The Eyepiece

SW FL Astronomical Society, Inc.
PO Box 100127
Cape Coral FL 33910

2022/23 Speaker Series

November 3rd, 2022 **December 1, 2022** **January 5, 2023**

The Universe in the Infrared: Spitzer's Final Voyage

Dr. Luisa Rebull, Research Scientist, Caltech/IPAC

Forming the Brightest Galaxies in the Universe

Dr. Desika Narayanan, University of Florida

Remote Imaging in the Utah Desert

Craig Stocks - Observatory Owner

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

Monthly Meetings

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

This month's meeting will be a combined live and Zoom meeting! Masks are optional.

Each meeting will have the same link/meeting ID (see below).

So, mark your calendar for:

Nov. 3, 2022
Dec. 1, 2022
Jan. 5, 2023

For instructions on how to use Zoom to access our meetings, click here. The actual link is below.

https://widener.zoom.us/j/96535769204

Meeting ID: 965 3576 9204

One tap mobile:
+13126266799,,96535769204#
(or)
+16465588656,,96535769204#

Observing Program Dates Announced

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

10-21-22
11-18-22
12-16-22
1-20-23
2-17-23
3-17-23
4-21-23
5-19-23

Solar Observing/Park

10-1-22 / Ponce de Leon
11-5-22 / Bayshore Live Oak
12-3-22 / Gilchrist
1-7-23 / Ponce de Leon
2-4-23 / Bayshore Live Oak
3-4-23 / Gilchrist
4-1-23 / Ponce de Leon
5-6-23 / Bayshore Live Oak

President's Report

Wow! It has been a very trying time for many of our members. Ian totally shut us down for October. Some of you may have even lost almost everything. If you have been affected by Ian, please let us know and we can handle the dues renewal which is coming up starting in December.
We are slowly returning to 'normal' as power, water and Internet are returning.
The Planetarium is back in operation, but we are unsure of Internet for the November meeting. I will send out information if we are going to be at the Planetarium, otherwise it will be a Zoom only meeting. We have an excellent speaker on Zoom for the meeting.
The year is ending, and we are looking for some new blood in the officer positions. Specifically VP is in need of someone who may end up taking over later for me. I have been at this for a long time.
The Burrowing Owl festival is on for Feb 25th, 2023. I do not have updated details on the other events that normally occur during the winter season.
I am not sure what the status for Seahawk Park is. We need to schedule events out there.
I would like to thank John MacLean and the program committee for putting together some very exciting talks for 2022/2023. Please let all your friends and contacts know about the meeting program topics. The more we can get on the zoom session the better.
Mike Jensen has been busy with the website as well.
I believe the CPC-1100 has been fixed. The new board appears to have done the trick.

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.:

November 3, 2022	Dr. Luisa Rebull, NASA-IPAC The Universe in Infrared – Spitzer's Final Voyage
December 1, 2022	Dr. Desika Narayanan, University of Fla Forming the Brightest Galaxies in the Universe
January 2023	Craig Stocks - Utah Desert Remote Observatories - "Remote Imaging in the Utah Desert"

Club Officers & Positions

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The Astronomical League Report

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 linking to your digital copy of the September 2022 Quarterly Reflector magazine on around August 26, You can also directly access copies 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 Globular Cluster Observing Program

Globular clusters are frequent targets during our public star parties. The Messier List includes 29 of them and the Herschel 400 has a total of 62.

The goal of the Globular Cluster Observing Program is to provide an in-depth introduction to this class of objects, allowing the observer to observe or image and compare the structures of globular clusters. The use of any kind of computer aided Go-To technology is allowed, as is of course manual star-hopping using a finder scope. Remote telescopes are also allowed. A minimum of 8 inches aperture is recommended but larger scopes will definitely provide more detail. A 12.5 inch scope was used for validating the entire list of 190 potential targets.
The League strongly advises the purchase of their publication "A Guide to the Globular Cluster Observing Program" available on the League webstore which contains the listing of 190 objects which extend into the southern hemisphere. The Guide contains background information on globular clusters along with specific information about each of the 190 targets.

To obtain an award, observers must select a minimum of any 50 globular clusters from the entire list of 190 objects cataloged in the Guide. This allows for customization of an observing list suitable to the observer's interests, skies, and equipment.

The program goes beyond just observing the selected globulars, however, and requires both visual and imaging observers to identify the Shapley-Sawyer concentration class of each cluster observed. The Guide explains the mechanics of how to do this.

The Guide designates certain members of the entire 190 object list as challenge objects. Some of these are globulars within the M31 and M33 galaxies which appear as stellar type point objects in amateur scopes. Visual observers are required to include 1 challenge object in their selection of 50 objects. Imaging observers must select 3 challenge objects.

Hercules Cluster (M13) By Linwood Ferguson

Astronomical League - Awards

The Astronomical League presents awards to deserving people who have advanced the goals of the Astronomical League. These include promoting astronomy, contributing to the League, and advancing the science of astronomy. There are many awards that are presented. If you know someone who qualifies for an award, please contact the appropriate award administrator to get more information on nominating that person for the award.

The awards are presented to recognize people for their hard work and accomplishments and to encourage youngsters to study astronomy. Those wishing to receive awards for various observing programs should visit our observing club pages to determine who to contact.

To view the AL awards, click here.

The Night Sky Network

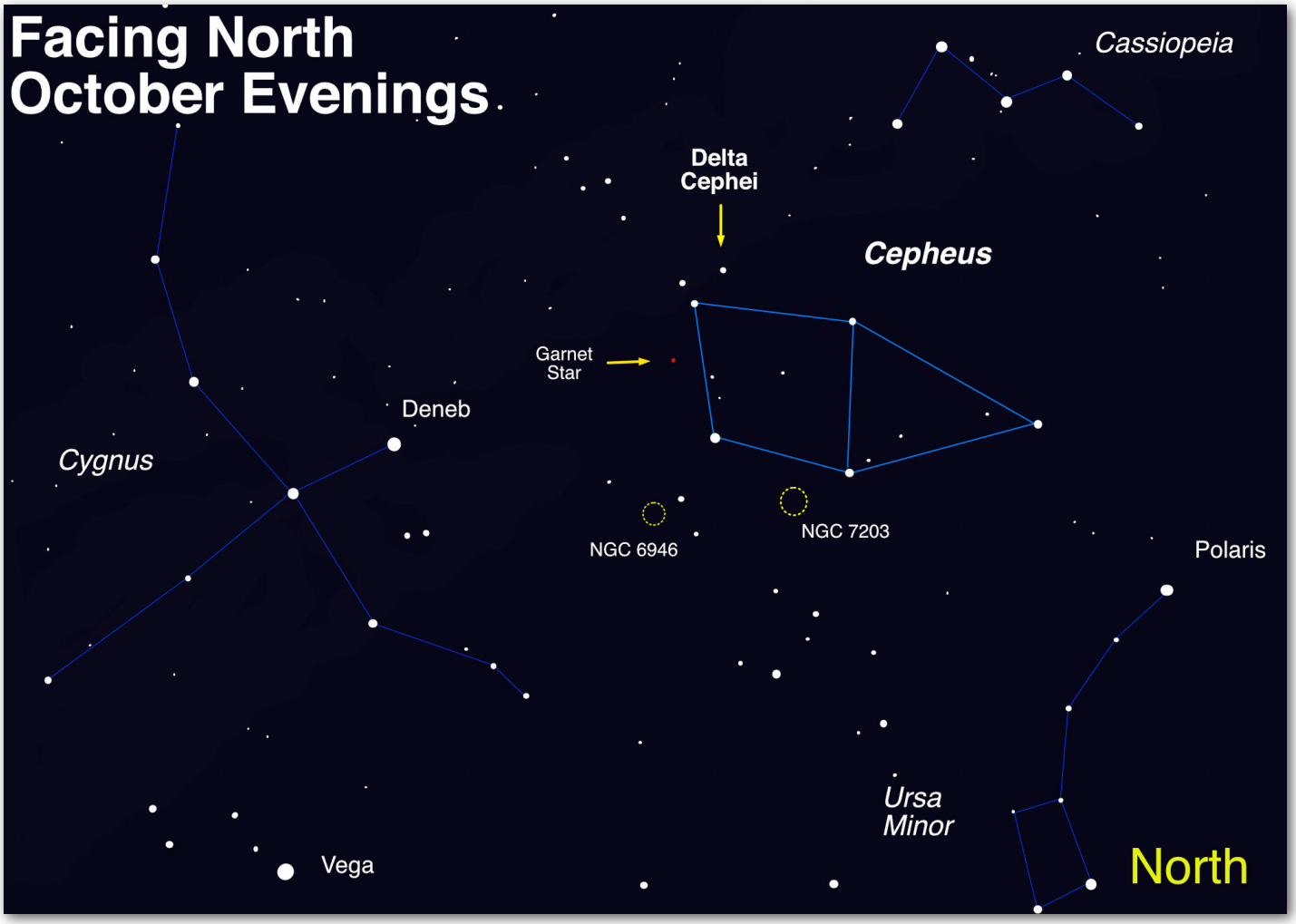
This article is distributed by NASA Night Sky Network
The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Newbie Info

Cepheus: A House Fit for a King
David Prosper

Sometimes constellations look like their namesake, and sometimes these starry patterns look like something else entirely. That's the case for many stargazers upon identifying the constellation of **Cepheus** for the first time. These stars represent Cepheus, the King of Ethiopia, sitting on his throne. However, many present-day observers see the outline of a simple house, complete with peaked roof, instead – quite a difference! Astronomers have another association with this northern constellation; inside its borders lies the namesake of one of the most important types of stars in modern astronomy: Delta Cephei, the original **Cepheid Variable**.

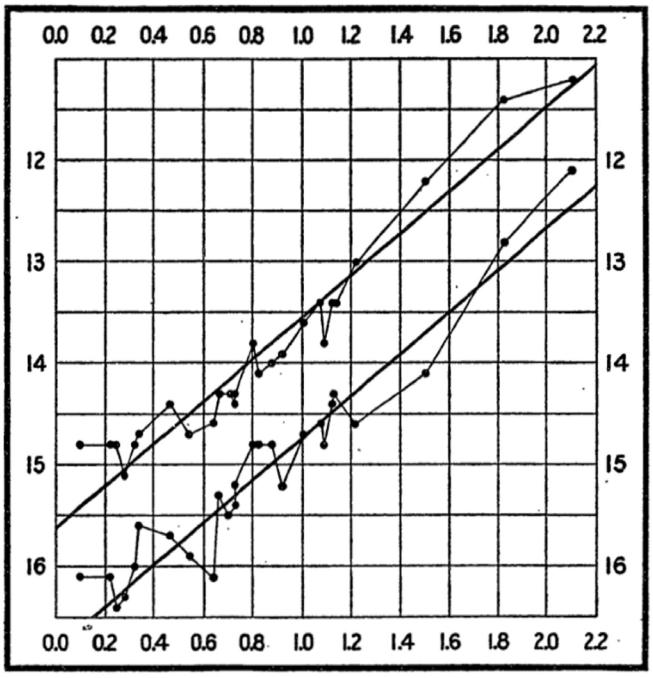
Cepheus is a circumpolar constellation for most observers located in mid-northern latitudes and above, meaning it does not set, or dip below the horizon. This means Cepheus is visible all night long and can be observed to swing around the northern celestial pole, anchored by Polaris, the current North Star. Other circumpolar constellations include Cassiopeia, Ursa Major, Ursa Minor, Draco, and Camelopardalis. Its all-night position for



The stars of Cepheus are visible all year round for many in the Northern Hemisphere, but fall months offer some of the best views of this circumpolar constellation to warmly-dressed observers. Just look northwards! Image created with assistance from Stellarium: stellarium.org.

many stargazers brings with it some interesting objects to observe. Among them: the "Garnet Star" Mu Cephei, a supergiant star with an especially deep red hue; several binary stars; several nebulae, including the notable reflection nebula NGC 7023; and the "Fireworks Galaxy" NGC 6946, known for a surprising amount of supernovae.

Perhaps the most famous, and certainly the most notable object in Cepheus, is the star **Delta Cephei**. Its variable nature was first discovered by John Goodricke, whose observations of the star began in October 1784. Slightly more than a century later, Henrietta Leavitt studied the variable stars found in the Magellanic Clouds in 1908 and discovered that the type of variable stars represented by Delta Cephei possessed very consistent relationships between their luminosity (total amount of light emitted), and their pulsation period (generally, the length of time in which the star goes through a cycle of where it dims and then brightens). Once the period for a Cepheid Variable (or **Cepheid**) is known, its luminosity can be calculated by using the scale originally developed by Henrietta Leavitt, now called "Leavitt's Law.". So, if a star is found to be a Cepheid, its actual brightness can be calculated versus its observed brightness. From that difference, the Cepheid's distance can then be estimated with a great deal of precision. This revolutionary discovery unlocked a key to measuring vast distances across the cosmos, and in 1924 observations of Cepheids by Edwin Hubble in what was then called the Andromeda Nebula proved that this "nebula" was actually another galaxy outside of our own Milky Way! You may now know this object as the "Andromeda **Galaxy**" or M31. Further observations of Cepheids in other galaxies gave rise to another astounding discovery: that our universe is not static, but expanding!



Because of their importance as a "standard candle" in measuring cosmic distances, astronomers continue to study the nature of Cepheids. Their studies revealed that there are two distinct types of Cepheids: Classical and Type II. Delta Cephei is the second closest Cepheid to Earth after Polaris, and was even studied in detail by Edwin Hubble's namesake telescope, NASA's Hubble Space Telescope, in 2008. These studies, along with others performed by the ESA's Hipparcos mission and other observatories, help to further refine the accuracy of distance measurements derived from observations of Cepheids. What will further observations of Delta Cephei and other Cepheids reveal about our universe? Follow NASA's latest observations of stars and galaxies across our universe at nasa.gov.

This historical diagram from Henrietta Leavitt's revolutionary publication shows the luminosity of a selection of Cepheid Variables on the vertical axis, and the log of their periods on the horizontal axis. The line drawn through these points shows how tight that relationship is between all the stars in the series. From Henrietta Leavitt and Edward Pickering's 1912 paper, "Periods of 25 Variable Stars in the Small Magellanic Cloud," a copy of which can be found at: https://ui.adsabs.harvard.edu/abs/1912HarCi.173....1L/abstract

Astrophotography (SIG)
Special Interest Group

Join Our Astrophotography Special Interest Group (SIG)
– Mike Jensen, Group Lead

REGULAR MEETINGS
Regular meetings are usually on the Third Tuesday of each month,
The next meeting is Tuesday Nov. 15th at 6:30

https://us02web.zoom.us/j/81077794455?pwd=MHJVL2VvZGZRK3JyM-1d5QVJiZE1TUT09

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

ASTRO SIG SPEAKER FOR NOVEMBER

JOIN US IN NOVEMBER AS WE WELCOME SPEAKER PETER BEALO, Instrument and Equipment Section Lead For the AAVSO (American Association of Variable Star Observers)
Peter's talk: ***Introducing the AAVSO, How You Can Do Science with Your AP Setup, No Matter How Modest***
The AAVSO is an international non-profit organization of variable star observers whose mission is to enable anyone, anywhere, to participate in scientific discovery through variable star astronomy.

Membership in the AAVSO is open to anyone—professionals, amateurs, and educators alike—interested in variable stars and in contributing to the support of valuable research.

Professional astronomers have neither the time nor the telescopes needed to gather data on the brightness changes of thousands of variables, and amateurs make a real and useful contribution to science by observing variable stars and submitting their observations to the AAVSO International Database.

PixInsight Debuts New YouTube Tutorials

On Sept. 22nd PixInsight announced a new series of tutorials for 2022.

Five videos are now available on their YouTube channel with more to follow. See below.
https://www.youtube.com/pixinsight
The tutorials are dedicated to describing the graphical interface of PixInsight and its practical use at beginner to intermediate levels, from the most basic concepts such as workspaces, image windows and views, to more complex topics such as masks, processing histories, projects, and more.

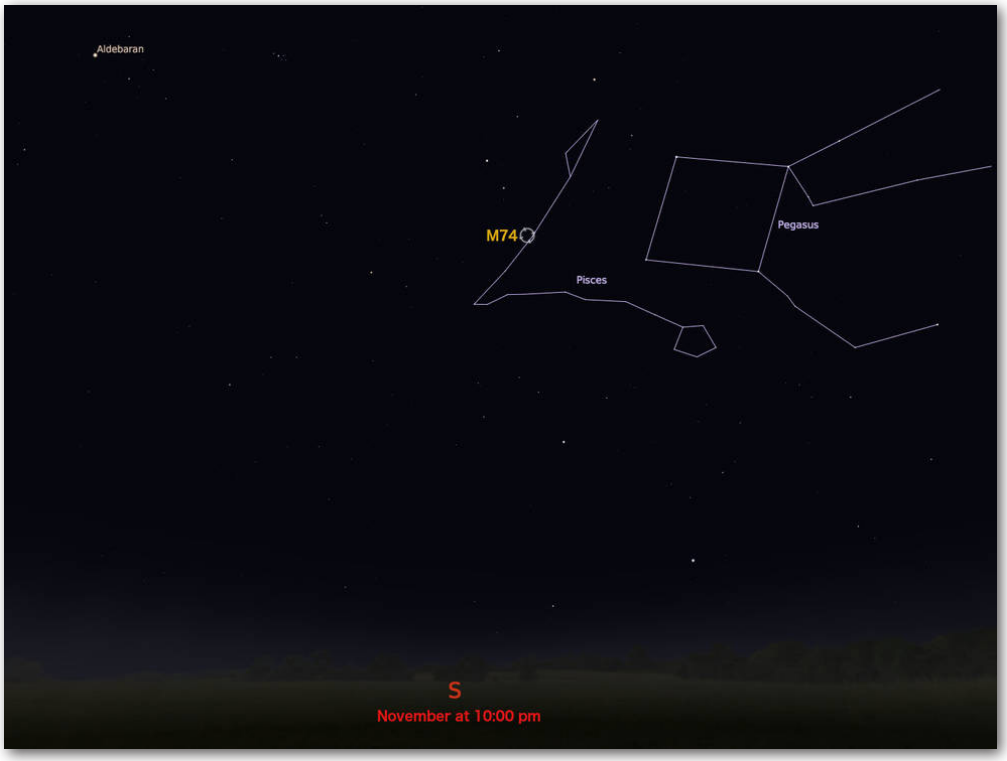
October Astrophotography Suggestions

M74

A stunning face-on spiral galaxy, M74 was discovered in 1780 by Charles Messier's observing assistant, the French astronomer Pierre Méchain. M74 is located roughly 32 million light-years away from Earth in the constellation Pisces. With an apparent magnitude of only 10, the galaxy appears as a faint patch of light through small telescopes. It is best observed during November.

M74 is a perfect example of a grand-design spiral galaxy. Symmetrical spiral arms reach out from the galaxy's central nucleus and are traced by winding dust lanes. The arms are dotted with clusters of young, blue stars and pink regions where the ultraviolet light from these young stars has ionized clouds of hydrogen and caused them to glow.

This Hubble image of M74 is a composite of exposures taken in 2003 and 2005 at visible and infrared wavelengths. A small segment of this image used data from the Canada-France-Hawaii Telescope and the Gemini Observatory to fill in a region that Hubble did not observe.



The Pelican Nebula - IC 5070

The Pelican Nebula by Linwood Ferguson

The Pelican Nebula is an emission nebula located near the bright star Deneb in the constellation Cygnus, the Swan. Named for its resemblance to a pelican, the nebula is associated with the neighbouring North America Nebula (NGC 7000) and is one of several notable nebulae found in the area of the Northern Cross. It is an active star forming region with a particularly active mix of star formation and evolving gas clouds. The position and balance of the stars and gas will gradually change to leave the nebula looking completely different millions of years from now.

The young stars in the nebula are heating up the cold gas in their vicinity and, as a result, an ionization front gradually moves outward. A number of unusually dense filaments of cold gas are still visible, among them two jets emanating from the Herbig-Haro object 555 (HH 555). Herbig-Haro objects are jets of matter and partially ionized gas ejected by newborn stars, which appear as patches of nebulosity in star-forming regions. These jets are ejected at speeds of several hundred kilometres per second and collide with nearby dust and gas, producing dramatic shock fronts that glow as a result of the gas being heated as it collides with the interstellar medium.

Galaxy NGC 7331

Big, beautiful spiral galaxy NGC 7331 is often touted as an analog to our own Milky Way. About 50 million light-years distant in the northern constellation Pegasus, NGC 7331 was recognized early on as a spiral nebula and is actually one of the brighter galaxies not included in Charles Messier's famous 18th century catalog. Since the galaxy's disk is inclined to our line-of-sight, long telescopic exposures often result in an image that evokes a strong sense of depth. In this Hubble Space Telescope close-up, the galaxy's magnificent spiral arms feature dark obscuring dust lanes, bright bluish clusters of massive young stars, and the telltale reddish glow of active star forming regions. The bright yellowish central regions harbor populations of older, cooler stars. Like the Milky Way, a supermassive black hole lies at the core of spiral galaxy NGC 7331.

Image Credit & License: ESA/Hubble & NASA/D. Milisavljevic (Purdue University)

Rosette Nebula - C49

The Rosette Nebula by Mike Jensen

The Rosette Nebula is a vast emission nebula located about 5,200 light years away. The star forming region lies near a large molecular cloud in the constellation Monoceros, the Unicorn. It is closely associated with the young open star cluster NGC 2244.

Also known as the Satellite Cluster, NGC 2244 appears in the centre of the Rosette. The hot young stars of the cluster were formed from the nebula's material in the last 5 million years.

The stars in the Satellite Cluster are responsible for the nebula's glow. Their radiation ionizes the surrounding clouds of nebulosity, causing them to emit their own light. The nebula glows in the red part of the spectrum because the powerful ultraviolet radiation from the stars strips electrons from the nebula's hydrogen atoms.

The Rosette Nebula is a very active stellar nursery. It is home to numerous Herbig-Haro objects and Herbig Ae/Be stars, Bok globules, T Tauri stars and clusters of newly formed stars. The dark filaments of dust extending toward the centre of the nebula, sometimes called "elephant trunks," are shaped by the stellar winds and radiation from hot young stars and electromagnetic forces.

The Rosette (or Rosetta) Nebula spans 130 light years and has an angular size of 1.3 degrees. It is much larger than the better-known Orion Nebula, which is about 24 light years across. However, the Orion Nebula is much closer to us at 1,344 light years and appears brighter but smaller than the Rosette.

The Rosette Nebula has an estimated mass of about 10,000 solar masses. It is home to about 2,500 stars. The most massive O- and B-type stars power the nebula and cause it to expand. The nebula will disperse in the next few million years, leaving behind only the central cluster, NGC 2244.

The Rosette Nebula was named after the stylized flower design used in sculptural objects since antiquity. The nebula's appearance in optical light resembles the rosette. It is sometimes called the Skull Nebula because it also closely resembles the human skull.

Jupiter in Opposition

Jupiter's opposition occurs every 13 months, making the planet appear larger and brighter than any other time of the year. But that's not all. Jupiter will also make its closest approach to Earth since 1963 – almost six decades ago! This happens because Earth and Jupiter do not orbit the Sun in perfect circles – meaning the planets will pass each other at different distances throughout the year. Jupiter's closest approach to Earth rarely coincides with opposition, which means this year's views will be extraordinary. At its closest approach, Jupiter will be approximately 367 million miles in distance from Earth, about the same distance it was in 1963. The massive planet is approximately 600 million miles away from Earth at its farthest point.

JUPITER 9/3/2022 - Ray Bratton - Addison, IL
Meade 10" f6.3 1600mm, ASI294MC Pro,
ASIAIR PLUS Video Capture,
ASIAIR Stacking, PS RAW

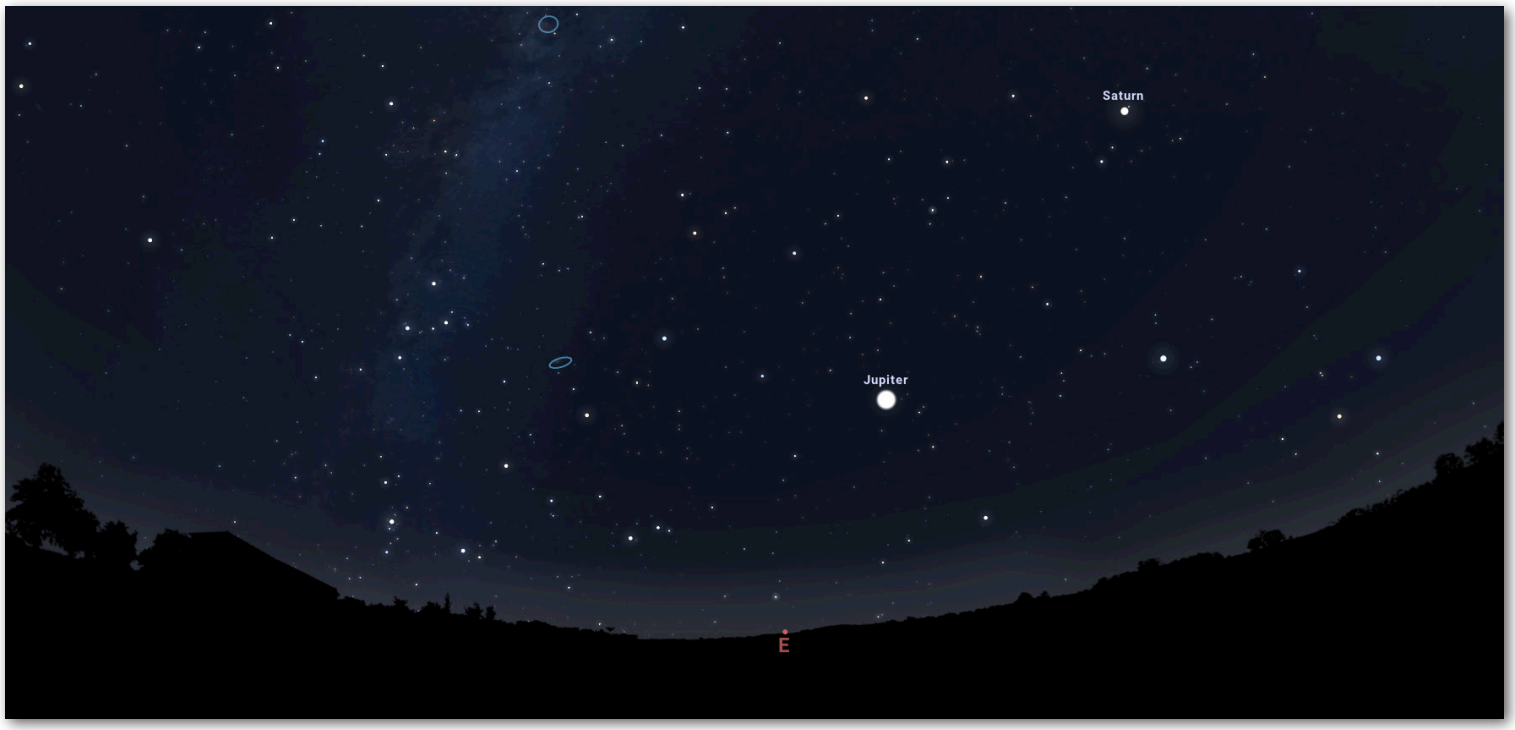
What is opposition?

Opposition is essentially the planetary equivalent of a full Moon. When a planet is close to the Earth, and on the opposite side of Earth to the Sun, we describe it as that planet being in opposition. The sunlight that shines on the planet is fully reflected, in the same way that sunlight is fully reflected from the Moon every 29.53 days in the lunar cycle. From our perspective here on Earth, the planet appears larger and brighter than at other times of the year.

"When a planet is in opposition, you can see the whole circular disk of that planet, which means we're getting the most light back from the planet to us. So it appears very bright in the sky," says Dr Jonathan Nichols, a reader in planetary auroras at the University of Leicester.

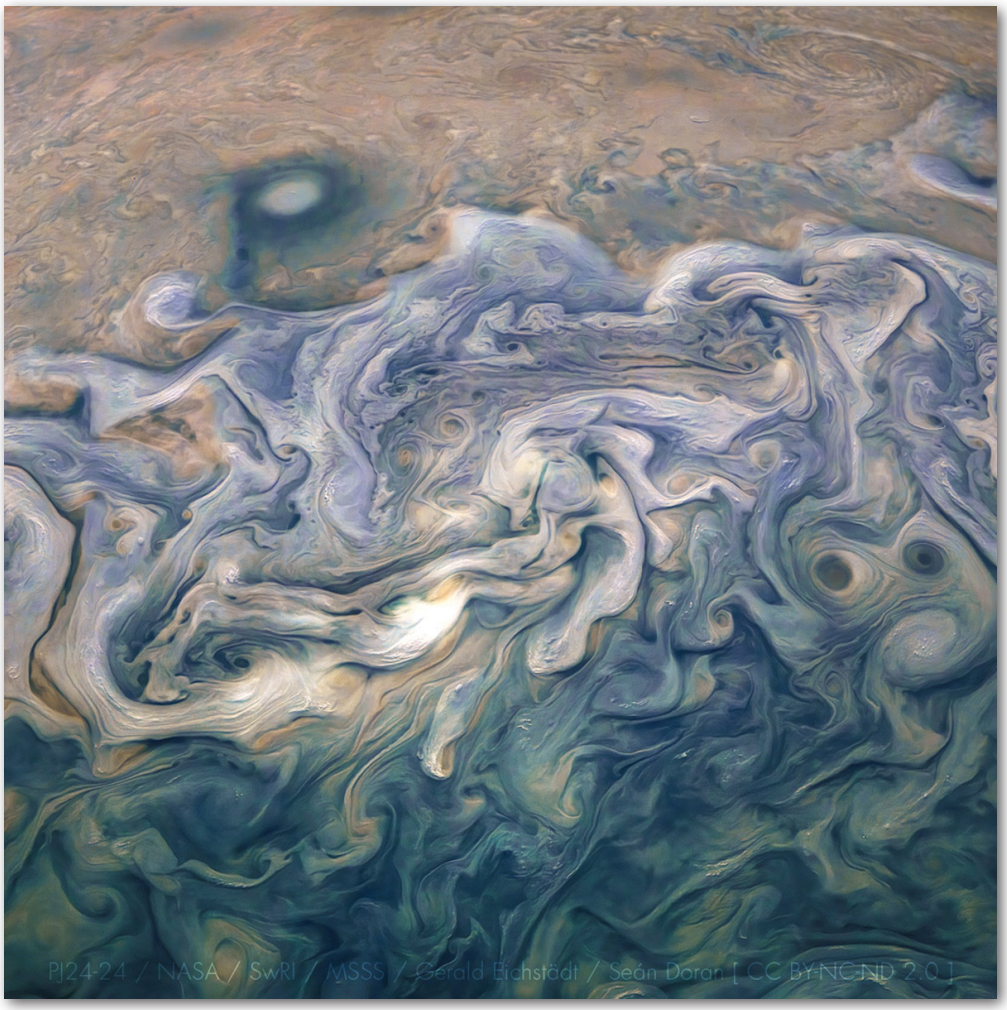
As the outer planets orbit around the Sun, Earth occasionally finds itself between the Sun and another planet, with all three directly aligned. Oppositions can often provide the best opportunity to observe and photograph a particular planet because of its favourable position and brightness.

At Jupiter's opposition, Earth will lie directly between Jupiter and the Sun, and will remain in the sky above the horizon for most of the night.



Only those planets that are beyond Earth's orbit can be in opposition, these are Mars, Jupiter, Saturn, Uranus and Neptune. Because Mercury and Venus orbit the Sun inside the path of Earth's orbit, they can never be in opposition.

This year, Jupiter goes into opposition at the same time the massive planet reaches its closest approach to Earth, as it travels in its own orbit around the Sun. And, it's the closest approach to Earth for 59 years. The reason for this is down to the shape of the orbits. As they're not perfect circles, Earth and Jupiter will pass each other at different distances throughout the year. When Jupiter reaches opposition, the gas giant will be situated a mere 591.3 million kilometers (3.95 AU) from Earth. At the furthest point away from Earth in its orbit around the Sun, Jupiter is around 966 million kilometers distant.



The image on the right is provided by a Juno flyby of Jupiter.

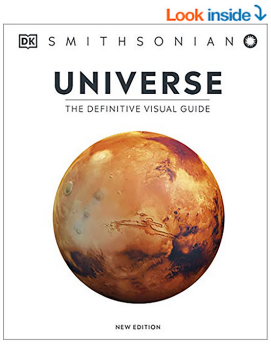
Universe: The Definitive Visual Guide

Recommended by The Eyepiece Editor Mike Jensen & Member Linwood Ferguson

We're not necessarily here to promote one of the world's largest companies and retailers, but **THIS IS AN AWESOME BOOK AT AN AWESOME PRICE**!

Recommended to the Astro SIG group in our October meeting by Linwood Ferguson, I downloaded it for my Kindle and this book is incredible and VERY up to date!

Kindle $1.99 | Hardcover $43.57



Universe: The Definitive Visual Guide Kindle Edition

by DK (Author) | Format: Kindle Edition

★★★★★ 999 ratings

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Marvel at the wonders of the universe, from stars and planets to black holes and nebulae, in this exploration of our solar system and beyond.

Universe opens with a look at astronomy and the history of the Universe, using 3D artworks to provide a comprehensive grounding in the fundamental concepts of astronomy, including the basic techniques of practical astronomy.

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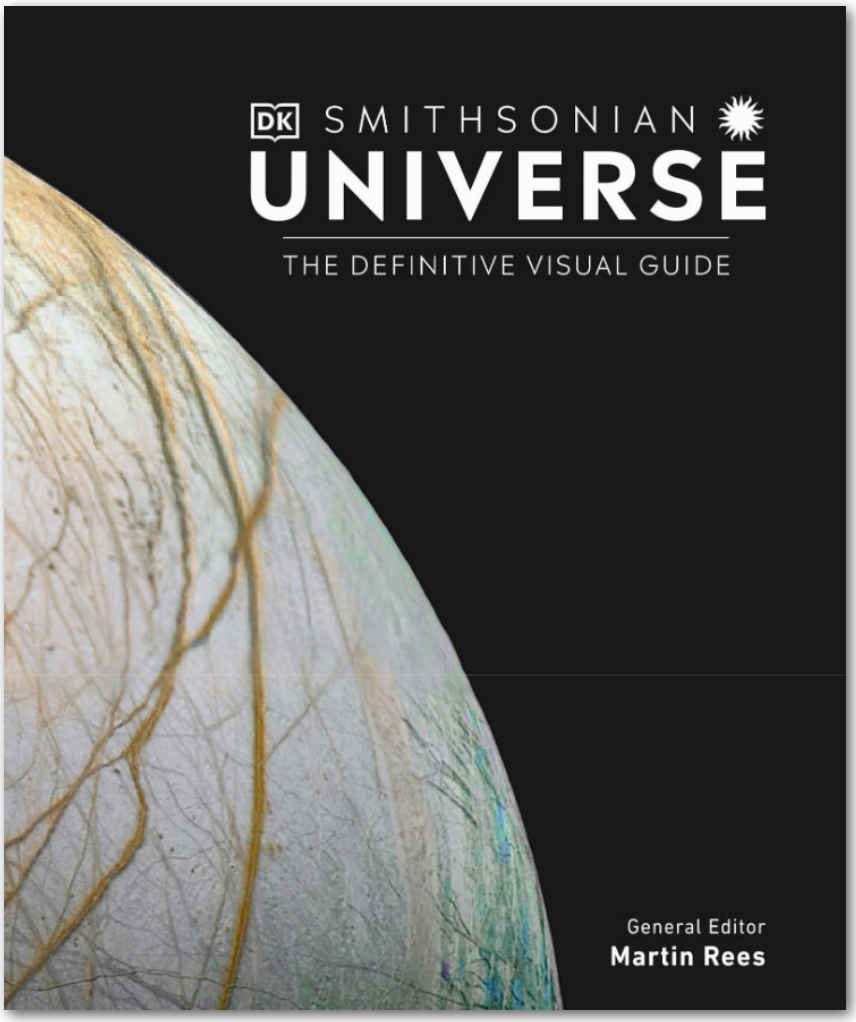


Marvel at the wonders of the universe, from stars and planets to black holes and nebulae, in this exploration of our solar system and beyond.

Universe opens with a look at astronomy and the history of the Universe, using 3D artworks to provide a comprehensive grounding in the fundamental concepts of astronomy, including the basic techniques of practical astronomy.

The core of the book is a tour of the cosmos covering the Solar System, the Milky Way, and galaxies beyond our own. Explanatory pages introduce different celestial phenomena, such as galaxies, and are followed by catalogs that profile the most interesting and important examples.

A comprehensive star atlas completes the picture, with entries on each of the 88 constellations and a monthly sky guide showing the night sky as it appears throughout the year as viewed from both the northern and southern hemispheres.

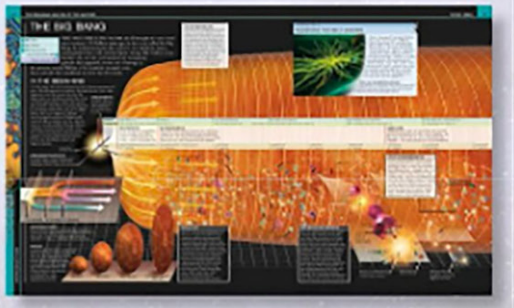
ABOUT THIS BOOK

Universe is divided into three main sections. The INTRODUCTION is an overview of the basic concepts of astronomy. GUIDE TO THE UNIVERSE looks, in turn, at the solar system, the Milky Way (our home galaxy), and the regions of space that lie beyond. Finally, THE NIGHT SKY is a guide to the sky for the amateur skywatcher.

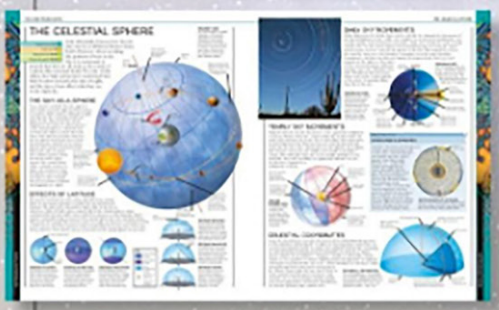
INTRODUCTION

This section is about the universe and astronomy as a whole. It is subdivided into three parts. WHAT IS THE UNIVERSE? looks at different kinds of objects in the universe and the forces governing how they behave and interact. THE BEGINNING AND END OF THE UNIVERSE covers the origin and history of the universe, while THE VIEW FROM EARTH explains what we see when we look at the sky.

△ **WHAT IS THE UNIVERSE?**
This section begins by looking at some basic questions about the size and shape of the universe. It goes on to explain concepts such as matter and radication, the motion of objects in space, and the relationship between time and space.



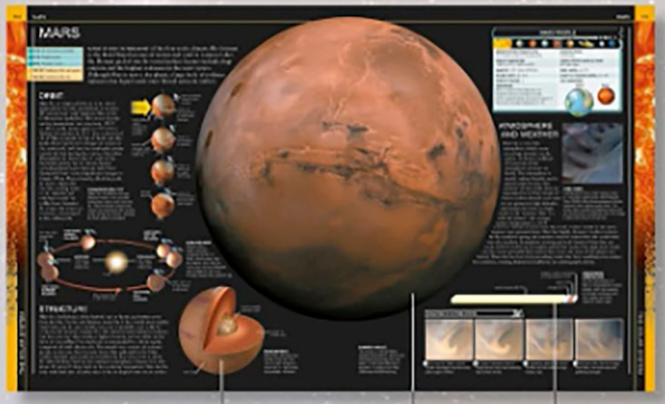
△ **THE BEGINNING AND END OF THE UNIVERSE**
The universe is thought to have originated in an event known as the Big Bang. This section describes the Big Bang in detail and looks at how the universe came to be the way it is now, as well as how it might end.



△ **THE VIEW FROM EARTH**
This section presents a simple model for making sense of the changing appearance of the sky. It also contains practical advice on looking at the sky with the naked eye, telescopes, and binoculars.

GUIDE TO THE UNIVERSE

This part of the book focuses on specific regions of space, starting from the Sun and then moving outward to progressively more distant reaches of the universe. It is divided into three sections, covering the solar system, the Milky Way, and features beyond the Milky Way. In each section, introductory pages describe features in a general way and explain the processes behind their formation. These pages are often followed by detailed profiles of actual features (such as individual stars), usually arranged in order of their distance from Earth.

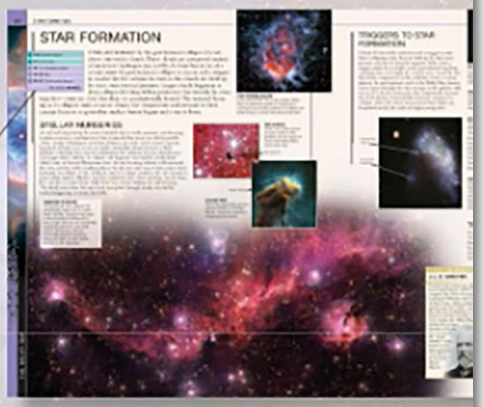


△ **THE SOLAR SYSTEM**
This section is about the Sun and the many bodies in orbit around it. It covers the eight planets one by one and then looks at asteroids, comets, and meteors, as well as the remote regions on the margins of the solar system. For most planets, profiles of individual surface features or moons are also included.

artwork of planet's interior structure

main image shows planet as it appears from space

illustrations show atmospheric composition for each planet



color-coded panel contains references to other relevant sections

THE MILKY WAY ▷
The subject of this section is the Milky Way and the stars, nebulae, and planets that it contains. Pages such as those shown here describe how particular types of features are formed.

THE NIGHT SKY

This section is an atlas of the night sky. It is divided into two parts. The first (THE CONSTELLATIONS) is a guide to the 88 regions into which astronomers divide the sky. It contains illustrated profiles of all the constellations arranged according to their position in the sky, with the most northerly ones first and the southernmost last. The second part (the MONTHLY SKY GUIDE) is a month-by-month guide containing a summary of the highlights for each month, detailed star charts, and charts showing the positions of the planets.

detailed chart

text describes features of interest

THE CONSTELLATIONS ▷
Each constellation profile is illustrated with a chart, two locator maps, and one or more photographs. A more detailed guide to the section can be found on pp 348–349.

The Pillars of Creation

10/19/2022 : NASA's Webb Takes Star-Filled Portrait of Pillars of Creation

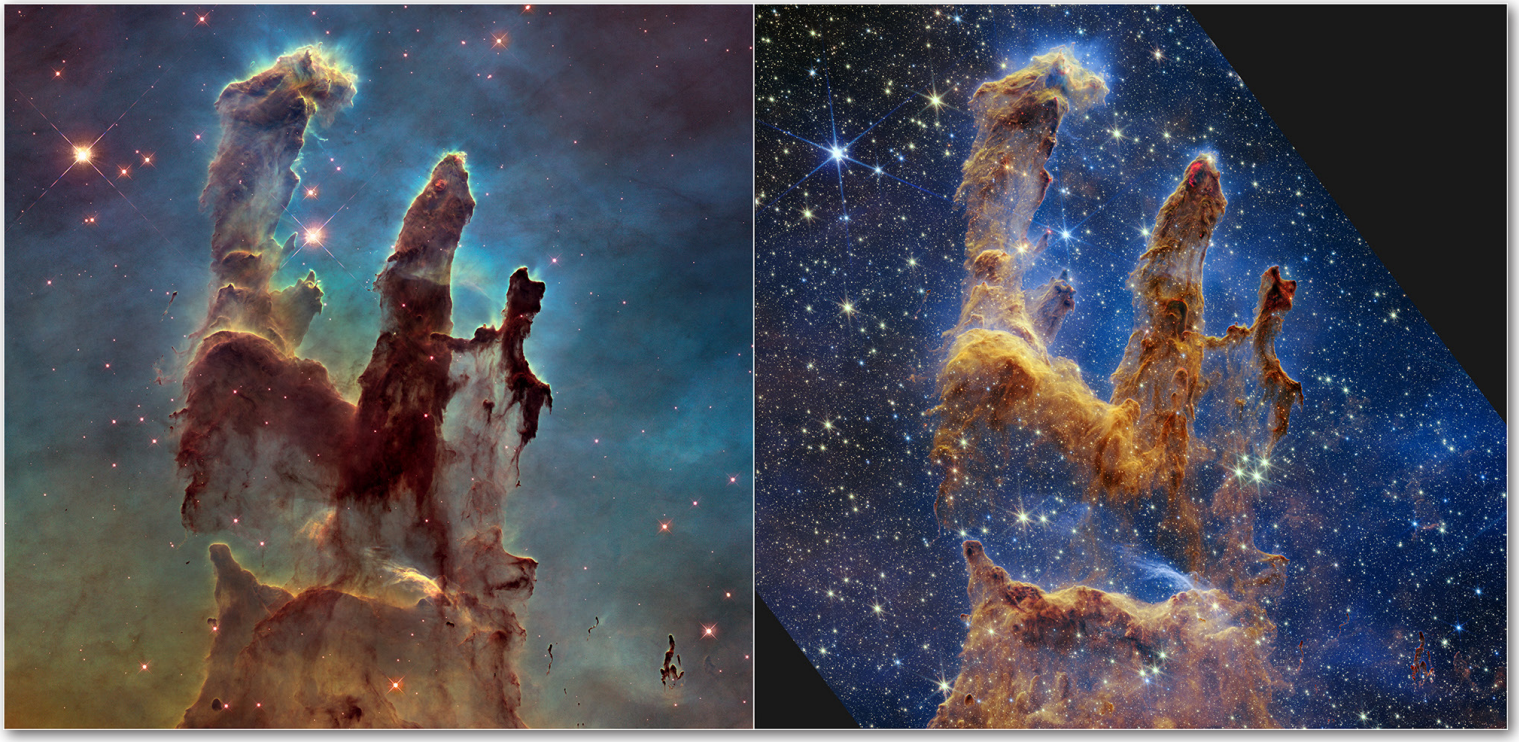
NASA's James Webb Space Telescope has captured a lush, highly detailed landscape – the iconic Pillars of Creation – where new stars are forming within dense clouds of gas and dust.

The three-dimensional pillars look like majestic rock formations, but are far more permeable. These columns are made up of cool interstellar gas and dust that appear – at times – semi-transparent in near-infrared light.

Webb's new view of the Pillars of Creation, which were first made famous when imaged by NASA's Hubble Space Telescope in 1995, will help researchers revamp their models of star formation by identifying far more precise counts of newly formed stars, along with the quantities of gas and dust in the region. Over time, they will begin to build a clearer understanding of how stars form and burst out of these dusty clouds over millions of years.

Newly formed stars are the scene-stealers in this image from Webb's Near-Infrared Camera (NIRCam). These are the bright red orbs that typically have diffraction spikes and lie outside one of the dusty pillars. When knots with sufficient mass form within the pillars of gas and dust, they begin to collapse under their own gravity, slowly heat up, and eventually form new stars.

What about those wavy lines that look like lava at the edges of some pillars? These are ejections from stars that are still forming within the gas and dust. Young stars periodically shoot out supersonic jets that collide with clouds of material, like these thick pillars. This sometimes also results in bow shocks, which can form wavy



NASA's Hubble Space Telescope made the Pillars of Creation famous with its first image in 1995, but revisited the scene in 2014 to reveal a sharper, wider view in visible light, shown above at left. A new, near-infrared-light view from NASA's James Webb Space Telescope, at right, helps us peer through more of the dust in this star-forming region. The thick, dusty brown pillars are no longer as opaque and many more red stars that are still forming come into view.

patterns like a boat does as it moves through water. The crimson glow comes from the energetic hydrogen molecules that result from jets and shocks. This is evident in the second and third pillars from the top – the NIRCam image is practically pulsing with their activity. These young stars are estimated to be only a few hundred thousand years old.

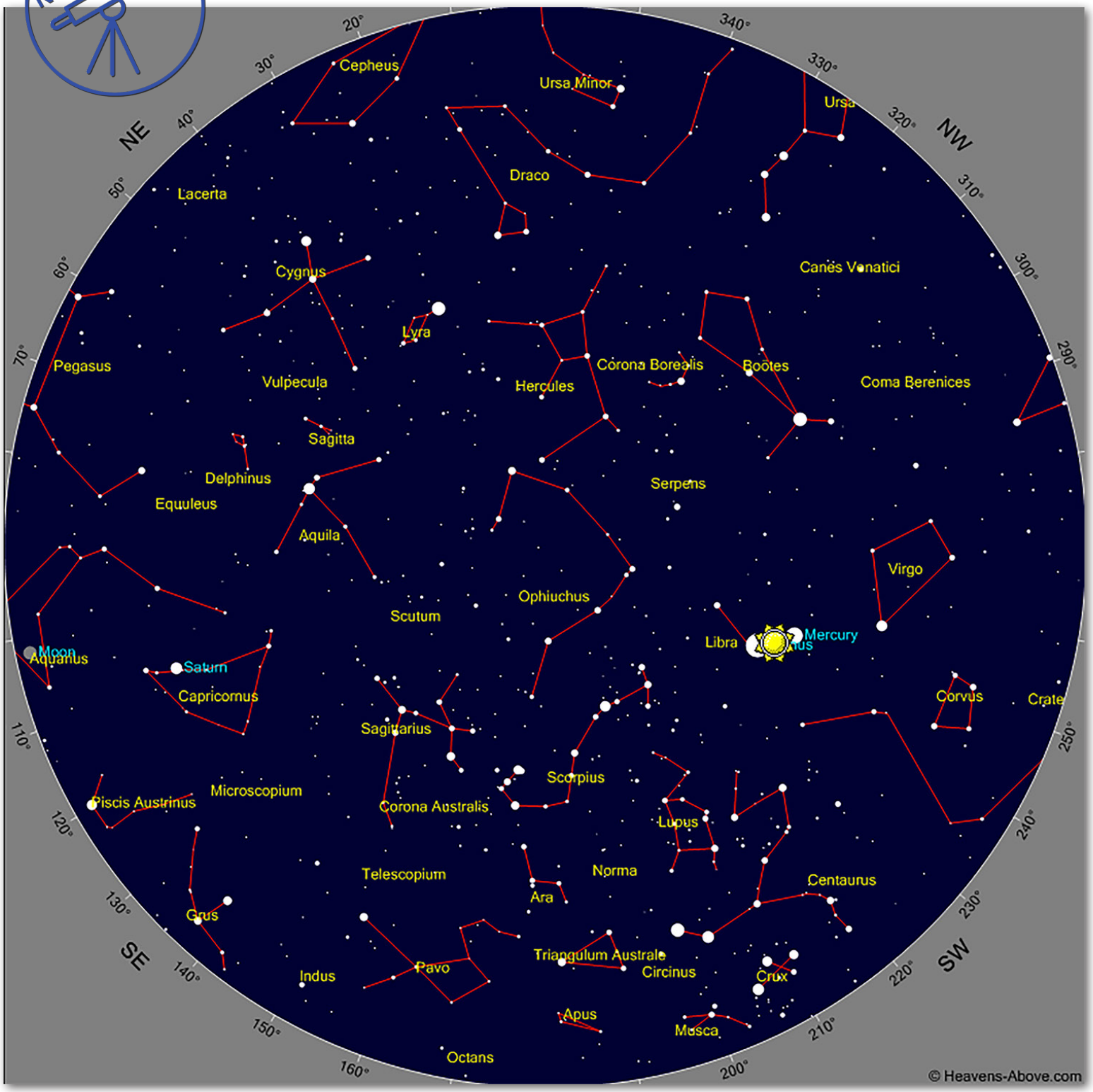
Although it may appear that near-infrared light has allowed Webb to "pierce through" the clouds to reveal great cosmic distances beyond the pillars, there are no galaxies in this view. Instead, a mix of translucent gas and dust known as the interstellar medium in the densest part of our Milky Way galaxy's disk blocks our view of the deeper universe.

This scene was first imaged by Hubble in 1995 and revisited in 2014, but many other observatories have also stared deeply at this region. Each advanced instrument offers researchers new details about this region, which is practically overflowing with stars.

This tightly cropped image is set within the vast Eagle Nebula, which lies 6,500 light-years away.

Credits: NASA, ESA, CSA, STScI; Joseph DePasquale (STScI), Anton M. Koekemoer (STScI), Alyssa Pagan (STScI).

NOV 2022 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 Hon

Year 2022 Month November Day 3 Time 14:22:11 Update Reset to now

	Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
Right ascension	$14^h\ 22^m\ 2.5^s$	$14^h\ 46^m\ 17.4^s$	$5^h\ 38^m\ 52.8^s$	$23^h\ 59^m\ 28.2^s$	$21^h\ 24^m\ 56.0^s$	$2^h\ 57^m\ 53.2^s$	$23^h\ 34^m\ 40.3^s$	$19^h\ 53^m\ 37.1^s$
Declination	-13° 26' 5"	-15° 19' 35"	23° 58' 44"	-1° 44' 31"	-16° 32' 29"	16° 30' 13"	-4° 3' 45"	-23° 7' 30"
Range (AU)	1.418	1.712	0.609	4.168	9.670	18.692	29.244	34.879
Elongation from Sun	3.3°	3.1°	135.7°	138.3°	97.6°	174.0°	131.7°	75.1°
Brightness	-1.2	-3.8	-1.3	-2.6	0.7	5.6	7.8	14.4
Equatorial Diameter	4.75"	9.75"	15.39"	47.30"	17.19"	3.77"	2.34"	0.09"
Phase Angle	7.5°	4.2°	27.8°	7.7°	5.7°	0.3°	1.4°	1.6°
Constellation	Libra	Libra	Taurus	Pisces	Capricornus	Aries	Aquarius	Sagittarius
Meridian transit	11:30	11:55	02:50	21:07	18:33	00:09	20:42	17:02
Rises	05:30	05:55	20:46	15:08	12:34	18:06	14:43	11:03
Sets	17:31	17:55	08:49	03:10	00:36	06:08	02:45	23:01
Altitude	45.5°	50.6°	-65.2°	-11.5°	25.9°	-52.7°	-5.3°	44.8°
Azimuth	250.7°	245.4°	346.0°	91.8°	108.5°	62.0°	94.1°	123.6°
Inferior Conjunction	2022-Sep-23 2023-Jan-07	2022-Jan-09 2023-Aug-13	-	-	-	-	-	-
Opposition	-	-	2020-Oct-13 2022-Dec-08	2022-Sep-26 2023-Nov-03	2022-Aug-14 2023-Aug-27	2021-Nov-04 2022-Nov-09	2022-Sep-16 2023-Sep-19	2022-Jul-20 2023-Jul-22
Superior Conjunction	2022-Jul-16 2022-Nov-08	2022-Oct-22 2024-Jun-04	2021-Oct-08 2023-Nov-18	2022-Mar-05 2023-Apr-11	2022-Feb-04 2023-Feb-16	2022-May-05 2023-May-09	2022-Mar-13 2023-Mar-15	2022-Jan-16 2023-Jan-18
Max. eastern elongation	2022-Aug-27 2022-Dec-21	2021-Oct-29 2023-Jun-04	-	-	-	-	-	-
Max. western elongation	2022-Oct-08 2023-Jan-30	2022-Mar-20 2023-Oct-23	-	-	-	-	-	-
Perihelion	2022-Oct-06 2023-Jan-02	2022-Sep-04 2023-Apr-17	2022-Jun-21 2024-May-08	2011-Mar-17 2023-Jan-20	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	2022-Aug-23 2022-Nov-19	2022-May-15 2022-Dec-26	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

Source: https://childwellbeing.asu.edu/SpaceFacts

10 Crazy Facts You Didn't Know About Space

There is so much about space, our solar system, and the galaxy that we still don't know! Space is vast. With billions of galaxies and stars, and planets in our own solar system yet to be fully explored or understood, scientists' knowledge of space is always evolving. There are, however, some really cool things we know about space right now! We've compiled a list of what we think are ten stellar facts that we hope you'll think are out of this world!

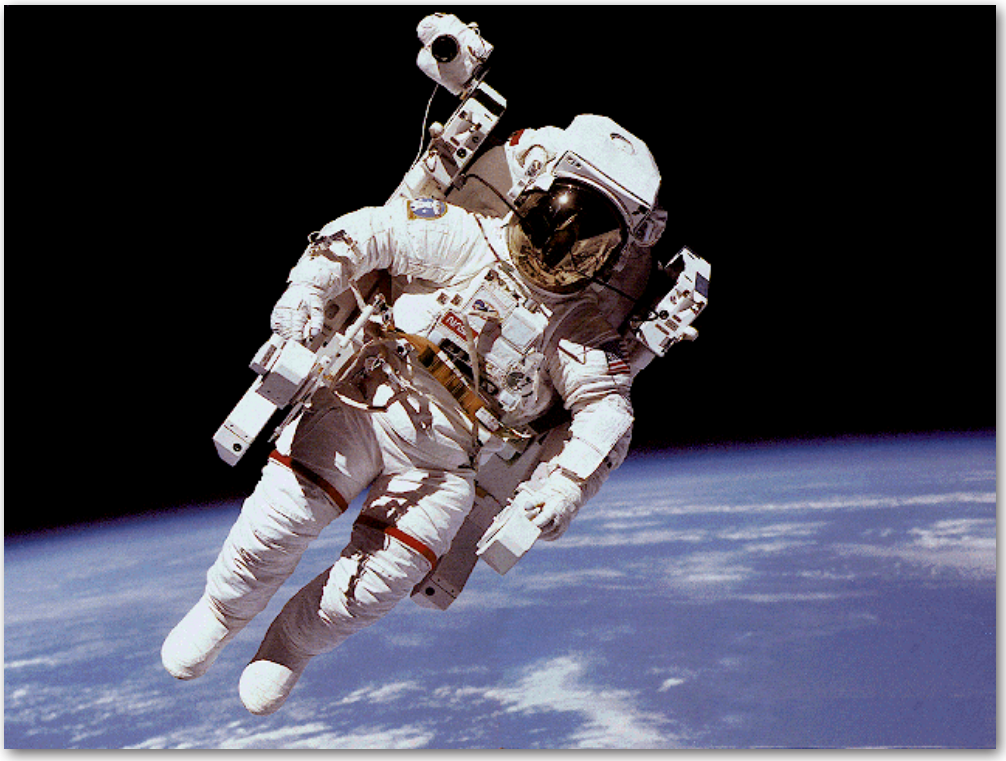
1. SPACE IS COMPLETELY SILENT

There is no atmosphere in space, which means that sound has no medium or way to travel to be heard.

2. THE HOTTEST PLANET IN OUR SOLAR SYSTEM IS 450° C.

Venus is the hottest planet in the solar system and has an average surface temperature of around 450° C. Did you know that Venus isn't the closest planet to the sun? That is Mercury. You would think that Mercury would then be the hottest, but Mercury has no atmosphere (which regulates temperature), resulting in big fluctuations.

3. A FULL NASA SPACE SUIT COSTS $12,000,000.



While the entire suit costs a cool $12m, 70% of that cost is for the backpack and control module. However, the space suits that NASA uses were built in 1974. If these were priced by today's pricing, they would cost an estimated 150 million dollars!

4. THE SUN'S MASS TAKES UP 99.86% OF THE SOLAR SYSTEM.

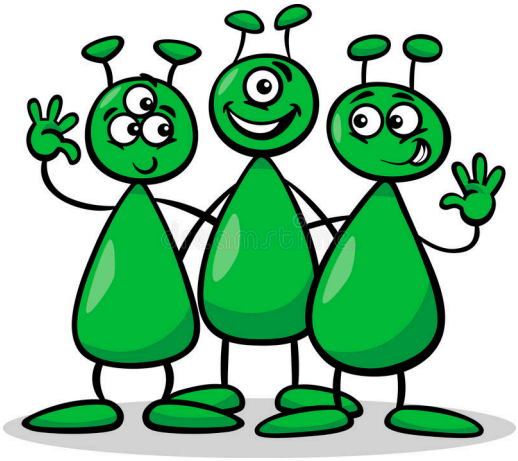
The Sun accounts for 99.86% of the mass in our solar system with a mass of around 330,000 times that of Earth. Did you know that the Sun is made up of mostly hydrogen (three quarters worth) with the rest of its mass attributed to helium. If the Sun had a voice would it be high and squeaky from all that helium?

5. ONE MILLION EARTHS CAN FIT INSIDE THE SUN

The Sun is large enough that approximately 1.3 million Earths could fit inside (if squashed in) or if the Earths retained their spherical shape then 960,000 would fit. But can you visualise that number of Earths?

6. THERE ARE MORE TREES ON EARTH THAN STARS IN THE MILKY WAY

There are about three trillion trees on Planet Earth, and between 100-400 billion stars, approximately, in the galaxy.



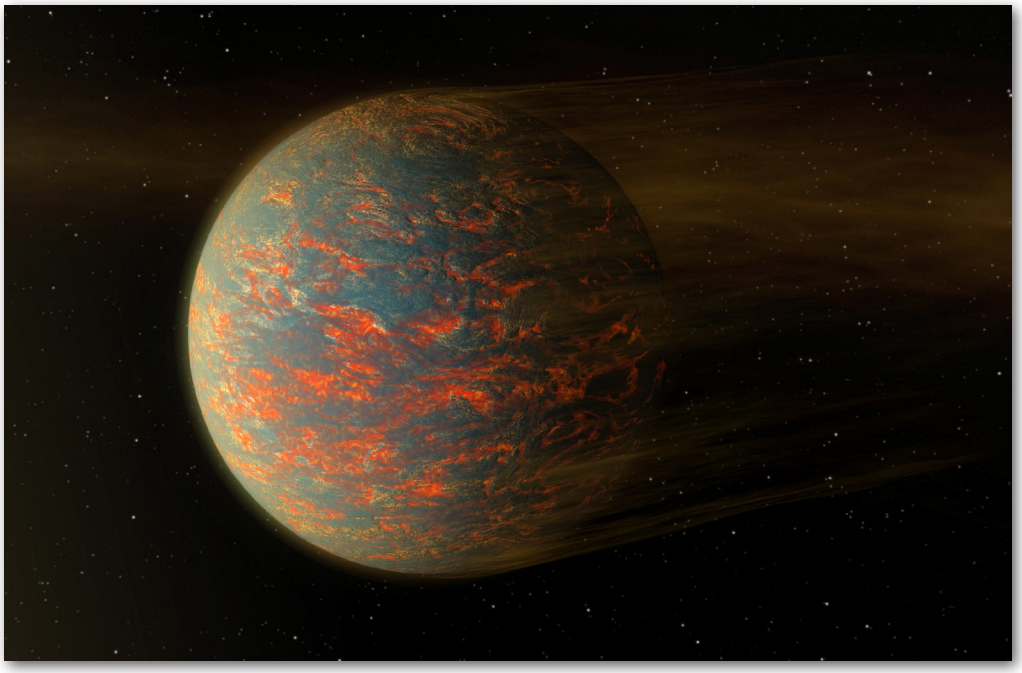
7. THE SUNSET ON MARS APPEARS BLUE

Just as colors are made more dramatic in sunsets on Earth, sunsets on Mars, according to NASA, would appear bluish to human observers watching from the red planet. Fine dust makes the blue near the Sun's part of the sky much more visibilke, while normal daylight makes the Red Planet's familiar rusty dust color the most perceptible to the human eye.

8. THERE ARE MORE STARS IN THE UNIVERSE THAN GRAINS OF SANDS ON EARTH

The universe extends far beyond our own galaxy, The Milky Way, which is why scientists can only estimate how many stars are in space. However, scientists estimate the universe contains approximately 1,000,000,000,00 0,000,000,000,000 stars, or a septillion. While no one can actually count every single grain of sand on the earth, the estimated total from researchers at the University of Hawaii, is somewhere around seven quintillion, five hundred quadrillion grains. That is an awfully big sand castle!

9. ONE DAY ON VENUS IS LONGER THAN ONE YEAR.



Venus has a slow axis rotation which takes 243 Earth days to complete its day. The orbit of Venus around the Sun is 225 Earth days, making a year on Venus 18 days less than a day on Venus.

10. THERE IS A PLANET MADE OF DIAMONDS

There's a planet made of diamonds twice the size of earth The "super earth," aka 55 Cancri e, is most likely covered in graphite and diamond. Paying a visit to that planet would probably pay for the $12 million dollar space suit needed to get there!