November/December 2022 VOL. 20

THE OBSERVER

BATTLE POINT ASTRONOMICAL ASSOCIATION

WWW.BPASTRO.ORG BAINBRIDGE ISLAND, WA


Photo credit: Mario Alejandro Torres

Rudolph Planetarium Update

The Planetarium is coming! BPAA has placed our order with Digitalis Education for the new projector. It will arrive by the end of the year. Soon we'll be able to offer exciting, interesting and informative astronomy programs even when the sky is cloudy and raining. We are especially excited and looking forward to offering kid-friendly star programs.

We've raised about $34,000 so far and are still looking to raise about $13,000 of the $47,000 needed to complete the purchase of the projector and software licenses, so if you are thinking about making a donation to help fund the Planetarium now would be a good time to do so. You can contribute on our website https://bpastro.org/planetarium-fundraiser/; through One Call For All https://onecallforall.org/battle-point-astronomical-association/; or by mailing your check to BPAA Rudolph Planetarium, PO Box 10914, Bainbridge Island, 98110. BPAA is a 501c3 charitable organization and all gifts are tax deductible. Thanks in advance for your support!

If you've already supported the Planetarium, thank you, we are most grateful.

Improvements to the Ritchie Telescope Continue

Chief Astronomer Cole Rees and others have been working diligently to upgrade the Ritchie Telescope's performance, including imaging capability. If you'd like to help with this work and in the process learn how to operate the Ritchie, contact Cole at Astronomer@BPAstro.org.

BPAA Dues Increase Coming

BPAA's membership dues haven't been raised since long before any current Board member can remember. Since costs for everything are going up, the Board in September decided that a modest increase is in order. The new annual dues are effective January 1, 2023, as follows:

- Family Membership: $40 (up from $30)
- Individual Membership: $25 (up from $20)
- Junior Membership (under 18 years of age): $10 (unchanged)
- Credentialed Teacher Individual Membership: first year is free. If you're a credentialed teacher and are active in creating and managing BPAA's science programs for kids (BPAstroKids), additional years' free membership may be granted at the Board's discretion.

SAVE THE DATE! - Annual Member Meeting and Board Elections are Coming!

The 2023 Annual Member Meeting will be held on Wednesday January 11 at 7pm at the Ritchie Observatory. All members are invited and welcome to attend either in person or via Zoom. More information will be forthcoming.

Board elections will take place at this meeting. All six of the current Board members are nominated to continue. There are three open positions: Vice President, Secretary, and Education Officer. If you'd like to consider nominating yourself or someone else, please contact President Frank Petrie, president@bpastro.org, to learn more about the available positions.

Membership Committee

We're thrilled to welcome BPAA members Diane Dalton and Dave DeBarr to their new roles as the Membership Committee. Diane is handling member signups and renewals as well as keeping the Groups.io mailing list up-to-date. Dave is managing member activities and looking for ways members can interact and share our interests in all things astronomy. Stay tuned for more frequent opportunities for engagement, from star parties to special interest group gatherings.

Ways for members to stay in touch:
- Join BPAA's new Discord channel: https://discord.gg/mMjZyqJG7N
- Opt-in to BPAA's Groups.io messaging group:
  Subscribe: bpastro+subscribe@groups.io
- Facebook: BattlePointAstronomy
- Instagram: BP_Astronomical
- YouTube: BPAA Bainbridge

Opportunities to Get Involved!

Facilities Director Denise Hidano has a list of tasks around the observatory looking for volunteers to get them done. Opportunities include everything from freshening up the building and grounds to maintaining our loaner telescopes. Drop Denise a note at Facilities@BPAstro.org to learn more and volunteer.

Webb Reveals Dust, Structure in Pillars of Creation

Credits: NASA, ESA, CSA, STScI; Joseph DePasquale (STScI), Alyssa Pagan (STScI)

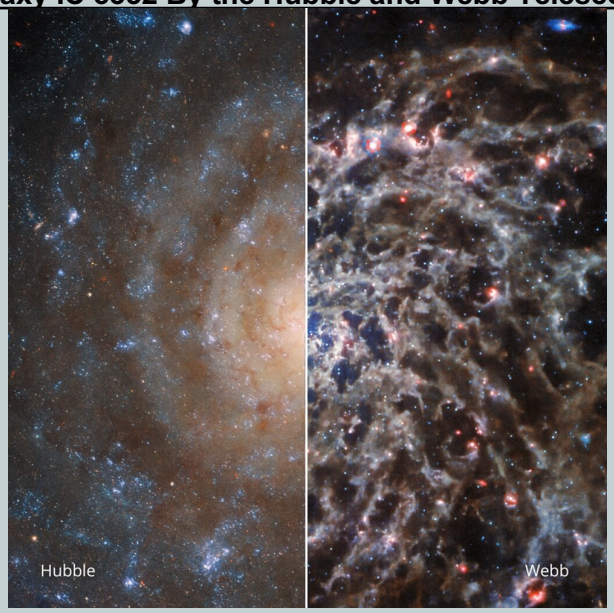
NASA's James Webb Space Telescope's mid-infrared view of the Pillars of Creation strikes a chilling tone. Thousands of stars that exist in this region seem to disappear, since stars typically do not emit much mid-infrared light, and seemingly endless layers of gas and dust become the centerpiece. The detection of dust by Webb's Mid-Infrared Instrument (MIRI) is extremely important – dust is a major ingredient for star formation.

This scene was first captured by NASA's Hubble Space Telescope in 1995 and revisited in 2014, but many other observatories, like NASA's Spitzer Space Telescope, have also gazed deeply at the Pillars of Creation. With every observation, astronomers gain new information, and through their ongoing research build a deeper understanding of this star-forming region. Each wavelength of light and advanced instrument delivers far more precise counts of the gas, dust, and stars, which inform researchers' models of how stars form. As a result of the new MIRI image, astronomers now have higher resolution data in mid-infrared light than ever before, and will analyze its far more precise dust measurements to create a more complete three-dimensional landscape of this distant region.

The Pillars of Creation is set within the vast Eagle Nebula, which lies 6,500 light-years away.

(Source: nasa.gov)

Galaxy IC 5332 By the Hubble and Webb Telescopes



Credit: ESA/Webb, NASA & CSA, J. Lee and the PHANGS-JWST and PHANGS-HST Teams

These are the "bones" of galaxy IC 5332, usually hidden by dust. In mid-infrared light, Webb is able to peer through that dust and see the patterns of gas spread throughout the galaxy.

Compare Hubble's combined visible and ultraviolet view (left) with Webb's mid-infrared view (right) of galaxy IC 5332. Notice how the dark regions of dust between the spiral arms of this galaxy are visible in Hubble's image but not in Webb's, as mid-infrared light is able to pass through the dust. Different stars also shine brighter at different wavelengths — so some stars are clearer in Hubble's view, while others are more visible with Webb. Taken together, these two views provide us a more complete understanding of galaxy IC 5332's structure and composition.

Source: NASA Images on Flickr)

Chandra Adds X-ray Vision to Webb Images

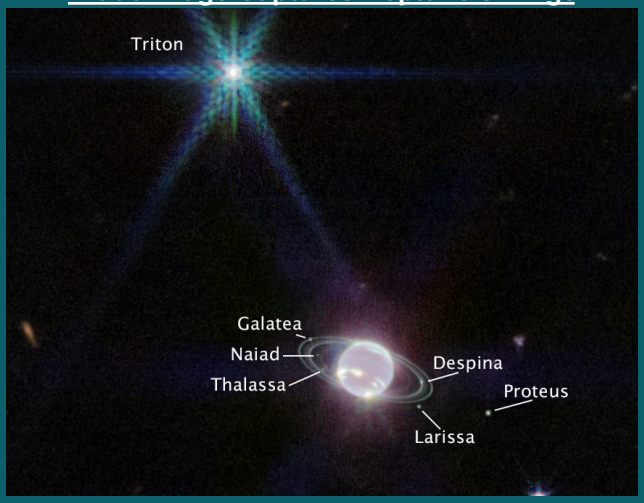
Stephan's Quintet Composite

Image credits: X-ray: NASA/CXC/SAO; IR (Spitzer): NASA/JPL-Caltech; IR (Webb): NASA/ESA/CSA/STScI

The four galaxies within Stephan's Quintet are undergoing an intricate dance choreographed by gravity. (The fifth galaxy, on the left, is an interloping galaxy at a different distance.) The new Webb image (red, orange, yellow, green, blue) of this object features never-seen-before details of the results of these interactions, including sweeping tails of gas and bursts of star formation. The Chandra data (light blue) of this system has uncovered a shock wave that heats gas to tens of millions of degrees, as one of the galaxies passes through the others at speeds of around 2 million miles per hour. This new composite also includes infrared data from NASA's now-retired Spitzer Space Telescope (red, green, blue).

(Source: NASA Images on Flickr)

Webb Image Captures Neptune's Rings



Credits: NASA, ESA, CSA, STScI

NASA's James Webb Space Telescope shows off its capabilities closer to home with its first image of Neptune. Not only has Webb captured the clearest view of this distant planet's rings in more than 30 years, but its cameras reveal the ice giant in a whole new light.

Most striking in Webb's new image is the crisp view of the planet's rings – some of which have not been detected since NASA's Voyager 2 became the first spacecraft to observe Neptune during its flyby in 1989. In addition to several bright, narrow rings, the Webb image clearly shows Neptune's fainter dust bands.

Webb also captured seven of Neptune's 14 known moons. Dominating this Webb portrait of Neptune is a very bright point of light sporting the signature diffraction spikes seen in many of Webb's images, but this is not a star. Rather, this is Neptune's large and unusual moon, Triton.

Covered in a frozen sheen of condensed nitrogen, Triton reflects an average of 70 percent of the sunlight that hits it. It far outshines Neptune in this image because the planet's atmosphere is darkened by methane absorption at these near-infrared wavelengths.

(Source: nasa.gov)

Tentative Evidence of First Generation of Stars

The arrow denotes the individual star, dubbed Earendel, found in a Hubble Space Telescope image of a gravitational lens. The star's position along a ripple in spacetime magnifies it and makes it possible for the star to be detected across from 13 billion light-years away.

Science: NASA / ESA / Brian Welch (JHU) / Dan Coe (STScI); Image processing: NASA / ESA / Alyssa Pagan (STScI)

Scientists have detected something unusual around a distant quasar — perhaps the first real evidence of a first-generation star.

Big Bang cosmology tells us that the early universe was made up of only hydrogen, helium, and a smattering of lithium. From this, we can reason that the first generation of stars would have been quite different from the stars around us today. We've never seen this first generation— the first stars are too far away to image directly. But now, we have tentative evidence that they really did exist, and in the pure form astronomers had predicted.

The first stars were "pure" in the sense that they must have been free of metals, the term astronomers use to mean any elements heavier than hydrogen and helium. For historical reasons, we call these stars Population III (Pop III). Because they were missing metals, these stars were huge, with hundreds of Suns' worth of mass. Astronomers have hypothesized that some of them ended their lives in a peculiar kind of explosion called a pair-instability-supernova (PISN).

Unlike most supernovae we observe, a PISN does not leave behind a black hole or neutron star— just gas leftover from a shredded star. Subsequent generations of stars — Pop II, then Pop I — were formed from the heavier elements left behind. Neither Pop III stars, nor the explosions they ended in, have ever been directly observed. But a recent article in The Astrophysical Journal claims to have found evidence of this peculiar type of supernova in the gas around ULAS J1342, one of the most distant quasars known.

More observations of similarly distant quasars could verify this observation. So could observations of individual far-away stars, made possible by gravitational lensing. The star Earendel, discovered this way in the distant Sunrise Arc galaxy, is also a Pop III candidate.

(Source: skyandtelescope.org)

NASA Pushes Back Artemis 1 Launch to November

NASA will wait until at least the middle of November before attempting another launch of the Space Launch System on the Artemis 1 mission, citing the impacts from Hurricane Ian.

NASA announced late Sept. 30 that inspections of Kennedy Space Center facilities after the passage of the storm a day earlier turned up no evidence of damage to the SLS or Orion spacecraft, which had moved back into the Vehicle Assembly Building Sept. 27 as a precautionary measure.

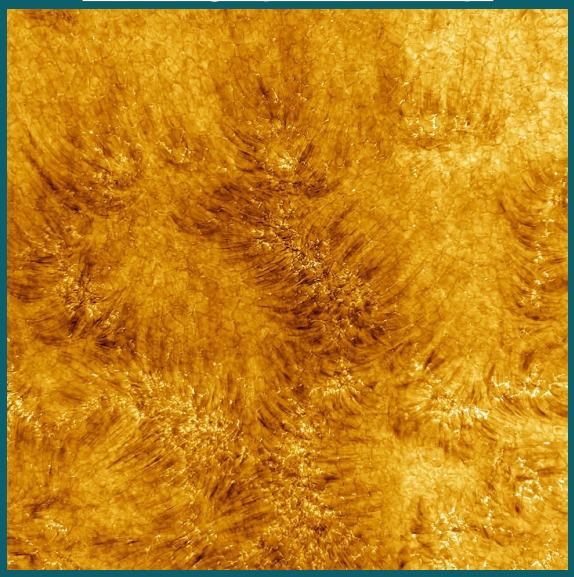
However, NASA said it has ruled out attempting a launch of the Artemis 1 mission during the next launch period, which opens Oct. 17 and runs through Oct. 31. Instead, it will focus on the following launch window, which runs from Nov. 12 to 27.

"Focusing efforts on the November launch period allows time for employees at Kennedy to address the needs of their families and homes after the storm and for teams to identify additional checkouts needed before returning to the pad for launch," NASA said in the statement.

NASA did not state when in the November launch period it might be ready to attempt a launch. "Over the coming days, managers will assess the scope of work to perform while in the VAB and identify a specific date for the next launch attempt," the agency stated.

(Source: spacenews.com)

NSF's Flagship Solar Telescope



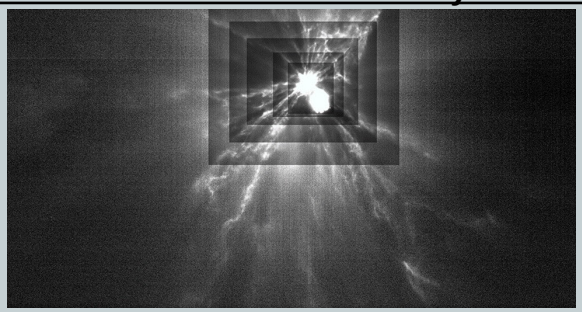
The first images of the chromosphere – the area of the Sun's atmosphere above the surface – taken with the Daniel K. Inouye Solar Telescope on June 3rd, 2022. The image shows a region 82,500 kilometers across at a resolution of 18 km. This image is taken at 486.13 nanometers using the H-beta line from the Balmer series. Credit: NSO/AURA/NSF

On August 31, 2022, a delegation of National Science Foundation (NSF) leaders, congressional dignitaries, and members of both the scientific and Native Hawaiian communities gathered near the summit of Haleakalā, Maui to commemorate the inauguration of the world's most powerful solar telescope. The NSF's Daniel K. Inouye Solar Telescope is nearing the completion of the first year of its Operations Commissioning Phase (OCP), delivering on its promise to reveal the Sun in ways never seen before.

"NSF's Inouye Solar Telescope is the world's most powerful solar telescope that will forever change the way we explore and understand our sun," said NSF Director, Sethuraman Panchanathan. "Its insights will transform how our nation, and the planet, predict and prepare for events like solar storms."

(Source: nso.edu)

DART Asteroid Redirect Test Wildly Successful



This image from the small LICIACube spacecraft shows the plumes of ejecta streaming from the Dimorphos asteroid after the DART mission made impact with it on September 26, 2022. Each rectangle represents a different level of contrast in order to better see fine structure in the plumes. Credit: ASI / NASA / APL

NASA announced that the Double Asteroid Redirect Test's attempt to alter the path of an asteroid moon had succeeded beyond expectations — though not beyond hopes.

Before the DART spacecraft slammed head-on into Dimorphos, the moon of asteroid 65803 Didymos, the moon orbited its primary in about 11 hours, 55 minutes. It now takes only 11 hours, 23 minutes (plus or minus 2 minutes) to complete its orbit. The large change — 32 minutes — was within the range predicted before the impact, but at the top end of what was possible.

The mission confirmed the measurement using visible light and radar. With both ground- and space-based optical telescopes, they recorded lightcurves of the Didymos system as the two components alternately eclipsed each other: small, brief dips in brightness as Dimorphos casts a shadow on Didymos, and larger, longer dips as Dimorphos passes through Didymos' shadow. The cadence of these dips changed with the faster orbit of Dimorphos.

The radar method was independent of the optical one. Following the DART impact, Doppler-delay radar images of the Didymos-Dimorphos system showed that the moonlet had neither the position nor velocity expected from the pre-impact orbit, and the new orbital speed derived from radio observations closely matched the optical ones.

(Source: skyandtelescope.org)

WHAT'S UP(COMING)!

Nov 8 – Total lunar eclipse
– Full Moon
Nov 9 – Uranus at opposition
Nov 12 – Asteroid 27 Euterpe at opposition
– Northern Taurid meteor shower 2022
Nov 17 – Leonid meteor shower 2022
Nov 18 – M45 is well placed
Nov 19 – Asteroid 115 Thyra at opposition
Nov 21 – α-Monocerotid meteor shower 2022
Nov 22 – Asteroid 324 Bamberga at opposition
Nov 23 – New Moon
Nov 24 – 118P/Shoemaker-Levy at perihelion
Nov 28 – November Orionid meteor shower 2022
Nov 29 – Asteroid 30 Urania at opposition
Dec 1 – Asteroid 349 Dembowska at opposition
Dec 6 – December ϕ-Cassiopeid meteor shower 2022
Dec 7 – Full Moon
Dec 9 – Monocerotid meteor shower 2022
Dec 10 – 1 Ceres at perihelion
Dec 12 – σ-Hydrid meteor shower 2022
Dec 14 – Geminid meteor shower 2022
Dec 15 – 81P/Wild at perihelion
– NGC 1981 is well placed
Dec 16 – Comae Berenicid meteor shower 2022
Dec 20 – December Leonis Minorid meteor shower 2022
Dec 21 – December Solstice
Dec 22 – Ursid meteor shower 2022
Dec 23 – New Moon
Dec 28 – NGC 2232 is well placed
Dec 29 – NGC 2244 is well placed
Jan 2 – M41 is well placed
Jan 4 – Quadrantid meteor shower 2023
Jan 6 – Full Moon
Jan 12 – C/2022 E3 (ZTF) at perihelion
Jan 15 – M47 is well placed
– NGC 2403 is well placed
Jan 19 – γ-Ursae Minorid meteor shower 2023
Jan 21 – New Moon
Jan 26 – Asteroid 6 Hebe at opposition
Jan 31 – M44 is well placed

2022 Officers

President	Frank Petrie
Vice President	Vacant
Chief Astronomer	Cole Rees
Chief Scientist	Steve Ruhl
Treasurer	Kim Wilkes
Secretary	Peter Moseley
Facilities Officer	Denise Hidano
Education Officer	Vacant

Astronomy: The Oldest Scientific Discipline

The Nebra Disc, estimated to be 3,600 years old, is one of the oldest known artefacts depicting the night sky. (Image credit: Frank Vincentz)

Astronomy is one of the oldest scientific disciplines that has evolved from the humble beginnings of counting stars and charting constellations with the naked eye to the impressive showcase of humankind's technological capabilities that we see today.

Despite the progress astronomy has made over millennia, astronomers are still working hard to understand the nature of the universe and humankind's place in it. That question has only gotten more complex as our understanding of the universe grew with our expanding technical capabilities.

As the depths of the sky opened in front of our increasingly sophisticated telescopes, and sensitive detectors enabled us to spot the weirdest types of signals, the star-studded sky that our ancestors gazed at turned into a zoo of mind-boggling objects including black holes, white dwarfs, neutron stars and supernovas.

Most of today's citizens of planet Earth live surrounded by the inescapable glow of modern urban lighting and can hardly imagine the awe-inspiring presence of the pristine star-studded sky that illuminated the nights for ancient tribes and early civilizations. We can guess how drawn our ancestors were to that overwhelming sight from the role that sky-watching played in their lives.

Ancient monuments, such as the 5,000 years old Stonehenge in the U.K., were built to reflect the journey of the sun in the sky, which helped keep track of time and organize life in an age that solely depended on seasons. Art pieces depicting the moon and stars were discovered dating back several thousand years, such as the "world's oldest star map," the bronze-age Nebra disk.

Ancient Assyro-Babylonians around 1,000 B.C. systematically observed and recorded periodical motions of celestial bodies, according to the European Space Agency (ESA), and similar records exist also from early China. In fact, according to the University of Oregon, astronomy can be considered the first science as it's the one for which the oldest written records exist.

Ancient Greeks elevated sky-watching to a new level. Aristarchus of Samos made the first (highly inaccurate) attempt to calculate the distance of Earth to the sun and moon, and Hipparchus sometimes considered the father of empirical astronomy, cataloged the positions of over 800 stars using just the naked eye. He also developed the brightness scale that is still in use today, according to ESA.

During the Middle Ages, the science of astronomy continued to advance in Asia and the Islamic world. Islamic scholars kept building on the knowledge of the Ancient Greeks, expanding the catalog introduced by Hipparchus. They also developed new tools for measuring the positions of objects in the sky such as the quadrant and the sextant, according to ESA.

The first true breakthrough in humankind's exploration of the universe, however, arrived with the invention of the telescope in the 17th century. Italian astronomer Galileo Galilei was an early adopter and developer of the technology, which enabled him to make major strides in the understanding of our solar system.

If the above text and links have whetted your appetite for more information on the history of astronomy, please read the detailed three-part series by the European Space Agency about the history of astrometry from the earliest times, to the emergence of telescopes to modern space-based observations. Also, follow the link below for the full article which had so much more on this subject that I just couldn't squeeze into this newsletter

(Source: space.com)