



**BATTLE POINT
ASTRONOMICAL
ASSOCIATION**

Igniting passion for science through the lens of astronomy!



Photo Credit: Frank Petrie

THE OBSERVER

May 2024, Vol. 36

**March of Stars Madness Campaign
from Frank Petrie**



MARCH OF STARS MADNESS

Help BPAA raise funds to secure a license for *The Navigators*, a full-dome movie experience, AND a high-resolution, 3D PNW terrain dataset for our planetarium!

Donate to the March of Stars Madness Fundraising Event:
<https://givebutter.com/NavigateTogether>



Hard to believe it's already a month since the March of Stars Madness campaign event on March 30! Thanks to everyone who attended this fundraiser for the purchase of two new content titles for the Rudolph Planetarium: a five-year license for "The Navigators," a magical full-dome movie about the Polynesian star navigators; and the Pacific Northwest High Resolution Terrain Dataset. A huge thank you to everyone who attended and donated to raise \$4,115 of our \$5,000 goal!

There's still time to support the campaign and help us reach the goal. You can make your donation [on our website](#), on [our Givebutter campaign page](#), with the QR code above, in person at any BPAA event, or by mailing your check to BPAA, PO Box 10914, Bainbridge Island, WA 98110. All donations are tax deductible as provided by law. Thank you!

**New Artwork in the Foyer
from Frank Petrie**



Accomplished artist and BPAA member Deborah Milton is freshening up the Observatory foyer with some new artwork! Come check out Deborah's handiwork and stay for a Planetarium show or another program at the Observatory.

Thank you, Deborah, for sprucing up the place!



Earth Expo 2024
from Denise Hidano and Frank Petrie



This year's Earth Expo event in Battle Point Park was a windy and rainy affair. Despite the conditions, the BPAA booth had our share of visitors interested in what BPAA is about. Those who braved the day with their kids were eager to find out more about our programs and 20 new people signed up for more information!

Concurrently with the event at the north end of the Park, the Planetarium was open and 12 people stopped in to see the short movie "Losing the Dark" about light pollution.

Many thanks to BPAA members who volunteered to help make this a success: Denise Hidano, Deborah Milton, Dan Schlesener, Joe Mulligan, Oscar Newman, John and Leatha Goar, Liz Walker, and Frank Petrie. John even brought his ukulele and conjured up visions of tropical paradise to counter the cold Pacific Northwest rain! Bottom line: we had fun!

Dome Repair Progress from Peter Mosely



Here is Patrick Clanton welding the assembly.

The welding on the arches is nearly done, but the recent rain caused some delays. We expect to send them to the powder coater around the 6th of May. When they are painted, they will be delivered to the Observatory for assembly on the ground.

Meanwhile the scaffolding is being constructed in the dome that will allow us to remove the old shutter; remove the guide track for the shutter and transfer it to the new arches; cutting out the old arches; trimming the dome ribs to fit the new arches and preparing the dome plate to receive the new arches. This work will continue into June.

When all is in readiness we will use a big crane to lift out the Ritchie Telescope; lift and set the new arches; lift the new shutter in place and lift the boxes containing the new CDK telescope onto the roof.



The arch assembly on it's side at BARN.

**Call for Volunteers for Rooftop Dome Reconstruction
from Frank Petrie**

As you just read, the new arches for the rooftop dome are being welded up at BARN. In preparation for partially dismantling the dome to receive the new arches and shutter, we are building internal scaffolding to support the two halves of the dome and serve as a work platform for installing the new arches. We need volunteers to help make this project successful. No experience necessary, just a willingness to get involved and make a difference! Contact Frank at president@bpastro.org to learn more and join the crew.

Planeteers Needed!

We are still looking to train new Planeteers! What is a Planeteer you might ask. It's someone who has been trained to run our new planetarium system and manage presentations in the Rudolph Planetarium! For members that checked off "Operating the Rudolph Planetarium" as a volunteer interest, this is your opportunity to shine! And all Planeteers get a great BPAA-blue shirt!

The first step is to get connected to us on our Discord channel. If you are not already on the Discord, please join here: <https://discord.gg/YSeHM26e59>. After you're on BPAA's Discord, please tag or message Erin (@astronomyftw) so they can add the Planeteer role to your account. When you've joined the Discord and have the Planeteer role, you'll have access to our team channel. All Planeteer information is kept in this channel: <https://discord.gg/BMQsfZ8d2r>.

You can then join us at our next training session on May 11th from 4pm to 5:30pm (before the Second Saturday science talk!) and we'll get you up to speed.

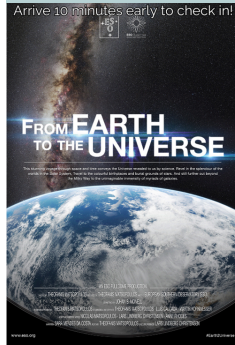
**Telescope Tuesdays
Every Tuesday, 10:00am - 2:00pm**

There's always a lot to do at the Ritchie observatory! Come on out every Tuesday, 10am to 3pm, and get involved. Learn how stuff works. Help make improvements. An enormous amount of progress has been made, but there's always more to do. And we might even have pizza! Come on out and support Telescope Tuesdays!

Movies at the Planetarium Every Wednesday

During May, we're continuing our second quarter of Movies at the Planetarium events and we're still looking for reviews of the program! Our core four will change based on your feedback, so if you have attended any of these events, we'd love to hear from you about your experiences. We hope to make MATP the best as it can be and feedback helps us do that. You can find the feedback form here:

<https://forms.gle/CA4nE9YbbB2UMHYVA>



MOVIES AT THE PLANETARIUM

MAY 1ST

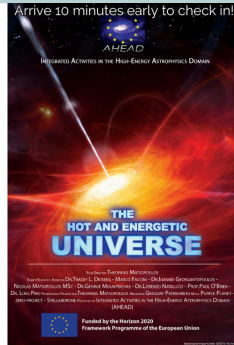
RUDOLPH PLANETARIUM
BATTLE POINT PARK



5PM



6PM



MOVIES AT THE PLANETARIUM

MAY 8TH

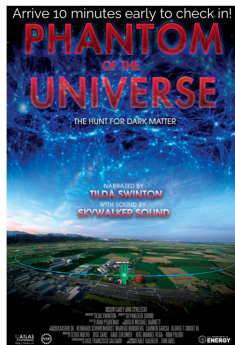
RUDOLPH PLANETARIUM
BATTLE POINT PARK



5PM



6PM



MOVIES AT THE PLANETARIUM

MAY 15TH

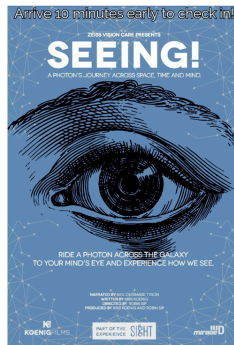
RUDOLPH PLANETARIUM
BATTLE POINT PARK



5PM



6PM



MOVIES AT THE PLANETARIUM

MAY 22TH

RUDOLPH PLANETARIUM
BATTLE POINT PARK



5PM



6PM

Wednesday 5/1: From Earth to the Universe
5pm show: <https://givebutter.com/N64MQW>
6pm show: <https://givebutter.com/6DhvAj>

Wednesday 5/15: Phantom of the Universe
5pm show: <https://givebutter.com/iyOBSi>
6pm show: <https://givebutter.com/gE5LNF>

Wednesday 5/8: The Hot and Energetic Universe
5pm show: <https://givebutter.com/x8hsBC>
6pm show: <https://givebutter.com/pDA6gY>

Wednesday 5/22: Seeing! A Photon's Journey
Across Space, Time, and Mind
5pm show: <https://givebutter.com/9xNYHF>
6pm show: <https://givebutter.com/H15vwn>

First Friday
May 3rd

FIRST FRIDAY

WHAT'S UP IN MAY?

Join us at the Rudolph Planetarium on **May 3rd** and learn all about what's up in the night sky for the upcoming month!

After the planetarium show, join us for a free tour of the Ritchie Observatory and get to know Battle Point Astronomical Association.

5PM

6PM

Please arrive 10 minutes early to check in!

Our next First Friday is on 5/3! Find out what's going on in the sky for the month of May and then join us for a tour of the Ritchie Observatory. Members: be sure to email planetarium@bpaastro.org for your free show discount code!

5pm show and tour: <https://givebutter.com/F84wj4>

6pm show and tour: <https://givebutter.com/RESbKt>

Second Saturday Program May 11, 7:00pm

Dr. Bob Abel, Olympic College, University of Washington

Join us for our May Second Saturday science talk with this month's guest speaker, Dr. Bob Abel! Dr. Abel is a recently retired and beloved former physics professor at Olympic College who has been spending his time working with the Institute for Data Intensive Research in Astrophysics & Cosmology (DiRAC) at the University of Washington on a fascinating RR Lyrae project. He'll tell us all about his wonderful work, and why so much work is needed in the era of Rubin and Big Data Astronomy.

After the talk, Erin will take us on a tour of the summer night sky."

And it's at 7pm...so hopefully we can do some stargazing at the end of the night!

Reserve your spot here: <https://givebutter.com/FD5NCS>

Third Saturday Kids Club
May 18, 12:00pm

BATTLE POINT ASTRONOMICAL ASSOCIATION

KIDS CLUB

AGES 8+

MAY 18TH @ 12PM

ONLY \$10

JOIN US EVERY THIRD SATURDAY AT NOON FOR EXCITING AND EDUCATIONAL ASTRONOMY FUN!

10800 BATTLE POINT DR NE,
BAINBRIDGE ISLAND, WA

REGISTER ONLINE:
[HTTPS://GIVEBUTTER.COM/XLJ1LE](https://GIVEBUTTER.COM/XLJ1LE)

ACTIVITIES:
PAINT-YOUR-OWN EARTH PLANTER
PLANETARIUM SHOW

PARENTS AND GUARDIANS ARE FREE!

A parent/guardian must be present at all times.

It's time for our next Third Saturday Kids Club event! We are excited for this program and have high hopes to bring exciting astronomy education geared toward kids. This month's activity will be a paint-your-own Ceramic Earth Planter! After 40 minutes (or when everyone is finished painting), we'll take a 20 minute wiggle break and then sit down to enjoy an audience-choice planetarium show. The event is scheduled for an hour and a half and the recommended age is 8 and up.

Admission: Children \$10, Parents/Guardians Free

Parents and guardians may purchase a planter of their own to paint or gift to someone for \$10.

The recommended minimum age for this month's Kids Club is 8! At least one parent or guardian must stay with the kiddo(s). Parents and guardians are free, but kids always get the best seats in the house at Kids Club!

Disclaimer:

While this program is geared toward kids, and we understand that kids have a lot of energy packed into tiny bodies, we must maintain a safe, healthy, and happy environment for everyone. **Please use your best judgment as a guardian to know if and when it is time to take your kiddo outside or leave altogether.** You are

always welcome back into the event after a break outside! **Disruptive and damaging behavior that isn't addressed in a reasonable time frame may result in temporary or permanent removal from the event.**

Buy your tickets here: <https://givebutter.com/xLJ1LF>

**Third Saturday Members Meeting
May 18, 7:00pm**

Are you interested in astronomy but don't know where to begin? Come learn the basics of operating a telescope, and finding your way around the sky. There will be hands-on training using some of our loaner telescopes, and if you have your own scope and need help understanding it, you're welcome to bring it along. You'll learn how a telescope works, how to choose what eyepiece to use, and other often-confusing but fundamentally simple concepts.

After the hands-on practice, we'll use the Planetarium to demonstrate some simple ways to find things in the sky that are interesting to look at.

Finally, for those who can stay on after the session ends (and if the sky is clear) we'll head outside as it gets dark and put our new skills to use! Be sure to dress warm!

For more info, contact Frank at president@bpastro.org.

Reserve your spot here: <https://givebutter.com/hOgdDL>

**Cosmic Conversations
May 20, 7:00pm
Topic: TBD**

On the third Tuesday of each month, we have been engaging in COSMIC CONVERSATIONS at the Ritchie Observatory in Battle Point Park. These are open to members and operate much like a book group, wherein we pick a topic, read some background material and then discuss what we've learned. These are nonmathematical discussions where we hope to learn from each other.

**Fourth Saturday Community Hour
May 25, 12:00pm to 2:00pm**



**Experiencing Hubble:
Understanding the Greatest
Images of the Universe**
Professor David Meyer
Northwestern University

COMMUNITY HOUR
SCIENCE VIDEO, SCIENCE CONVERSATION

MAY 25TH - 12 PM TO 2 PM
EXPERIENCING HUBBLE

RESERVE YOUR SPOT 

Please arrive 10 minutes early to check in!

BPAA welcomes you to our free, Fourth Saturday Community Hour where we'll show excerpts from a thought provoking and informative science video followed by a rousing discussion. This month's discussion will center around excerpts from the The Great Courses' "Experiencing Hubble: Understanding the Greatest Images of the Universe" and a selection of beautiful images taken by the Hubble Space Telescope (HST).

With the fairly recent launch of the James Webb Space Telescope (JWST) and the absolutely stunning images it is now providing, it is easy to forget just how monumental the ground-breaking HST has been for advancing our knowledge of the grand scale and beauty of our universe.

For example, the HST showed us in the late 1990s that the universe's expansion is actually accelerating (not contracting as assumed), and the incredible Hubble Ultra Deep Field images allowed us to see some of the early galaxies that formed after the Big Bang and taught us why we really need the JWST to look even farther back in time with its infrared imaging capabilities. We will also explore some of the incredible visual images that the HST has been providing us for three decades.

Come shower some love and respect for the HST with us, before we all move on to the even more spectacular JWST.

Sign up at: <https://givebutter.com/nQtYri>

BPAA Groups.io Email List to Be Discontinued

A few years back we created the bpaa@groups.io email list as a member benefit to facilitate the sharing of information among members and to announce late-breaking member-only events, star parties, and news. Initially this email group was fairly active, but over the last year or more it has fallen into disuse. Therefore, we will soon discontinue it.

To stay in touch with each other and what's going on around the Observatory, we invite you to [join our Discord](#). We've been using Discord for the past couple of years, and it has become quite active. It is open to members and non-members alike. To make it especially valuable to members, we've included exclusive member-only channels that you can join. For answers to your questions about joining and using Discord, contact Cole Rees at Astronomer@bpaastro.org.

Help Out with the Cub Scouts May 19, 1:00pm to 4:00pm

The Cub Scouts have scheduled a model rocketry event on the hill next to the Observatory for Sunday May 19th, from 1 to 4 pm. They have asked us to offer Planetarium shows and Solar Telescope viewing during the event. We'll need 3 or 4 volunteers to run these activities.

Contact Frank at president@bpaastro.org to volunteer for this event. It will be fun!

WHAT'S UP(COMING)!

Source for events and links are In-The-Sky.org, Dominic Ford, Editor. The links provide details for each event including a scale on how difficult they are to observe.

May 5 – [\$\eta\$ -Aquariid meteor shower 2024 peak](#)

May 7 – New Moon

May 8 – [\$\eta\$ -Lyrid meteor shower 2024 peak](#)

May 12 – [Messier 5 is well placed](#)

May 14 – [Mercury at dichotomy](#)

May 17 – [Asteroid 2 Pallas at opposition](#)

May 23 – Full Moon

May 29 – [Messier 4 is well placed](#)

May 31 – [Conjunction of the Moon and Saturn](#)

– [Close approach of the Moon and Neptune](#)

Jun 1 – [The Great Globular Cluster in Hercules is well placed](#)

Jun 3 – [Messier 12 is well placed](#)

Jun 5 – [Messier 10 is well placed](#)

Jun 6 – New Moon

Jun 10 – [Daytime Arietid meteor shower 2024 peak](#)

– [Messier 92 is well placed](#)

Jun 18 – [The cluster IC 4665 is well placed](#)

Jun 20 – [June solstice](#)

Jun 21 – Full Moon

Jun 27 – [June Bootid meteor shower 2024 peak](#)

– [Close approach of the Moon and Saturn](#)

Jun 28 – [Close approach of the Moon and Neptune](#)

– [The cluster NGC 6633 is well placed](#)

Jul 1 – [Conjunction of the Moon and Mars](#)

– [The cluster IC 4756 is well placed](#)

Jul 5 – New Moon

Jul 15 – [Close approach of Mars and Uranus](#)

Jul 21 – Full Moon

Jul 23 – [134340 Pluto at opposition](#)

Jul 24 – [Conjunction of the Moon and Saturn](#)

Jul 25 – [Close approach of the Moon and Neptune](#)

Jul 28 – [Piscis Austrinid meteor shower 2024 peak](#)

Jul 29 – [Close approach of the Moon and M45](#)

Jul 30 – [Southern \$\delta\$ -Aquariid meteor shower 2024 peak](#)

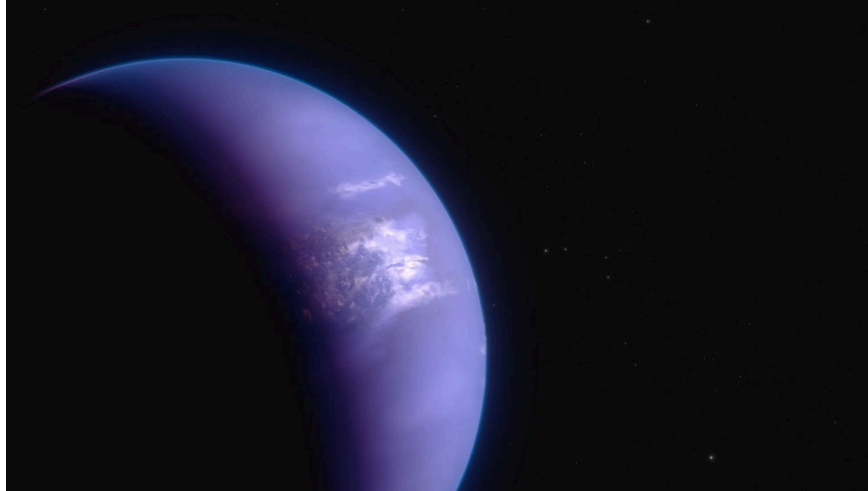
– [\$\alpha\$ -Capricornid meteor shower 2024 peak](#)

– [Conjunction of the Moon and Mars](#)

– [Conjunction of the Moon and Jupiter](#)

Here are some interesting things going on in Astronomy. If they pique your curiosity, please follow the link at the bottom of each for the full article!

NASA's Webb Maps Weather on Planet 280 Light-Years Away



This artist's concept shows what the hot gas-giant exoplanet WASP-43 b could look like. WASP-43 b is a Jupiter-sized planet roughly 280 light-years away, in the constellation Sextans. The planet orbits its star at a distance of about 1.3 million miles, completing one circuit in about 19.5 hours. Because it is so close to its star, WASP-43 b is probably tidally locked: Its rotation rate and orbital period are the same, such that one side faces the star at all times. Credits: NASA, ESA, CSA, Ralf Crawford (STScI)

An international team of researchers has successfully used NASA's James Webb Space Telescope to map the weather on the hot gas-giant exoplanet WASP-43 b. Precise brightness measurements over a broad spectrum of mid-infrared light, combined with 3D climate models and previous observations from other telescopes, suggest the presence of thick, high clouds covering the nightside, clear skies on the dayside, and equatorial winds upwards of 5,000 miles per hour mixing atmospheric gases around the planet.

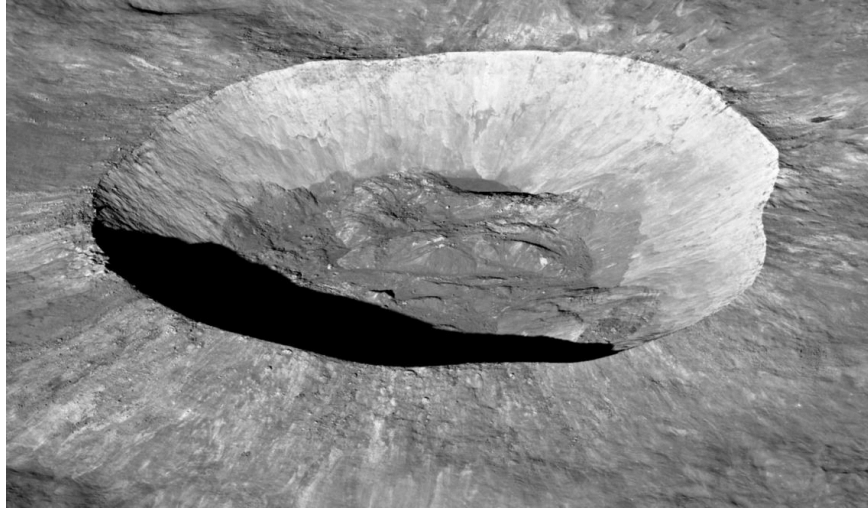
The investigation is just the latest demonstration of the exoplanet science now possible with Webb's extraordinary ability to measure temperature variations and detect atmospheric gases trillions of miles away.

WASP-43 b is a "hot Jupiter" type of exoplanet: similar in size to Jupiter, made primarily of hydrogen and helium, and much hotter than any of the giant planets in our own solar system. Although its star is smaller and cooler than the Sun, WASP-43 b orbits at a distance of just 1.3 million miles – less than 1/25th the distance between Mercury and the Sun.

With such a tight orbit, the planet is tidally locked, with one side continuously illuminated and the other in permanent darkness. Although the nightside never receives any direct radiation from the star, strong eastward winds transport heat around from the dayside.

(Source: [NASA Science](#))

Near-Earth Asteroid Was Blasted from A Crater on The Moon, Study Finds



Asteroid Kamo'oalewa, the target of China's upcoming Tianwen-2 mission, likely was blasted from the Giordano Bruno crater on the far side of the moon, as seen here by NASA's Lunar Reconnaissance Orbiter. Credit: NASA/Goddard/Arizona State University

For the first time, scientists have traced an asteroid to its exact place of origin – a particular crater on the moon. Unlike most near-Earth asteroids, which are thought to hail from the main asteroid belt between the orbits of Mars and Jupiter, asteroid 2016 HO3, also known as Kamo'oalewa, was likely blasted from the Giordano Bruno crater on the moon's far side and has been hurtling through space for several million years, according to a [study](#) published in the journal Nature Astronomy.

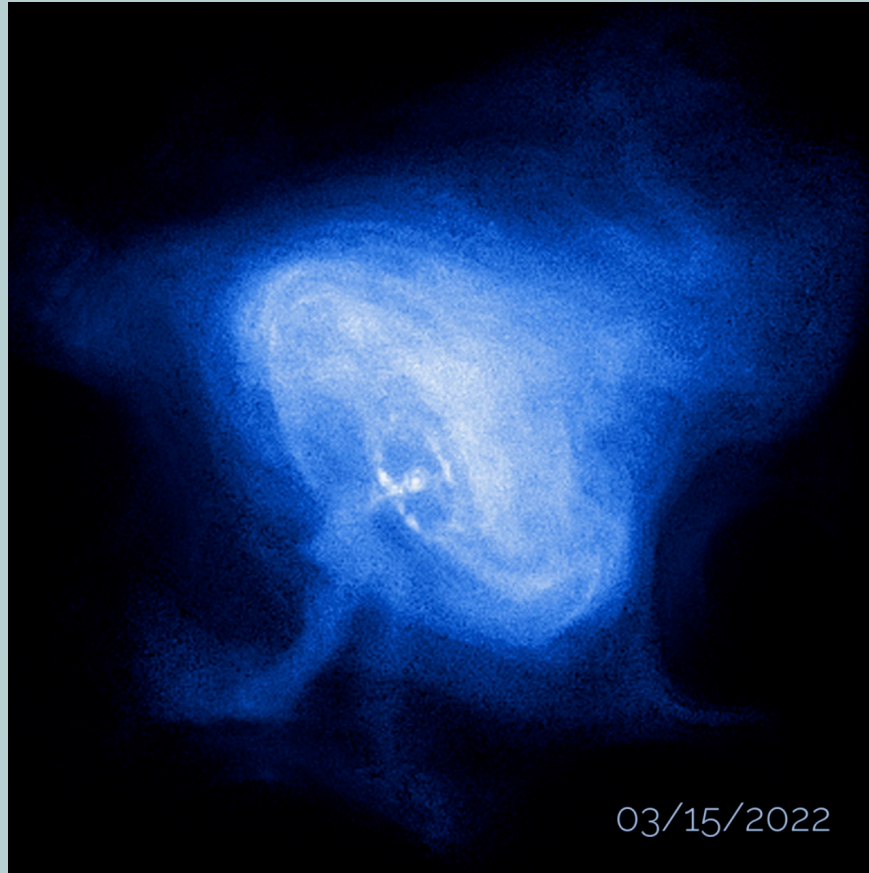
Selected as the target of China's Tianwen-2 mission, Kamo'oalewa has been in space for several million years as one of a few of Earth's co-orbital asteroids, meaning it travels around the sun on a similar orbit as Earth. Measuring between 150 and 190 feet in diameter, the asteroid is about half the size of the "London Eye" Ferris wheel.

According to lead study author Yifei Jiao, a visiting scholar at the University of Arizona Lunar and Planetary Laboratory who is also a doctoral student at Tsinghua University in Beijing, the report is the first account of a potentially hazardous near-Earth asteroid that has been linked to a specific crater on the moon.

Previous research pointing to Kamo'oalewa likely originating from the moon included its reflectance spectrum, which is more compatible with lunar materials rather than the general population of near-Earth asteroids, and its low orbital velocity relative to Earth, suggesting it originated close to the Earth-moon system. However, scientists had not succeeded in pinpointing its likely point of origin until now.

(Source: [University of Arizona News](#))

What Happens After a Supernova Blows? Watch And Find Out



Credit: skyandtelescope.org

New time-lapse videos from the Chandra X-ray Observatory show the Crab Nebula and the Cassiopeia A supernova remnant over more than 20 years

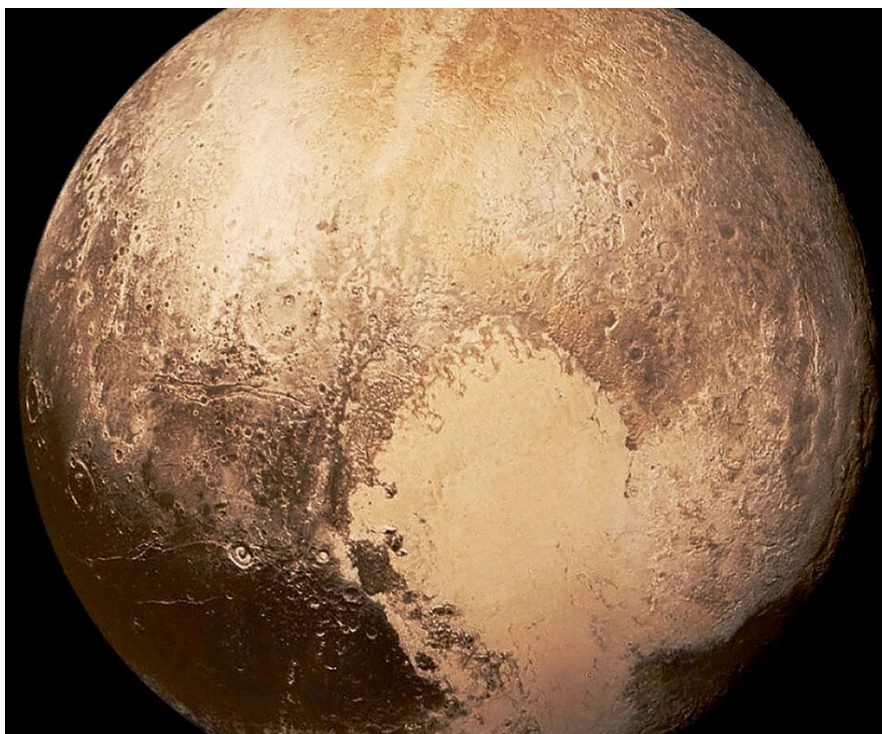
The years really fly by, don't they? It seems like just yesterday that the Chandra and Hubble Space Telescopes released new observations of the Crab Nebula, creating a short but stunning [time-lapse video](#) of this iconic supernova remnant. But that was 2002 — and here we are, 22 years later, with a much-awaited sequel.

All these years later, the pulsar that powers the show is still doing its thing: The Manhattan-size star spins 30 times a second, releasing vast amounts of energy in the process and transforming the material around it. And the movie (which combines original footage with the sequel) is still surprisingly short — now showing 35 observations taken between 2000 and 2022 in about 5 seconds. But the details it reveals are incredible.

Deep inside the nebula, the pulsar powers a wind that flies out so fast, it makes a shock wave, visible as the bright inner circle in the video. That shock wave is a site of transformation, where the energy of the wind is transmitted to high-energy particles. Wisps of particles and light ripple outward from the ring.

(Source: skyandtelescope.org)

A Cosmic Arrow Pierced Pluto's Heart — Is It Still There Beneath the Surface?



NASA's New Horizons spacecraft took this image of Pluto from 450,000 kilometers away. The view is dominated by the large, bright feature nicknamed the "heart," which measures about 1,600 kilometers across. The "left ventricle" is named Sputnik Planitia, an ice-covered basin excavated by an earlier impact. Credit: NASA / JHUAPL / SwRI

A giant impact likely formed Pluto's heart-shaped basin, Sputnik Planitia. A big chunk of the impactor's core might still be buried under the ice. When NASA's New Horizons mission sent back its first close-ups of Pluto in 2015, it revealed a giant, heart-shaped basin that dominated the dwarf planet's geology.

Named Tombaugh Regio after Pluto's discoverer, this "heart" is not a single geological feature but rather two distinct regions. The western lobe, called Sputnik Planitia, is a vast, elongated depression, as large as a quarter of the United States. It's filled with bright white nitrogen ice that sits several kilometers lower than the surrounding terrain.

Scientists believe this striking basin formed billions of years ago when a massive object slammed into the dwarf planet. Now, a team of scientists from the University of Bern in Switzerland and the University of Arizona has used computer simulations to dig deeper into the origins of Sputnik Planitia, finding that a large chunk of the impactor could still be buried beneath the nitrogen ice. Their research, published April 15th in [Nature Astronomy](#), also challenges previous assumptions about Pluto's internal structure, hinting that a long-suspected subsurface ocean is absent.

Shortly after Pluto's flyby, scientists noticed that Pluto's "heart" was located at a special location, close to the equator and right on its tidal axis. "If you drew a line from Pluto to its neighboring Moon, Charon, which it's tidally locked to, that line goes right through the heart of Pluto," says James Keane (Jet Propulsion Laboratory), who wasn't involved with the new study. In two independent papers published in 2016, Keane and other researchers proposed that Sputnik Planitia likely didn't form at the same latitude where it is today, but Pluto likely rotated on its axis to accommodate a large amount of extra mass beneath the ice at the lowest energy point for the system, a process known as true polar wander. The 2016 papers proposed that the extra mass likely came from [a subsurface ocean under](#)

(Source: [skyandtelescope.org](#))

Citizen Scientists Help Discover Record-Breaking Exoplanet in Binary Star System



An artist's interpretation of TOI 4633 c, a Neptune-like exoplanet found orbiting the habitable zone of a sunlike star. The system contains a second star (right) and may also host another exoplanet (left). Credit: Ed Bell for the Simons Foundation

A team of astronomers and citizen scientists has discovered a planet in the habitable zone of an unusual star system, including two stars and potentially another exoplanet.

The [planet hunters](#) spotted the Neptune-like planet as it crossed in front of its host star, temporarily dimming the star's light in a way akin to a solar eclipse on Earth. This "[transit method](#)" usually identifies planets with tight orbits, as they are more likely to follow paths that put them between Earth and their [host star](#) and, when following such paths, move into light-blocking positions more frequently. That's why this newly discovered planet is considered unusually far out, with the planet taking 272 days to lap its star.

Furthermore, the star is now by far the brightest one known to host a [transiting planet](#) in the [habitable zone](#) where liquid water can exist.

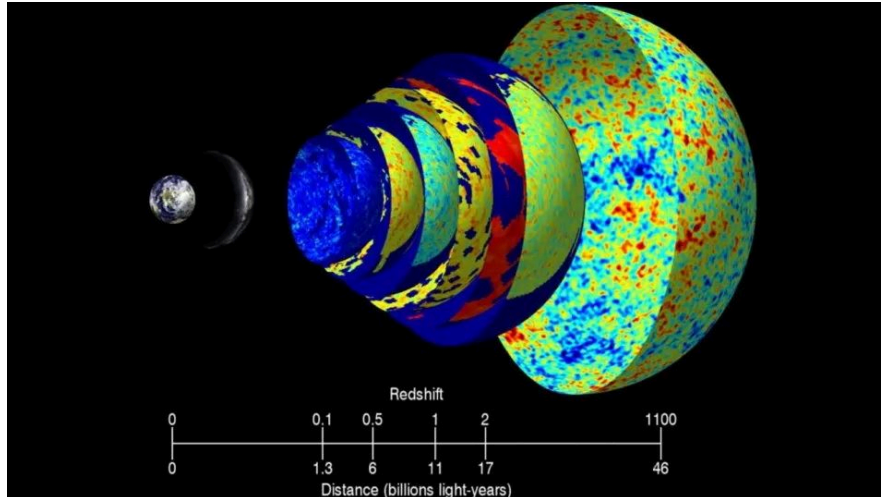
"Finding planets in multi-star systems is crucial for our understanding of how you can make different planets out of the same material," says study lead author Nora Eisner, a research fellow at the Flatiron Institute's Center for Computational Astrophysics in New York City.

The newfound planet—formally called TOI 4633 c, but nicknamed Percival (after a character from the "Harry Potter" book series) by the scientists—was first identified by [citizen scientists](#) sifting through data collected by NASA's [Transiting Exoplanet Survey Satellite](#) (TESS). The [Planet Hunters TESS program](#) enables anyone with a computer connected to the internet to search for undiscovered planets in the TESS data.

Eisner encourages people interested in volunteering with Planet Hunters TESS to [check out the project's website](#).

(Source: [phys.org](#))

How The Cosmic Microwave Background Proves the Big Bang



At any epoch in our cosmic history, any observer will experience a uniform "bath" of omnidirectional radiation that originated back at the Big Bang. Today, from our perspective, it's just 2.725 K above absolute zero, and hence is observed as the cosmic microwave background, peaking in microwave frequencies. At great cosmic distances, as we look back in time, that temperature was hotter dependent on the redshift of the observed, distant object. As each new year passes, the CMB cools down further by about 0.2 nanokelvin, and in several billion years, will become so redshifted that it will possess radio, rather than microwave, frequencies. [Credit:](#) Earth: NASA/BlueEarth; Milky Way: ESO/S. Brunier; CMB: NASA/WMAP

Less than a century ago, we had many different ideas for what the history of our Universe looked like, but shockingly little evidence available to decide the issue. Hypotheses included suggestions that our Universe:

- violated the principle of relativity, and that the light we observed from distant objects simply got tired as it traveled through the Universe,
- was the same not only in all locations, but at all times: static and unchanging even as our cosmic history unfolded,
- didn't obey general relativity, but rather a modified version of it that included a scalar field,
- didn't include ultra-distant objects, and that those were nearby interlopers that observational astronomers were confounding for distant ones,
- or that it began from a hot, dense state and had been expanding and cooling ever since.

That last example corresponds to what we know today as the hot Big Bang, while all the other challengers (including newer ones not mentioned here) have fallen by the wayside. Since the mid-1960s, in fact, no other explanation has held up to the observations. Why is that? That's the inquiry of Roger Brewis, who would like some information about the following:

"You cite the blackbody spectrum of the CMB as confirmation of the Big Bang. Could you tell me where I can get more detail on this, please."

There's never anything wrong with asking for more information. It's true: the cosmic microwave background (CMB) radiation, which we've concluded is the leftover glow from the Big Bang itself, is that key evidence. Follow the link below to see why it confirms the Big Bang and disfavors all other possible interpretations.

(Source: [Big Think](#))

2024 Officers

President - Frank Petrie
Vice President - Daniel Schlesener
Chief Astronomer - Cole Rees
Treasurer - Kim Wilkes
Facilities Officer - Denise Hidano
Education Officer - Erin Leigh Howard
Secretary - Joe Mulligan

Members-at-Large

Peter Moseley
Chuck Wraith

Communications Manager (Non-voting position)

Liz Walker

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