



ASTROFILES

Auburn Astronomical Society Newsletter

September 2022

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Moon Phases

September 17 — Last Quarter

September 25 — New Moon

October 2 — First Quarter

October 9 — Full Moon

October 17 — Last Quarter

October 25 — New Moon

November 1 — First Quarter

November 8 — Full Moon

News and events

We hope that everyone has had an enjoyable summer in spite of the heat and humidity. We are looking forward to cooler days (and nights) and longer hours of darkness to enjoy the night sky. As was mentioned a couple of months ago, the W.A.Gayle planetarium in Montgomery was planning to reopen back in August, but a recent post on their Facebook page by interim director Rick Evans explained a delay due to a number of administrative and training issues. We won't go into the details here but you can go to the planetarium Facebook page for Rick's full memo. He also mentioned that the planetarium building itself has some structural issues that may determine the long-term future of the facility. Since Rick is currently there on an interim basis, there are a number of things that he has no real control over as far as decision making goes. He just said to be patient as they work through these issues.

Saturday, October 1, 2022 has been designated as International Observe the Moon Night. There will be a first quarter moon that night and the purpose of the event is to encourage those with telescopes and even binoculars to get out and enjoy viewing the moon. One of the features during this event will be the ability to observe three of the six Apollo manned lunar landing sites, Apollo 11, 16 and 17. Please refer to the two pages later in this newsletter for more details as to where to locate these particular sites on the moon. The other three Apollo landing sites are found on the other half of the Moon's earth-facing side during the last quarter phase.

And finally, the James Webb Space Telescope (JWST) continues to produce amazing and spectacular images of a variety of targets, both near and far. Not only has it been trained on distant galaxies, which is its primary goal, but it has also been used to observe a few objects in and around our own solar system. Please refer to the next page that highlights a couple of recent images of a portion of the Orion nebular (M42) and also an interesting infra-red view of the planet Neptune. Scientists and researchers are just beginning to utilize the wonderful new capabilities of this telescope.

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Hubble (color)



Credits : NASA, C.R. O'Dell and S.K. Wong (Rice University)

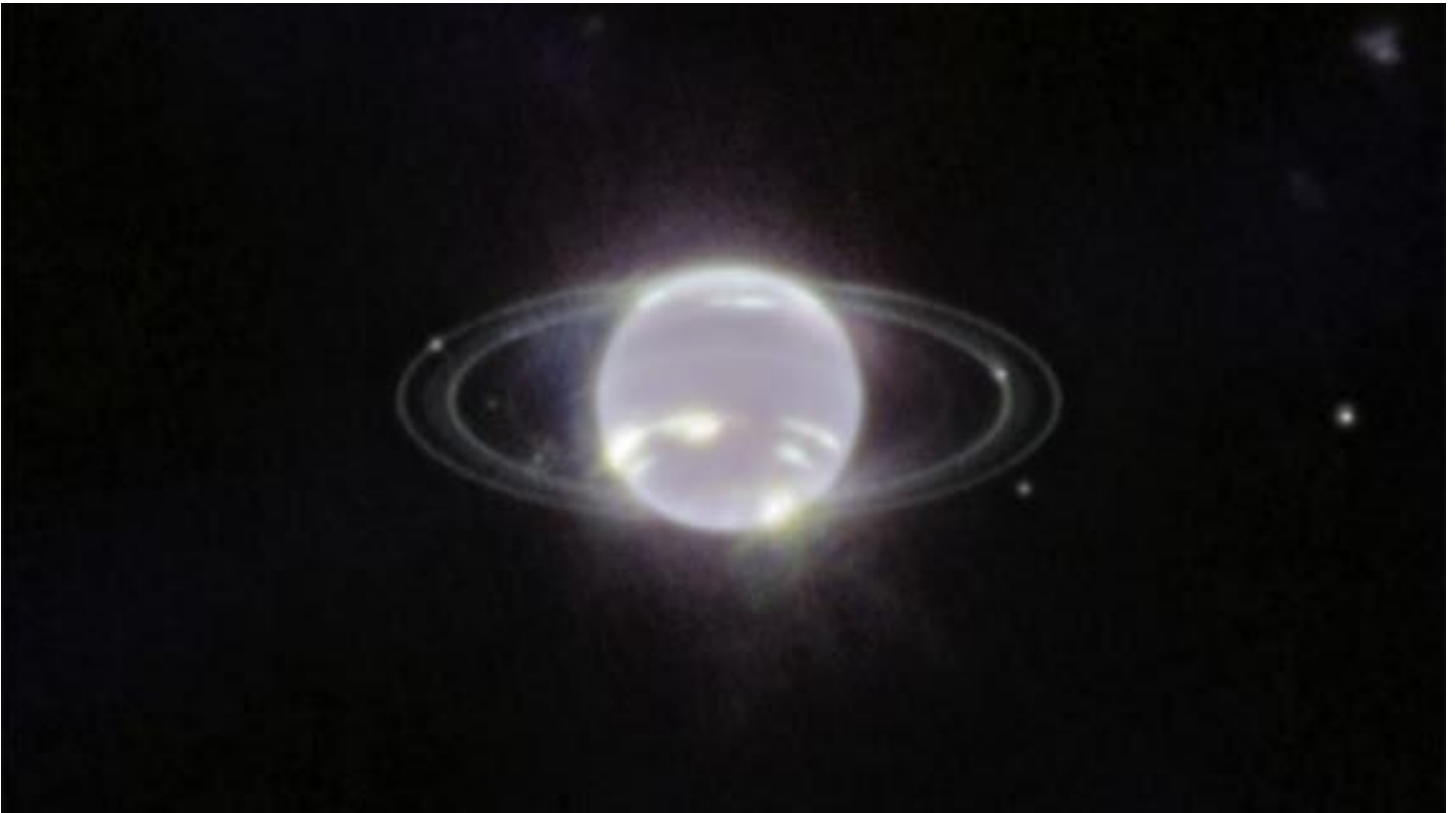
JWST (color)



Credits : NASA / ESA / CSA / PDR64All team S. Paenmayer



The Orion Nebula (M42) has long been known as a stellar (nursery) where new stars are created from the vast clouds of dust, but the Webb telescope is now providing unprecedented views of many of these young stars that still have some of the residual dust still surround them as they grow and develop. The above pair of images dramatically illustrate the Webb view as compared to the view from Hubble of the same exact portion of the nebula.



The Webb telescope recently captured this rather ghostly image of the planet Neptune (in infrared, of course) that clearly shows the planet's dust rings that were first detected by the Voyager 2 spacecraft some 33 years ago now. Also visible are a number of the planet's moons.



International OBSERVE THE MOON NIGHT 2022

SATURDAY 1ST OCTOBER



NORTHERN HEMISPHERE MOON MAP WITH HUMAN LANDING SITES

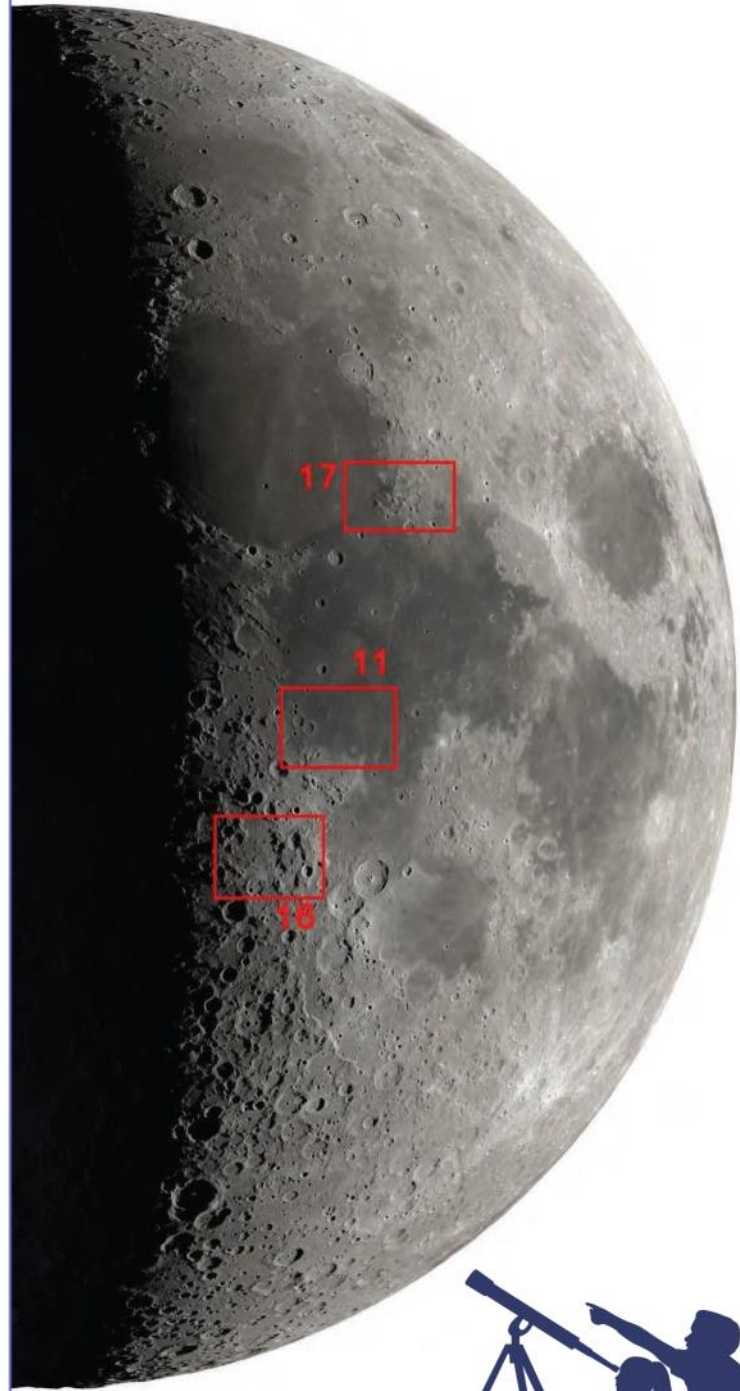
Moon Map

This map depicts the Moon as it will appear from the Northern Hemisphere at approximately 10:00 PM EDT/7:00 PM PDT on October 1, 2022 (02:00 UT Oct 2) but is useful for observing at any time on International Observe the Moon Night. Many of the best views will occur along the terminator (the line between day and night on the Moon).

Human Lunar Landing Sites

Between July 1969 and December 1972, a total of 12 astronauts landed on the surface of the Moon as part of six of the Apollo missions. Apollo missions 11, 12, 14, 15, 16, and 17 landed in different locations on the lunar surface. These locations, each fascinating for their own particular reasons, sampled a wide range of lunar geology and terrain, from smooth volcanic plains, called maria, to rugged ancient highlands. Three of the historic landing sites are visible tonight. Use this map and the magnified charts on the other side of this sheet to find and observe them.

This map can be used any time on International Observe the Moon Night, or a nearby date, but it was made showing the Moon at exactly 10pm EDT.



Map generated with NASA's Dial-A-Moon (<https://svs.gsfc.nasa.gov/4955>)

Selected Objects for Telescopic Viewing



Apollo 11: The first human landing site was on the smooth, flat plains of Mare Tranquillitatis (Sea of Tranquility). The region was selected because it is relatively smooth and flat - but even so, astronauts Armstrong and Aldrin had to maneuver their lander during the last minutes of their descent in order to avoid a field of giant boulders.

Apollo 11 Site: Mare Tranquillitatis
Commander: Neil A. Armstrong
Command Module Pilot: Michael Collins
Lunar Module Pilot: Edwin E. Aldrin Jr.
Command Module: Columbia
Lunar Module: Eagle
Mission Duration: July 16, 1969 - July 24, 1969



Apollo 16: This was the first and only mission to land in the rugged lunar highlands. In April 1972, astronauts Young and Duke collected rock samples more than four billion years old. These showed that the ancient lunar crust formed from rock that crystalized and floated to the top of a global lunar magma ocean.

Apollo 16 Site: Descartes Highlands
Commander: John W. Young
Command Module Pilot: Thomas K. Mattingly II
Lunar Module Pilot: Charles M. Duke Jr.
Command Module: Casper
Lunar Module: Orion
Mission Duration: April 16, 1972 - April 27, 1972



Apollo 17: The final Apollo mission to land on the Moon visited the spectacular Taurus-Littrow Valley, deeper than Earth's Grand Canyon. In December 1972, astronauts Cernan and Schmitt (the first professional geologist on the Moon) explored an active fault and a gigantic landslide deposit, and brought back samples that included beads of volcanic glass from an ancient lunar fire fountain.

Apollo 17 Site: Taurus-Littrow
Commander: Eugene A. Cernan
Command Module Pilot: Ronald E. Evans
Lunar Module Pilot: Harrison H. Schmitt
Command Module: America
Lunar Module: Challenger
Mission Duration: December 7, 1972 - December 19, 1972

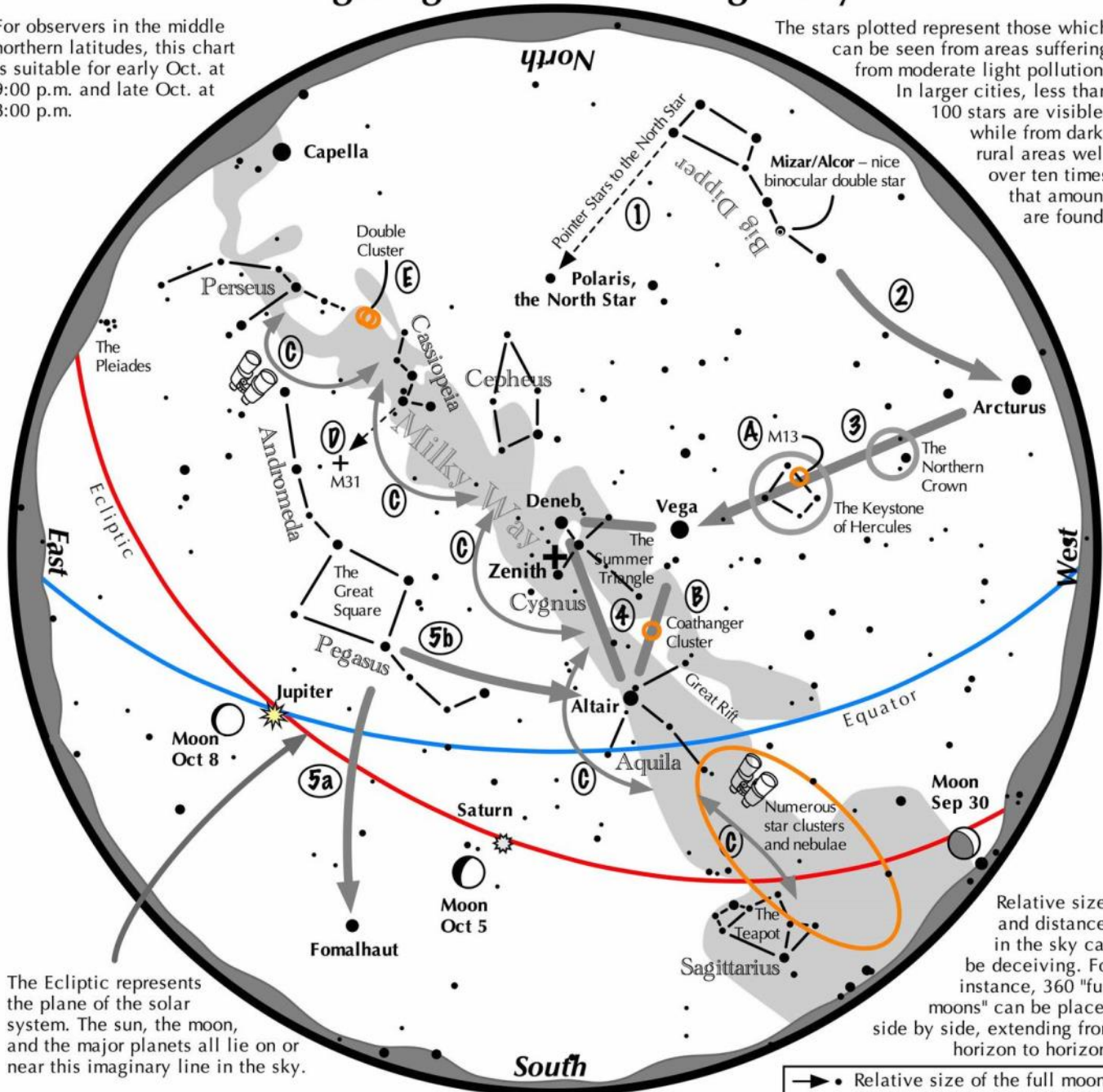


Detailed images are Lunar Reconnaissance Orbiter Wide Angle Camera mosaics with north up and lunar west to the left. Find more high-resolution images of the Moon at <https://trek.nasa.gov/moon>.

Navigating the October Night Sky

For observers in the middle northern latitudes, this chart is suitable for early Oct. at 9:00 p.m. and late Oct. at 8:00 p.m.

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



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

→ • Relative size of the full moon.

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

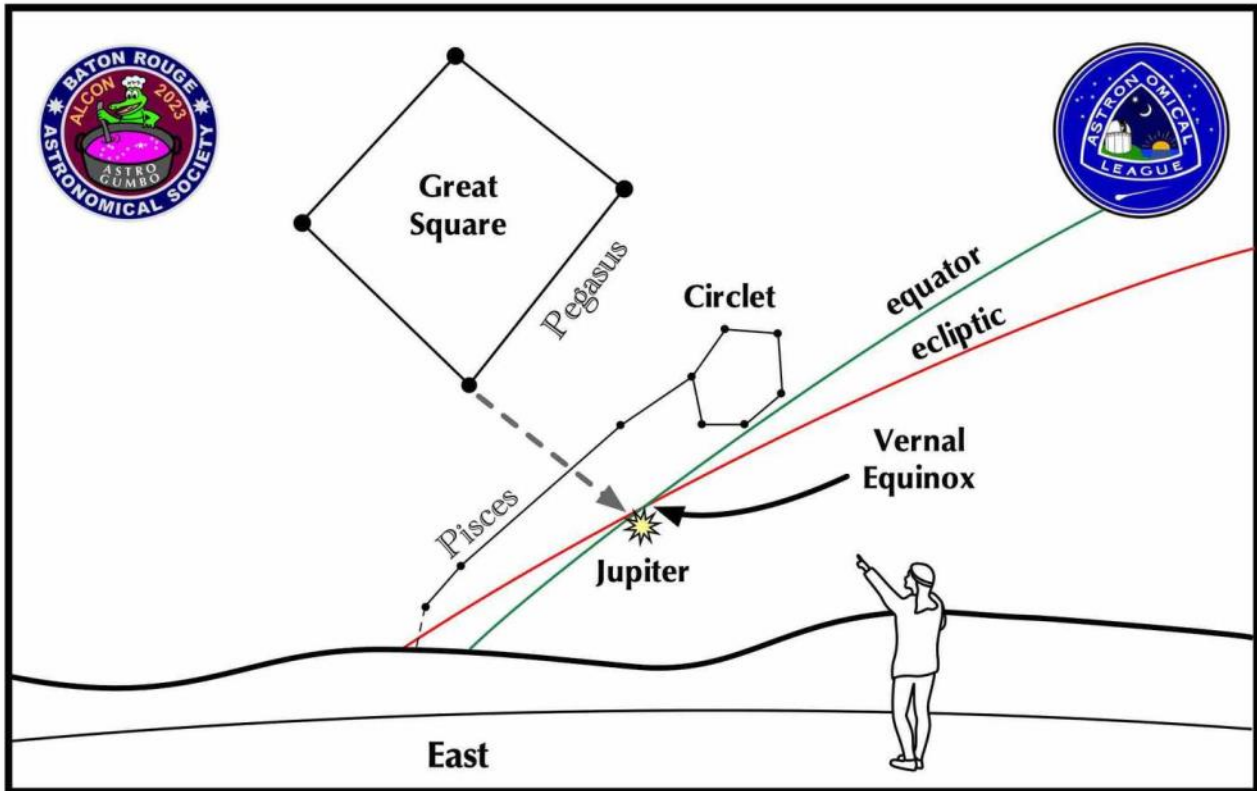
- 1 Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
- 2 Follow the arc of the Dipper's handle. It intersects Arcturus, the brightest star in the early October evening sky.
- 3 To the northeast of Arcturus shines another star of the same brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
- 4 Nearly overhead lie the summer triangle stars of Vega, Altair, and Deneb.
- 5 High in the east are the four moderately bright stars of the Great Square. Its two southern stars point west to Altair. Its two western stars point south to Fomalhaut.

Binocular Highlights

A: On the western side of the Keystone glows the Great Hercules Cluster, a ball of 500,000 stars. **B:** 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger. **C:** Sweep along the Milky Way for an astounding number of fuzzy star clusters and nebulae amid many faint glows and dark bays, including the Great Rift. **D:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **E:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster.



If you can see only one celestial event in the evening this October, see this one.



Jupiter lies at the Vernal Equinox

- Look in the east–southeast 90 minutes after sunset during October.
- Choose an evening when no bright moon is in the sky, such as one after October 12.
- Jupiter shines brightly above the horizon very near the location of the vernal equinox – the sun's position on March 21.
- Jupiter also acts as a good guide in finding the six dim stars of the "Cirlet" of Pisces. This odd stellar grouping really does take on the shape of a flattened circle. Dark skies are needed to see this interesting asterism.
- Jupiter will not be in the same location next year, as it will have moved eastward approaching the Pleiades. However, the Cirlet will always lie immediately south of the Great Square. So, once you meet it, these stars will be a celestial friend greeting you in the same sky location this time every year.



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

Fomalhaut: Not So Lonely After All

David Prosper

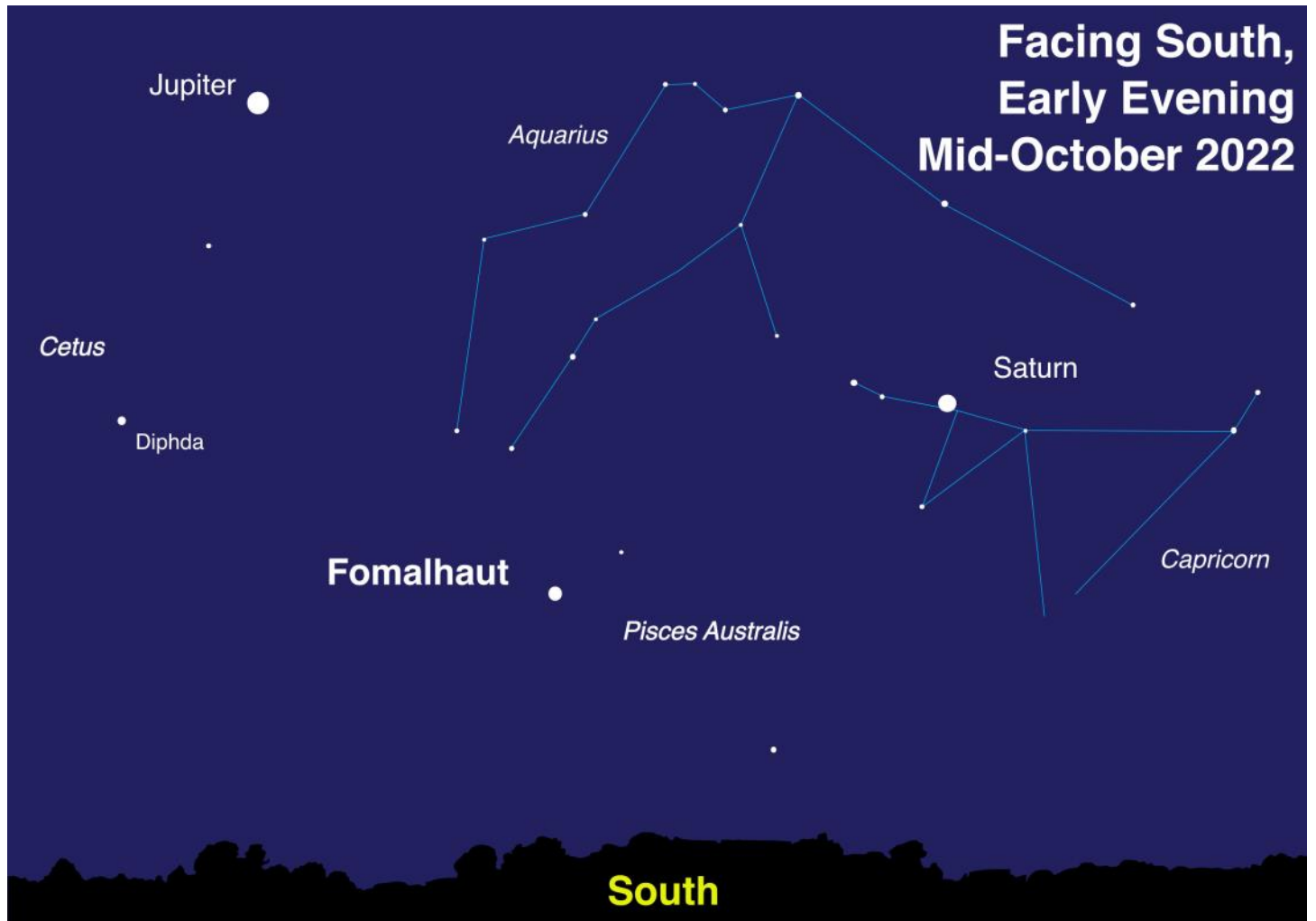
Fall evenings bring a prominent visitor to southern skies for Northern Hemisphere observers: the bright star **Fomalhaut**! Sometimes called "The Autumn Star," Fomalhaut appears unusually distant from other bright stars in its section of sky, leading to its other nickname: "The Loneliest Star." Since this star appears so low and lonely over the horizon for many observers, is so bright, and often wildly twinkles from atmospheric turbulence, Fomalhaut's brief but bright seasonal appearance often inspires a few startled UFO reports. While definitely out of this world – Fomalhaut is about 25 light years distant from us – it has been extensively studied and is a fascinating, and very identified, stellar object.

Fomalhaut appears solitary, but it does in fact have company. Fomalhaut's entourage includes two stellar companions, both of which keep their distance but are still gravitationally bound. Fomalhaut B (aka TW Piscis Austrini, not to be confused with former planetary candidate Fomalhaut b*), is an orange dwarf star almost a light year distant from its parent star (Fomalhaut A), and Fomalhaut C (aka LP 876-10), a red dwarf star located a little over 3 light years from Fomalhaut A! Surprisingly far from its parent star – even from our view on Earth, Fomalhaut C lies in the constellation Aquarius, while Fomalhaut A and B lie in Piscis Australis, another constellation! – studies of Fomalhaut C confirm it as the third stellar member of the Fomalhaut system, its immense distance still within Fomalhaut A's gravitational influence. So, while not truly "lonely," Fomalhaut A's companions do keep their distance.

Fomalhaut's most famous feature is a massive and complex disc of debris spanning many billions of miles in diameter. This disc was first detected by NASA's IRAS space telescope in the 1980s, and first imaged in visible light by Hubble in 2004. Studies by additional advanced telescopes, based both on Earth's surface and in space, show the debris around Fomalhaut to be differentiated into several "rings" or "belts" of different sizes and types of materials. Complicating matters further, the disc is not centered on the star itself, but on a point approximately 1.4 billion miles away, or half a billion miles further from Fomalhaut than Saturn is from our own Sun! In the mid-2000s a candidate planetary body was imaged by Hubble and named Fomalhaut b. However, Fomalhaut b was observed to slowly fade over multiple years of observations, and its trajectory appeared to take it out of the system, which is curious behavior for a planet. Scientists now suspect that Hubble observed the shattered debris of a recent violent collision between two 125-mile wide bodies, their impact driving the remains of the now decidedly non-planetary Fomalhaut b out of the system! Interestingly enough, Fomalhaut A isn't the only star in its system to host a dusty disc; Fomalhaut C also hosts a disc, detected by the Herschel Space Observatory in 2013. Despite their distance, the two stars may be exchanging material between their discs – including comets! Their co-mingling may help to explain the elliptical nature of both of the stars' debris discs. The odd one out, Fomalhaut B does not possess a debris disc of its own, but may host at least one suspected planet.

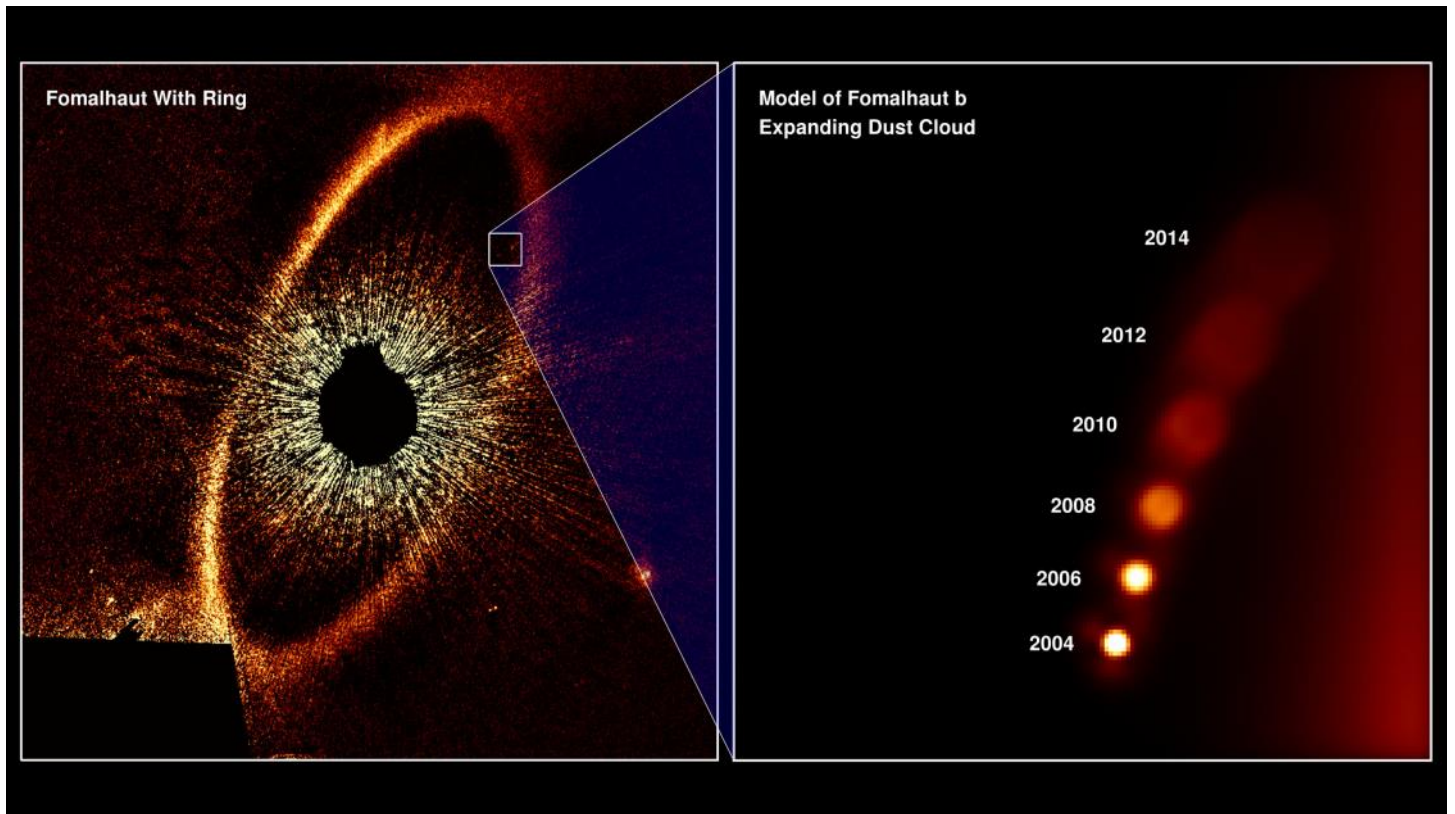
While Hubble imaged the infamous "imposter planet" of Fomalhaut b, very few planets have been directly imaged by powerful telescopes, but NASA's James Webb Space Telescope will soon change that. In fact, Webb will be imaging Fomalhaut and its famous disc in the near future, and its tremendous power is sure to tease out more amazing discoveries from its dusty grains. You can learn about the latest discoveries from Webb and NASA's other amazing missions at nasa.gov.

**Astronomers use capital letters to label companion stars, while lowercase letters are used to label planets.*



Sky map of the southern facing sky for mid-latitude Northern Hemisphere observers. With Fomalhaut lying so low for many observers, its fellow member stars in the constellation Piscis Australis won't be easily visible for many without aid due to a combination of light pollution and atmospheric extinction (thick air dimming the light from the stars). Fomalhaut is by far the brightest star in its constellation, and is one of the brightest stars in the night sky. While the dim constellations of Aquarius and Capricorn may also not be visible to many without aid, they are outlined here. While known as the "Loneliest Star," you can see that Fomalhaut has two relatively close and bright visitors this year: Jupiter and Saturn!

Illustration created with assistance from Stellarium



The magnificent and complex dust disc of the Fomalhaut system (left) with the path and dissolution of former planetary candidate Fomalhaut b displayed in detail (right).

Image credits: NASA, ESA, and A. Gáspár and G. Rieke (University of Arizona) Source: <https://www.nasa.gov/feature/goddard/2020/exoplanet-apparently-disappears-in-latest-hubble-observations>



Auburn Astronomical Society Membership Application Form

Name:

Address:

City: _____ State: _____ Zip: _____

Phone: _____ Date of Application* ____/____/____

E-mail:

Telescope(s):

Area(s) of special interest:

Enclose: \$20.00 for regular membership, payable in January. *Full-Time* student membership is half the Regular rate.

* For ***NEW*** members joining after January, refer to the prorated Dues Table below:

Jan \$20.00	Feb \$18.33	Mar \$16.66	Apr \$14.99	May \$13.33	Jun \$11.66
Jul \$10.00	Aug \$8.33	Sep \$6.66	Oct \$4.99	Nov \$2.33	Dec \$1.66

Make checks payable to: Auburn Astronomical Society and return this application to:

Auburn Astronomical Society
c/o John Wingard
5 Wexton Court
Columbus, GA 31907

For questions about your dues or membership status, contact: jwin1048@gmail.com

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