

"Astronomy compels the soul to look upward, and leads us from this world to another." Plato



# Astro

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## CONTENTS

- Boeing Tests Starliner's Launch Abort System . . . . . 1
- NASA Studies Plan to Send an Orbiter to Pluto . . . . . 1
- Voyager 2 Recent Pass Into Interstellar Space . . . . . 2
- Mars 2020 Stands on Its Own Six Wheels . . . . . 2
- Lowest Mass Black Hole has Been Found . . . . . 3
- Astronaut Smart Glove to Explore More . . . . . 3



### Boeing Tests Starliner Spacecraft's Launch Abort System

Boeing's CST-100 Starliner crewed vehicle aced a crucial safety test on November 4 in the New Mexico desert.

Called a pad abort test, the drill checked the vehicle's ability to carry astronauts to safety should engineers notice an anomaly with the rocket that could endanger a launch. That scenario means that during a pad abort test, the capsule has to quickly pick up enough speed to carry humans to safety, starting from a standstill.

"That was phenomenal," Boeing spokesperson Jessica Landa said during a live broadcast of the test. "Initial indication is we've had a very successful pad abort test today." [Space.com](https://www.space.com)

### NASA Studies Plan to Send an Orbiter to Pluto

New Horizons' flyby of Pluto in July 2015 was one of the most exciting events in planetary exploration. We finally got to see this distant world and its moons close-up for the first time in history. Unfortunately, however, it was only a quick flyby. Since then, there has been a lot of talk of a return mission to Pluto. And now, just such a mission may be on the drawing boards.

NASA is now exploring the possibility of sending a spacecraft back to Pluto, but this time to stay much longer, with an orbiter. The Southwest Research Institute (SwRI) has announced that it has been awarded funding by NASA to study attributes, feasibility and cost of such a mission.





## Voyager 2 Recent Pass Into Interstellar Space

NASA's Voyager 2 spacecraft crossed into interstellar space last November. Now, one year later, scientists have published the first results from the data Voyager 2 gathered as it passed from the Sun's sphere of influence out into interstellar space.

In some ways, what Voyager 2 experienced was surprisingly different from what what Voyager 1 found when it passed into interstellar space in 2012. These latest results also carry a number of other surprises for astronomers. The findings were published Monday in a series of five papers in *Nature Astronomy*.

As the Sun blows charged particles into space, it carves a bubble out of the surrounding gas and dust. Earth and the other solar system planets are nestled inside this bubble, called the heliosphere. The boundary between the heliosphere and outside space is called the heliopause. And that's what the Voyager spacecraft blew past.

Scientists are interested in the heliopause because it presents an opportunity to learn more about the Sun, interstellar space and the interactions between them. To understand what's happening at and near this boundary, they study the information the Voyager probes collected about magnetic fields and charged particles on either side of the heliopause.

## Mars 2020 Stands on Its Own Six Wheels

The rover's legs (the black tubing visible above the wheels) are composed of titanium, while the wheels are made of aluminum. Measuring 20.7 inches (52.5 centimeters) in diameter and machined with traction-providing cleats, or grousers, the wheels are engineering models that will be replaced with flight models next year. Every wheel has its own motor. The two front and two rear wheels also have individual steering motors that enable the vehicle to turn a full 360 degrees in place.

When driving over uneven terrain, the rover's "rocker-bogie" suspension system - called that because of its multiple pivot points and struts - maintains a relatively constant weight on each wheel for stability. Rover drivers avoid terrain that would cause the vehicle to tilt more than 30 degrees, but even so, the rover can handle a 45-degree tilt in any direction without tipping over. It can also roll over obstacles and through depressions the size of its wheels.

The Mars 2020 rover was photographed in the Simulator Building at JPL,

where it underwent weeks of testing, including an extensive evaluation of how its instruments, systems and subsystems operate in the frigid, near-vacuum environment it will face on Mars.

JPL is building and will manage operations of the Mars 2020 rover for NASA. The rover will launch on a United Launch Alliance Atlas V rocket in July 2020 from Space Launch Complex 41 at Cape Canaveral Air Force Station. NASA's Launch Services Program, based at the agency's Kennedy Space Center in Florida, is responsible for launch management.

When the rover lands at Jezero Crater on Feb. 18, 2021, it will be the first spacecraft in the history of planetary exploration with the ability to accurately retarget its point of touchdown during the landing sequence.

Charged with returning astronauts to the Moon by 2024, NASA's Artemis lunar exploration plans will establish a sustained human presence on and around the Moon by 2028. We will use what we learn on the Moon to prepare to send astronauts to Mars.



### Astronaut Smart Glove to Explore the Moon, Mars and Beyond

The NASA Haughton-Mars Project (HMP) and collaborating organizations SETI Institute, Mars Institute, NASA Ames Research Center, Collins Aerospace, and Attention are announcing the successful field test of an “astronaut smart glove” for future human exploration of the Moon, Mars, and beyond. The smart glove is a prototype for a human-machine interface (HuMI) that would allow astronauts to wirelessly operate a wide array of robotic assets, including drones, via simple single-hand gestures. NASA plans to return to the Moon by 2024 with the Artemis Program, and then send astronauts to Mars.

Both missions are expected to include an expansion of surface extra-vehicular activities (EVAs) in both quantity and complexity compared to Apollo. Future planetary spacesuits are expected to improve in nimbleness and comfort over time. But, as pressurized vessels, spacesuits are likely to remain fundamentally cumbersome, limiting the dexterity and precision with which astronauts may perform tasks such as collecting samples and operating robots. The evaluation of the “Astronaut Smart Glove” for Moon and Mars exploration is expected to continue, in particular with applications to the control of other types of robotic assets including robotic manipulators, rovers, and other planetary science and exploration systems. The promising early results obtained this summer might herald a new era in human-robot interactions and space exploration capabilities.

[Phys.org](https://phys.org)

## Lowest Mass Black Hole has Been Found only 3.3 Times the Mass of the Sun

Black holes are one of the most awesome and mysterious forces of nature. At the same time, they are fundamental to our understanding of astrophysics. Not only are black holes the result of particularly massive stars that go supernova at the end of their lives, they are also key to our understanding of General Relativity and are believed to have played a role in cosmic evolution.

Because of this, astronomers have diligently been trying to create a census of black holes in the Milky Way galaxy for many years. However, new research indicates that astronomers may have overlooked an entire class of black holes. This comes from a recent discovery where a team of astronomers observed a black hole that is just over three Solar masses, making it the smallest black hole discovered to date.

The study, “A noninteracting low-mass black hole–giant star binary system”, recently appeared in the journal *Science*. The team responsible was led by astronomers from Ohio State University and included members from the Harvard-Smithsonian Center for Astrophysics, The Observatories of the Carnegie Institution for Science, the Dark Cosmology Center, and multiple observatories

and universities. Because of the influence they have over space and time, astronomers have long been searching for black holes and neutron stars. Since they are also what results when stars die, they could also provide information on the life cycles of stars and how elements are formed. In order to do that, astronomers first need to determine where black holes are located in our galaxy, which requires that they know what to look for.

One way to find them is to look for binary systems, where two stars are locked in orbit with each other due to their mutual gravity. When one of these stars dies, the intense gravitational pull it generates will begin to pull matter from the other star. This is evidenced by the heat and x-rays that are emitted as material from the star is accreted onto its black hole companion.

This revealed a giant red star that appeared to be orbiting something that was much smaller than any known black hole, but much larger than any known neutron stars. After combining the results with additional data from the Tillinghast Reflector Echelle Spectrograph (TRES) and the Gaia satellite, they realized that they had found a black hole roughly 3.3 times the mass of the Sun.





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# SCHOOLS In ACTION!

Dear followers,

The photographs, which you can see below, are the ones that were taken during the projects and presentations of the students that participated in PSSP (Partner School Science Program) and FEP (Future Explorers Program). We are happy and proud to share the projects that were created with brilliant ideas.



1- Bornova Yönder Schools (FEP), IZMIR 2, 3- İsmail Kaymak Schools (FEP), CANAKKALE  
4, 5- Palet Schools (FEP), ISTANBUL





## Astronomy Picture of the Day

**Near the Center of the Lagoon Nebula**

**Image Credit & Copyright:** *Zhuoqun Wu, Chilescope*

Stars are battling gas and dust in the Lagoon Nebula but the photographers are winning. Also known as M8, this photogenic nebula is visible even without binoculars towards the constellation of the Archer (Sagittarius). The energetic processes of star formation create not only the colors but the chaos. The glowing gas results from high-energy starlight striking interstellar hydrogen gas and trace amounts of sulfur, and oxygen gases. The dark dust filaments that lace M8 were created in the atmospheres of cool giant stars and in the debris from supernovae explosions. The light from M8 we see today left about 5,000 years ago. Light takes about 50 years to cross this section of M8.

[apod.nasa.gov](http://apod.nasa.gov)



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