

THE OBSERVER

BATTLE POINT ASTRONOMICAL ASSOCIATION

WWW.BPASTRO.ORG BAINBRIDGE ISLAND, WA



Photo credit: Mario Alejandro Torres

BPAA's Grand (Re)Opening! **Saturday, May 14, 2022, 3-5 pm**

Though not entirely in the rear-view mirror, COVID has abated to the point where we are planning to resume in-person activities at the Observatory.

On the afternoon of May 14 we're hosting an open house and invite everyone to stop by and say hello.

The event will be followed by our monthly program at 7:30.

We're looking for a few volunteers who like to plan parties to help us plan for this event.

If that's you, please send an email to President@BPastro.org.

May 15 Lunar Eclipse

When the full Moon rises at 8:34 pm on May 15 it will be completely eclipsed by Earth's shadow! If we have clear skies that evening, the best places to see it are locations with a low southeastern horizon. Since Luna will be in shadow, it will be very difficult to see as it rises out of the twilight murk. Binoculars may help. We will attempt to observe it from the roof of the Ritchie Observatory, where we expect it to clear the treeline sometime after 9 pm. Totality ends at 9:54 when the Moon begins to move out of our shadow and the light gradually returns through the partial eclipse phase. See the "Total lunar eclipse" link in the "What's Up(coming)" observation calendar on the last page of the newsletter for complete details.

Watching a lunar eclipse is a dramatic demonstration of the movements of the Earth and Moon. Whether you join us in Battle Point Park or you find your own special viewing spot, be sure to check it out!

Summer Events and Activities

We have several exciting activities planned for this summer, in addition to our regular programming. We're thrilled to have been selected, along with KiDiMu, to be NASA Community Event Hosts for the release of first images from the James Webb Space Telescope! Join us in July to view what promises to be spectacular images soon after they are downloaded from Webb. We'll schedule follow-up viewing sessions for new images throughout the summer.

Have you ever looked up at the night sky and wondered "What's that bright object?" We'll be offering a beginning astronomy class where you can learn how to find your way around the night sky and identify what you see. We'll follow that with another class about telescopes: how they work, how to use them, and how to choose one to buy (if owning a 'scope is on your bucket list). Finally, we'll delve into astrophotography for those who want to take a deeper dive.

Check our website for dates and times of these events and classes.

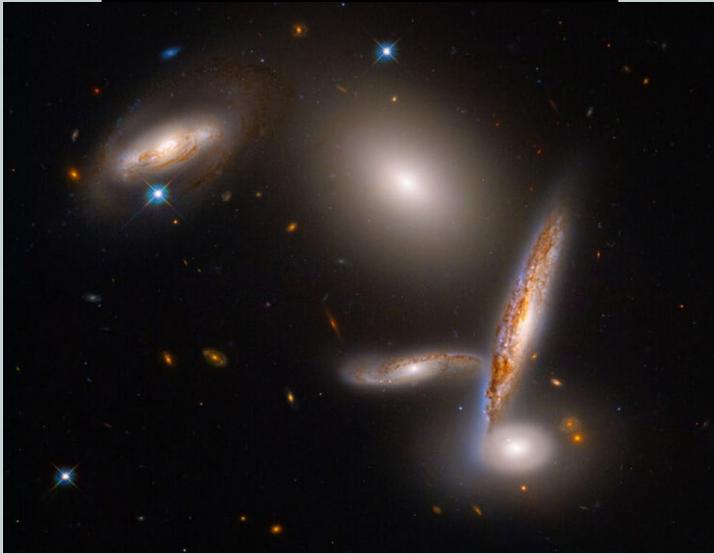
New Vision and Mission Statements

The BPAA Board recently adopted new vision and mission statements to articulate how we see ourselves and our role in the community. These statements reflect the Association's founding purpose focused on education and enjoyment of the night sky:

Vision: To ignite passion for scientific inquiry expressed through the lens of astronomy.

Mission: To provide opportunities for the curious to observe and discover the wonders of the universe. Supported by shared expertise and the largest publicly accessible telescope in the Pacific Northwest, our members and the wider community engage in hands-on experiences of astronomy, space exploration, and the enabling technologies.

Hubble Space Telescope Turns 32



The Hubble Space Telescope is celebrating its 32nd birthday with a stunning look at an unusual close-knit collection of five galaxies, called the Hickson Compact Group 40. This snapshot reflects a special moment in their lifetimes as they fall together before they merge. NASA / ESA / STScI

Three spiral galaxies, an elliptical, and a lenticular feature in this Hubble Space Telescope image, all packed into a volume less than 200,000 light-years across, or twice the diameter of the Milky Way's disk. Their light traveled 300 million light-years before it reached Hubble's cameras. At first glance, the five stunning galaxies of Hickson Compact Group 40 look disconnected, placed next to each other in space by chance superposition. But a closer look reveals connections between them, bridges made of gas and stars.

The image, taken late last year, was released recently in celebration of the Hubble Space Telescope's 32nd year of operations. Hubble has far outlived its expected lifetime, having captured 1.5 million images of about 50,000 celestial objects along the way so far. HCG 40 is one more under its belt.

(Source: skyllandtelescope.org)

Webb Telescope's Coldest Instrument Reaches Operating Temperature

NASA's James Webb Space Telescope will see the first galaxies to form after the big bang, but to do that its instruments first need to get cold – really cold. On April 7, Webb's Mid-Infrared Instrument (MIRI) – a joint development by NASA and ESA (European Space Agency) – reached its final operating temperature below 7 kelvins (minus 447 degrees Fahrenheit, or minus 266 degrees Celsius).

Along with Webb's three other instruments, MIRI initially cooled off in the shade of Webb's tennis-court-size sunshield, dropping to about 90 kelvins (minus 298 F, or minus 183 C). But dropping to less than 7 kelvins required an electrically powered cryocooler. Last week, the team passed a particularly challenging milestone called the "pinch point," when the instrument goes from 15 kelvins (minus 433 F, or minus 258 C) to 6.4 kelvins (minus 448 F, or minus 267 C).

"The MIRI cooler team has poured a lot of hard work into developing the procedure for the pinch point," said Analyn Schneider, project manager for MIRI at NASA's Jet Propulsion Laboratory in Southern California. "The team was both excited and nervous going into the critical activity. In the end it was a textbook execution of the procedure, and the cooler performance is even better than expected."

The low temperature is necessary because all four of Webb's instruments detect infrared light – wavelengths slightly longer than those that human eyes can see. Distant galaxies, stars hidden in cocoons of dust, and planets outside our solar system all emit infrared light. But so do other warm objects, including Webb's own electronics and optics hardware. Cooling down the four instruments' detectors and the surrounding hardware suppresses those infrared emissions. MIRI detects longer infrared wavelengths than the other three instruments, which means it needs to be even colder.

Now that the instrument is at operating temperature, team members will take test images of stars and other known objects that can be used for calibration and to check the instrument's operations and functionality. The team will conduct these preparations alongside calibration of the other three instruments, delivering Webb's first science images this summer.

(Source: nasa.gov)

Discovery of 30 Exocomets In a Young Planetary System

For the past 30 years, the star β Pictoris has fascinated astronomers because it enables them to observe a planetary system in the process of formation. It is made up of at least two young planets, and also contains comets, which were detected as early as 1987. These were the first comets ever observed around a star other than the sun.

Now, an international research team headed by Alain Lecavelier des Etangs, CNRS researcher at the Institut d'Astrophysique de Paris (CNRS/Sorbonne Université), has discovered 30 such exocomets and determined the size of their nuclei, which vary between 3 and 14 kilometers in diameter. The scientists were also able to estimate the size distribution of the objects, i.e., the proportion of small comets to large ones. This is the first time this distribution has been measured outside our solar system, and it is strikingly similar to that of comets orbiting the sun. It shows that, just like the comets of the solar system, the exocomets of β Pictoris were shaped by a series of collisions and breakups. This work sheds new light on the origin and evolution of comets in planetary systems. Since a part of Earth's water probably originated in comets, scientists are seeking to understand their impact on the characteristics of planets.

Their findings, published in Scientific Reports on April 28, 2022, are the outcome of 156 days of observation of the β Pictoris system using NASA's Transiting Exoplanet Survey Satellite (TESS). Other upcoming observations, in particular with the Hubble and James Webb space telescopes, should enable scientists to find out more in the future.

(Source: phys.org)

Precursor to Quasars Found In Hubble Data



Astronomers discovered GNz7q after reprocessing archival data from the Hubble Space Telescope's Great Observatories Origins Deep Survey-North (GOODS-North) field (larger image). The early galaxy and eventual quasar is the red, unresolved dot at the center of the inset. Science: NASA / ESA / Garth Illingworth (UC Santa Cruz) / Pascal Oesch (UC Santa Cruz, Yale) / Rychard Bouwens (LEI) / I. Labbe (LEI) / Cosmic Dawn Center / Niels Bohr Institute / Univ. of Copenhagen, Denmark

Astronomers have discovered a precursor to quasars, the brilliant beacons powered by gas-guzzling black holes with masses equivalent to millions or even billions of Suns. The find sheds light on the mystery of how quasars grow so quickly.

Deep observations have shown that quasars exist full-grown less than 1 billion years after the Big Bang. Looking back through space and time to find these objects is like finding mountains grown tall where there was flat ground the day before.

To find out how quasars grow so massive so quickly, astronomers want to find quasars before they outshine their host galaxies with their brilliance. But finding the "before" pics can be difficult, in part because of how quasars are thought to grow.

Such quasar precursors (known in technical terms as Compton-thick active galactic nuclei) have been found before in the relatively nearby universe. But if quasars exist within the universe's first billion years, then the precursors should, too.

While reprocessing data from a deep Hubble Space Telescope image known as the Great Observatories Origins Deep Survey (GOODS)-North, Seiji Fujimoto (Cosmic Dawn Center, Denmark) and colleagues have found just such an early quasar forerunner, reporting the results in Nature.

Dubbed GNz7q, the galaxy existed just 700 million years after the Big Bang and it's undergoing a tremendous starburst, birthing some 1,600 Suns' worth of stars every year. An emission line associated with this star formation confirms the galaxy's extreme distance from Earth.

(Source: skyllandtelescope.org)

Supernova reveals secrets to astronomers



The supernova known as 2014C took place eight years ago—but scientists are still watching and learning from its aftermath. The very faintly visible explosion is shown circled in red. Credit: Sloan Digital Sky Survey

An international group of astronomers has uncovered new clues about a mysterious stellar explosion that was discovered eight years ago, but is continuing to evolve even as scientists watch.

The results help astronomers better understand the process of how massive stars—giants far larger than our own sun—live and die.

The study was published in *The Astrophysical Journal* by a group led by the University of Texas at Austin and including scientists with the University of Chicago.

In 2014, astronomers saw a sudden bright spot in the sky—a sure sign that a star had exploded out in space.

When an exploding star is first detected, astronomers around the world begin to follow it with telescopes as the light it gives off changes rapidly over time. By watching how it evolves, using telescopes that can see visible light and also X-rays, radio waves, and infrared light, scientists can deduce the physical characteristics of the system.

By doing this many times, scientists have grouped these exploding stars into categories. 2014C, as this particular event was named, looked like what's called a Type Ib supernova. They are what happen when the largest known stars in the universe die.

In fact, scientists think 2014C was probably originally not one but two stars orbiting each other, one bigger than the other. The more massive star evolved more quickly, expanded, and its outer layer of hydrogen got sucked away. When it eventually ran out of fuel, its core collapsed, triggering a gigantic explosion.

The study provided valuable clues as to the evolution of these stars and mass lost from these systems, and in a larger sense to the lives and deaths of these relatively mysterious stars, the scientists said.

(Source: phys.org)

Newly Found Martian Auroras Defy Easy Explanation

Scientists with the United Arab Emirates' Mars mission have spotted a 'worm-like' aurora stretching halfway across the Red Planet.

The discovery of "sinuous discrete" auroras, or shining lights high in the atmosphere arising from solar activity interacting with magnetic fields, came from observations from the Hope orbiter, which has been at work since February 2021. Mars has only a patchy magnetic field, making auroras tough to track down. Hope has already assisted with better observations of local, nighttime aurora varieties (diffuse aurora and discrete aurora) that eluded other missions.

But these other types of lights are nowhere near the scale of the new sinuous discrete auroras, which wrapped around half the planet. Observations at that scale required Hope's unique ability to take whole disk "snapshots" of the thin Martian atmosphere in action, officials said.

Detailed explanation is thin so far, however. That said, more information might be lurking in archival data from other missions, particularly that gathered by the long-running European Space Agency's Mars Express and NASA's MAVEN (Mars Atmosphere and Volatile Evolution) spacecraft that observe the Red Planet's atmosphere.

"The sinuous discrete aurora was a shocking discovery that in many ways has us scratching our heads and going back to the drawing board," Rob Lillis, a planetary scientist at the University of California, Berkeley who works on the Emirates Mars ultraviolet spectrometer instrument, said in the same statement.

(Source: space.com)

Two Rocky Exoplanets Discovered Around Nearby Star

Using NASA's Transiting Exoplanet Survey Satellite (TESS), astronomers have detected two rocky alien worlds orbiting a nearby M dwarf star known as HD 260655. The newly found exoplanets are larger and at least two times more massive than the Earth. The finding is reported in a paper published April 21 on arXiv.org.

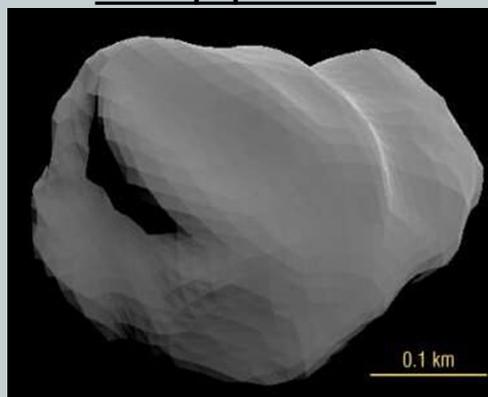
TESS is conducting a survey of about 200,000 of the brightest stars near the sun with the aim of searching for transiting exoplanets. So far, it has identified over 5,600 candidate exoplanets (TESS Objects of Interest, or TOI), of which 205 have been confirmed so far.

Now, a team of astronomers led by Rafael Luque of the University of Chicago confirmed another two planets monitored by TESS. They report that transit signals have been identified in the light curve of the bright M dwarf HD 260655 (or TOI-4599). The planetary nature of these signals was confirmed by archival and new precise radial velocity (RV) measurements.

Based on the derived densities of the two new alien worlds, the astronomers concluded that they both have rocky composition. However, they noted that while HD 260655 b has a density in perfect agreement with the Earth's, the density of HD 260655 c suggests an internal composition void of iron and fully made of silicates.

(Source: phys.org)

OSIRIS-REx Spacecraft to Visit Apophis Asteroid



Imaging scientist Dathon Golish created this simulated image of the view of near-Earth asteroid Apophis in the APEX camera, based on a shape model produced by JPL's Marina Brozović and her colleagues. Credit: UArizona/JPL/Arecibo

NASA's OSIRIS-REx spacecraft will swing by Earth to deliver a sample from asteroid Bennu on Sept. 24, 2023. NASA has extended the University of Arizona-led mission, which will be renamed OSIRIS-APEX, to study near-Earth asteroid Apophis for 18 months. Apophis will make a close approach to Earth in 2029.

The University of Arizona will lead the mission, which will make its first maneuver toward Apophis 30 days after the OSIRIS-REx spacecraft delivers the sample it collected from Bennu back in October 2020. At that point, the original mission team will split—the sample analysis team will analyze the Bennu sample, while the spacecraft and instrument team transitions to OSIRIS-APEX, which is short for OSIRIS-Apophis Explorer.

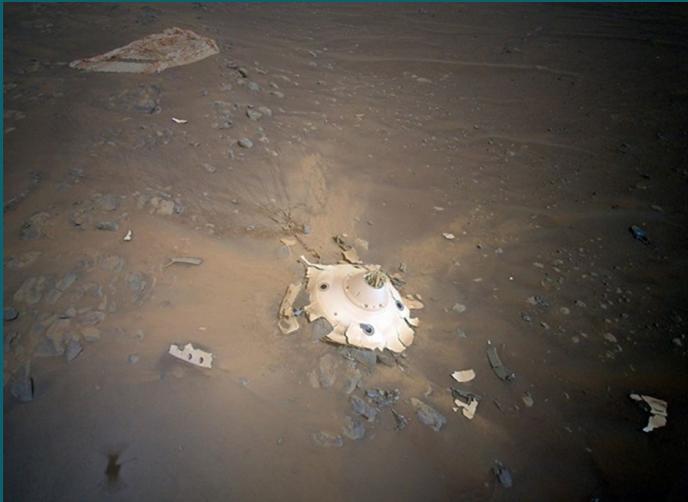
"Apophis is one of the most infamous asteroids," DellaGiustina said. "When it was first discovered in 2004, there was concern that it would impact the Earth in 2029 during its close approach. That risk was retired after subsequent observations, but it will be the closest an asteroid of this size has gotten in the 50 or so years asteroids have been closely tracked, or for the next 100 years of asteroids we have discovered so far. It gets within one-tenth the distance between the Earth and moon during the 2029 encounter. People in Europe and Africa will be able to see it with the naked eye, that's how close it will get. We were stoked to find out the mission was extended."

OSIRIS-APEX will not collect a sample, but when it reaches Apophis, it will study the asteroid for 18 months and collect data along the way. It also will make a maneuver similar to the one it made during sample collection at Bennu, by approaching the surface and firing its thrusters. This event will expose the asteroid's subsurface, to allow mission scientists to learn more about the asteroid's material properties.

The scientists also want to study how the asteroid will be physically affected by the gravitational pull of Earth as it makes its close approach in 2029.

(Source: phys.org)

Ingenuity Spots Wreckage of Rover's Landing Equipment



NASA's Ingenuity Mars Helicopter imaged the discarded backshell and parachute during its 26th flight on April 19, 2022. NASA/JPL-Caltech

New images taken by Ingenuity, NASA's record-breaking Mars helicopter, show Perseverance's discarded parachute and protective backshell, which helped the rover and helicopter safely land on the martian surface Feb. 18, 2021.

Ingenuity captured the 10 new color images of the discarded parachute and backshell during the helicopter's 26th flight, which it carried out April 19, 2022.

The cone-shaped backshell, while upright, is visibly broken and splayed out around the edges, with stray pieces strewn across the surrounding landscape. That is no surprise considering the shell struck the ground at some 78 mph (126 km/h). But despite the expected catastrophic structural damage, the backshell's coating, which served to protect Perseverance as it tore through the martian atmosphere, appears to have remained intact during the spacecraft's descent.

Meanwhile, the parachute, which Perseverance deployed while still traveling at about 940 mph (1,500 km/h), shows no signs of damage from its supersonic inflation. However, only about one-third of the 70-foot-wide (21.5 m), cryptically encoded parachute is visible in the new images.

(Source: [astronomy.com](https://www.astronomy.com))

NASA Extends Ingenuity Helicopter Mission

NASA has extended flight operations of the Ingenuity Mars Helicopter through September. In the months ahead, history's first aircraft to operate from the surface of another world will support the Perseverance rover's upcoming science campaign exploring the ancient river delta of Jezero Crater. Along the way, it will continue testing its own capabilities to support the design of future Mars air vehicles.

The Ingenuity Mars Helicopter was built by JPL, which also manages this technology demonstration project for NASA Headquarters.

(Source: [nasa.gov](https://www.nasa.gov))

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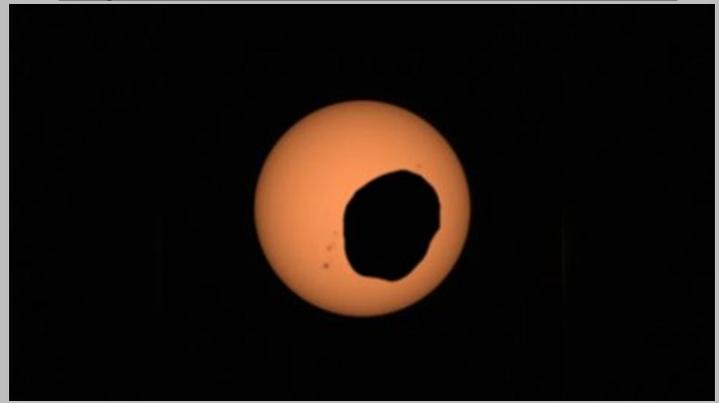
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Eclipse of Mars' Moon From Perseverance Rover



The NASA's Perseverance Mars rover captured this image of Phobos, one of Mars' two moons, during an eclipse. NASA/JPL-Caltech/ASU/MSSS/SSI

The Perseverance rover just witnessed a unique kind of eclipse while sitting on the surface of Mars – and the robotic explorer captured video of it. And although it looks like the rover was watching the shadow of a potato cross the red Martian surface, that's actually Phobos, one of Mars' two little moons.

Perseverance observed the 40-second eclipse on April 2. If this sounds much shorter than a typical solar eclipse we might see from Earth when our moon passes in front of the sun, it's because Phobos is about 157 times smaller than our moon.

The rover continues an 18-year history of robots watching eclipses on Mars that began with NASA's Spirit and Opportunity rovers in 2004 and was followed by Curiosity capturing the first video of a Martian eclipse in 2019. Perseverance has provided the best video of this eclipse yet using the zoom capabilities of its mast-mounted camera system.

The video was also captured in color using a solar filter to reduce the light intensity, allowing scientists to gain more insight about Phobos.

"You can see details in the shape of Phobos' shadow, like ridges and bumps on the moon's landscape," said Mark Lemmon, a planetary astronomer with the Space Science Institute in Boulder, Colorado, in a statement. "You can also see sunspots. And it's cool that you can see this eclipse exactly as the rover saw it from Mars."

Eclipse observations of Phobos help scientists track how the moon's orbit is changing over time and better predict when Phobos' time will come to an end.

(Source: [cnn.com](https://www.cnn.com))

WHAT'S UP(COMING)!

May 6 – [n-Aquariid meteor shower 2022](#)

May 8 – [n-Lyrid meteor shower 2022](#)

May 13 – [M5 is well placed](#)

May 15 – [Total lunar eclipse](#)

– Full Moon

May 30 – New Moon

Jun 2 – [M13 is well placed](#)

Jun 3 – [M12 is well placed](#)

Jun 6 – [M10 is well placed](#)

Jun 10 – [Daytime Arietid meteor shower 2022](#)

Jun 11 – [M92 is well placed](#)

Jun 14 – Full Moon

Jun 18 – [IC4665 is well placed](#)

Jun 21 – Summer Solstice

Jun 27 – [June Bootid meteor shower 2022](#)

Jun 28 – New Moon

Jun 29 – [NGC 6633 is well placed](#)

Jul 2 – [IC4756 is well placed](#)

Jul 13 – Full Moon

Jul 28 – New Moon

Jul 29 – [Piscis Austrinid meteor shower 2022](#)

Jul 30 – [Southern \$\delta\$ -Aquariid meteor shower 2022](#)

– [\$\alpha\$ -Capricornid meteor shower 2022](#)