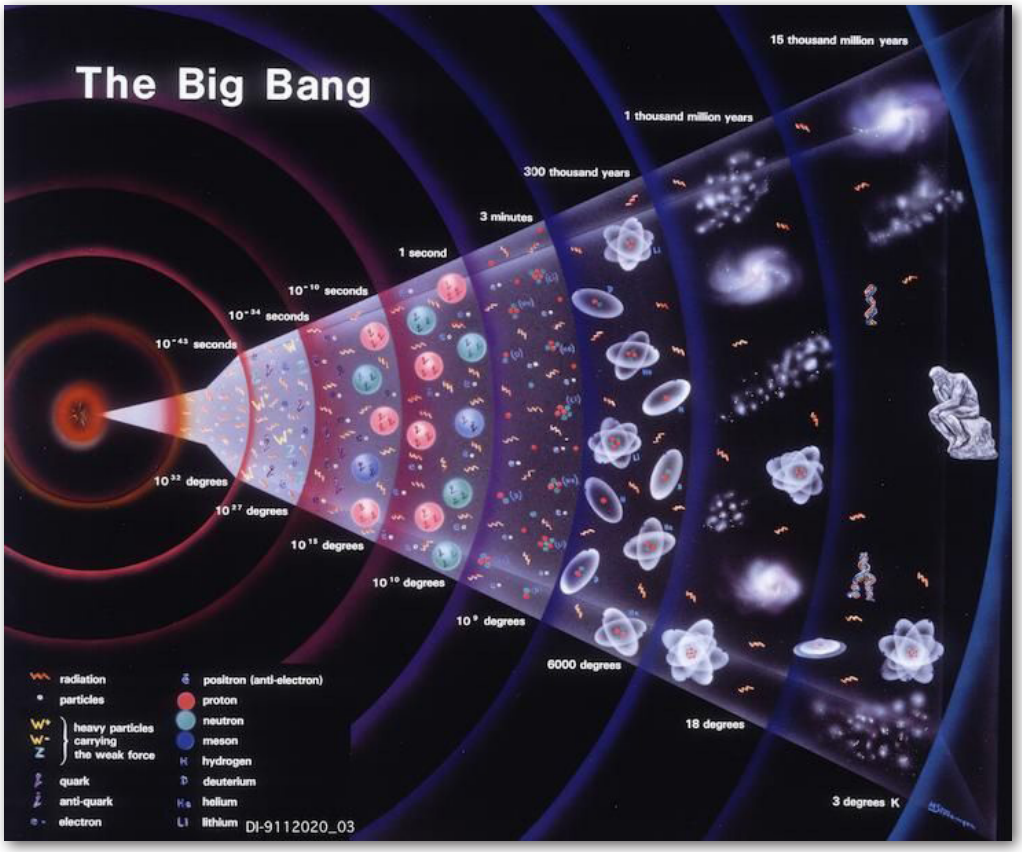
JWST's images of WR 124 are snapshots in an ever-changing view of the massive star. When it eventually explodes as a supernova, it'll be similar to stars that exploded in the early Universe. Those stars seeded the Universe with the heavy elements necessary for rocky planets to form and for life to eventually arise. Maybe one day, somewhere in the Milky Way, future life can trace its beginnings back to stars like WR 124.

Full article and photos: https://www.universetoday.com/160540/prelude-to-a-supernova-the-james-webb-captures-a-rare-wolf-rayet-star/

Explaining the universe one small step at a time

Baffled by black holes? Confused by quantum theory? Explaining the universe one small step at a time

Science writer Marcus Chown breaks down the mysteries of the universe into manageable chunks



Editor's Note: This is an in-depth article that really breaks the science down. I'll give you the bullet points but the full article is here.

Evolution
Traits which enable organisms to compete successfully for scarce food resources and so survive to reproduce become more common with each successive generation.

Special relativity
Light is uncatchable.

Global warming
Molecules like carbon dioxide absorb heat radiated by the Earth's surface and trap it in the atmosphere.

Quantum theory
Particles can behave as waves and waves can behave as particles

Black holes
A sufficiently concentrated mass creates a bottomless pit in space-time from which nothing, not even light, can escape.

The Big Bang
The universe began in a hot, dense state and has been expanding and cooling ever since.

Early Universe Was Crammed with Stars

The early universe was crammed with stars 10,000 times the size of our sun, new study suggests

By Paul Sutter, published March 19, 2023

When the universe's first stars emerged from the cosmic dark ages, they ballooned to 10,000 times the mass of Earth's sun, new research suggests.

The first stars in the cosmos may have topped out at over 10,000 times the mass of the sun, roughly 1,000 times bigger than the biggest stars alive today, a new study has found.

Nowadays, the biggest stars are 100 solar masses. But the early universe was a far more exotic place, filled with mega-giant stars that lived fast and died very, very young, the researchers found.

And once these doomed giants died out, conditions were never right for them to form again.

An illustation showing a twinkling burst of starlight at the center of a turbulent field of crackling orange radiation and glowing black holes. (Image credit: ESA)

The cosmic Dark Ages

More than 13 billion years ago, not long after the Big Bang, the universe had no stars. There was nothing more than a warm soup of neutral gas, almost entirely made up of hydrogen and helium. Over hundreds of millions of years, however, that neutral gas began to pile up into increasingly dense balls of matter. This period is known as the cosmic Dark Ages.

In the modern day universe, dense balls of matter quickly collapse to form stars. But that's because the modern universe has something that the early universe lacked: A lot of elements heavier than hydrogen and helium. These elements are very efficient at radiating energy away. This allows the dense clumps to shrink very rapidly, collapsing to high enough densities to trigger nuclear fusion – the process that powers stars by combining lighter elements into heavier ones.

But the only way to get heavier elements in the first place is through that same nuclear fusion process. Multiple generations of stars forming, fusing, and dying enriched the cosmos to its present state.

Without the ability to rapidly release heat, the first generation of stars had to form under much different, and much more difficult, conditions.

Cold fronts

To understand the puzzle of these first stars, a team of astrophysicists turned to sophisticated computer simulations of the dark ages to understand what was going on back then. They reported their findings in January in a paper published to the preprint database arXiv(opens in new tab) and submitted for peer review to the Monthly Notices of the Royal Astronomical Society.

The new work features all the usual cosmological ingredients: Dark matter to help grow galaxies, the evolution and clumping of neutral gas, and radiation that can cool and sometimes reheat the gas. But their work includes something that others have lacked: Cold fronts – fast-moving streams of chilled matter – that slam into already formed structures.

Stars form when clouds of dust and gas collapse, triggering nuclear fusion inside the dense balls of material. (Image credit: NASA/ESA/Hubble Heritage Team (STScI/AURA))

The researchers found that a complex web of interactions preceded the first star formation. Neutral gas began to collect and clump together. Hydrogen and helium released a little bit of heat, which allowed clumps of the neutral gas to slowly reach higher densities.

But high-density clumps became very warm, producing radiation that broke apart the neutral gas and prevented it from fragmenting into many smaller clumps. That means stars made from these clumps can become incredibly large.

Supermassive stars

These back-and-forth interactions between radiation and neutral gas led to massive pools of neutral gas– the beginnings of the first galaxies. The gas deep within these proto-galaxies formed rapidly spinning accretion disks – fast-flowing rings of matter that form around massive objects, including black holes in the modern universe.

Meanwhile, on the outer edges of the proto-galaxies, cold fronts of gas rained down. The coldest, most massive fronts penetrated the proto-galaxies all the way to the accretion disk.

These cold fronts slammed into the disks, rapidly increasing both their mass and density to a critical threshold, thereby allowing the first stars to appear.

Those first stars weren't just any normal fusion factories. They were gigantic clumps of neutral gas igniting their fusion cores all at once, skipping the stage where they fragment into small pieces. The resulting stellar mass was huge.

Sky Chart

You can download or view this map better at: https://heavens-above.com/skychart2.aspx?lat=0&lng=0&loc=Unspecified&alt=0&tz=UCT

Planet Positions

Click on the graphic above to go to Time and Date for a great simulation of the rotation of the constellations and the rising/setting of the planets. The chart below is set for the date of our meeting but can be programmed for any date and time. The chart can also be found at this link on Heavens Above.

Planet Summary

Year 2023 Month April Day 15 Time 15:52:46 Update Reset to now

	Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
Right ascension	$2^h\ 41^m\ 2.1^s$	$4^h\ 10^m\ 18.0^s$	$6^h\ 45^m\ 57.6^s$	$1^h\ 24^m\ 13.7^s$	$22^h\ 24^m\ 57.5^s$	$2^h\ 59^m\ 29.9^s$	$23^h\ 46^m\ 54.5^s$	$20^h\ 10^m\ 53.7^s$
Declination	18° 46' 14"	22° 49' 36"	24° 56' 18"	7° 42' 31"	-11° 22' 36"	16° 40' 32"	-2° 42' 5"	-22° 33' 20"
Range (AU)	0.785	1.093	1.596	5.955	10.405	20.580	30.782	34.818
Elongation from Sun	18.8°	39.8°	75.3°	3.0°	51.3°	22.1°	29.2°	85.1°
Brightness	0.8	-4.0	1.2	-1.9	1.0	5.8	8.0	14.4
Equatorial Diameter	8.57"	15.27"	5.87"	33.11"	15.97"	3.42"	2.22"	0.09"
Phase Angle	117.0°	63.4°	35.9°	0.6°	4.6°	1.1°	0.9°	1.6°
Constellation	Aries	Taurus	Gemini	Pisces	Aquarius	Aries	Pisces	Capricornus
Meridian transit	13:07	14:36	17:12	11:51	08:52	13:26	10:13	06:38
Rises	07:07	08:36	11:12	05:51	02:53	07:27	04:15	00:39
Sets	19:07	20:36	23:11	17:50	14:51	19:25	16:13	12:37
Altitude	45.2°	60.5°	58.6°	29.0°	-15.2°	50.0°	5.0°	-44.2°
Azimuth	297.2°	322.0°	36.0°	278.8°	258.2°	296.5°	267.3°	237.7°
Inferior Conjunction	2023-Jan-07 2023-May-01	2022-Jan-09 2023-Aug-13	-	-	-	-	-	-
Opposition	-	-	2022-Dec-08 2025-Jan-16	2022-Sep-26 2023-Nov-03	2022-Aug-14 2023-Aug-27	2022-Nov-09 2023-Nov-13	2022-Sep-16 2023-Sep-19	2022-Jul-20 2023-Jul-22
Superior Conjunction	2023-Mar-17 2023-Jul-01	2022-Oct-22 2024-Jun-04	2021-Oct-08 2023-Nov-18	2023-Apr-11 2024-May-18	2023-Feb-16 2024-Feb-28	2022-May-05 2023-May-09	2023-Mar-15 2024-Mar-17	2023-Jan-18 2024-Jan-20
Max. eastern elongation	2023-Apr-11 2023-Aug-10	2021-Oct-29 2023-Jun-04	-	-	-	-	-	-
Max. western elongation	2023-Jan-30 2023-May-29	2022-Mar-20 2023-Oct-23	-	-	-	-	-	-
Perihelion	2023-Mar-31 2023-Jun-27	2022-Sep-04 2023-Apr-17	2022-Jun-21 2024-May-08	2023-Jan-20 2034-Dec-05	2003-Jul-26 2032-Nov-28	1966-May-22 2050-Aug-17	1876-Aug-26 2042-Sep-03	1989-Sep-05 2237-Sep-15
Aphelion	2023-Feb-15 2023-May-14	2022-Dec-26 2023-Aug-07	2021-Jul-13 2023-May-30	2017-Feb-17 2028-Dec-28	2018-Apr-17 2047-Jul-15	2009-Feb-27 2092-Nov-23	1959-Jul-17 2125-Dec-01	1866-Jun-04 2114-Feb-19

Fun Astronomy Facts

Here's a great way to start learning the night sky. From Eyes on the Sky. Click on the images to go to the YouTube videos.

Complete beginner to astronomy? Want to learn the stars and constellations? Or wish you just knew how to get around the night sky? You have come to the right place. These "Stargazing Basics" videos by Eyes on the Sky take the budding amateur astronomer through all the basics of stargazing, quickly and easily.

These videos follow a proven formula I have developed over the past few years, and teach regularly at informal education presentations about astronomy, with excellent beginner results. You will learn where the important locations in the sky are, how to understand the differences in the brightness of stars and planets, and finally, how to get a better sense of measuring from objects you can identify to ones you wish to find. .

And after getting acquainted with the night sky, you may be interested in learning about Telescope Basics or what binoculars are good options for observing.

NOTE: All three astronomy / stargazing videos on this page are closed-captioned, and can be translated into 58 different languages for viewing by many different viewers, including those who are hearing-impaired.

Getting oriented in the night sky
First up is how to get oriented in the night sky. Quickly and easily learn the concepts of the meridian, zenith, ecliptic, celestial poles, celestial sphere, celestial equator, right ascension and declination.

Understanding magnitudes

The second video in this series explores how to understand the magnitude scale, starting with visible stars in the naked eye range, going up in brightness to understand the relative brightness of bright planets such as Venus and Jupiter and then the full Moon and Sun, and then heading back down the magnitude scale (but UP in numbers - all explained!) to dimmer objects. In addition to visual magnitude, absolute magnitude, integrated magnitude and surface brightness are covered.

Measuring distance in the sky

And finally, how to measure distance in the sky. It's easy to find bright stars in the sky - those are visible even from brightly lit cities. But how do you find dimmer stars that are not visible, or how do you determine how large a constellation is, or whether you are looking at Canis Major or Canis Minor? This video takes the viewer from the widest possible angular measurements one could see all the way down to 1 degree measurements - all with the simple tool of your hand on your outstretched arm. The etymology of the word "astronomy" is "star arrangement," so this video really guides the viewer towards the true meaning of "Astronomy made easy!" because you will be able to find the arrangement of the stars with ease now!

Southwest Florida Astronomical Society Meeting Minutes

Calusa Nature Center Planetarium and Zoom March 2, 2023

President Risley opened the meeting by thanking Tom Klein for providing his expertise in crafting tonight's zoom meeting. John MacLean then introduces our guest speaker….Doctor Eric Pearlman of Florida Tech Pearlman's presentation was 'Active galactic nuclei (supermassive black holes within the center of galaxies) Titled "Nature's Hearts of Darkness" beginning with a general discussion of relativity.. Rs=2GM over C2=3 M over M km…. Eric stated that when the distance of light is D= 1.5 R forcing light to move in a clockwise circular motion around the hole…. For more information visit https:// www.fourmilab.ch/gravitation/orbits/."

"Upcoming Outreach events:

1) Rotary Park star party occurred last Saturday under cloudy skies.
2) Big Cypress Observing will be on 3/18/23 contact Brian Risley
3) Seahawk Park Star Parties will be on 3/25/23 contact Brian Risley
4) Babcock Ranch CNCP Observing event this Friday 3/3/23 with Brian Risley
5) FSW/Charlotte Observing Events with Tom Segur

a) Solar observing 3/4/23 Gilchrist Park
b) FSW Planetarium observing 3/17/23 sunset until 9:30PM
c) Solar observing 4/1/23 Ponce de Leon Parke

6). Our participation in the Cape Coral Burrowing Owl event went over well. Thanks to Steven Volp for helping John MacLean to host the event. Estimated that 200 people visited our two scopes. Used one hydrogen alpha solar scope and One 8" Dobsonian with filter.

Board and Committee reports:

1) Sean Dey reported on the status of our ByLaw review plans. Sean stated that the original ByLaws were crafted in 1980 and is ready to work with the Officers to craft new proposed wording.
2) Excess equipment review plans were discussed by Brian Risley. He stated that he was getting with Heather of the Planetarium and Tony Costanzo to establish a proper valuation of each piece and to craft an Online presence.
3) John MacLean stated that he would hope that members would step up to assist in obtaining speakers for our monthly events. John stated that we have speakers lined up through June and that next month would be "Music from he Stars" from Dr. Derek Buzasi of FGCU.
4) John asked Dan D to contact Eva regarding the Social committee activities.
5) John MacLean gave his monthly treasurer's report….his summary for the end of February illustrated an opening balance of $3,758.60 income of $600 and expenses of $587.26 leaving an ending balance of $3,771.34. Sean Day moved to approve and Tom Segur seconded. Motion passed unanimously.
6) Dan Dannenhauer asked that the February 2, 2023 meeting minutes be approved. John MacLean moved and Bill Francis seconded. Motion passed unanimously.

President Brian Risley moved for adjournment at 9:06 PM……so moved Secretary Dan Dannenhauer"