

Capital Area Astronomy Association



Abrams Planetarium

Next meeting:

May meeting cancelled

Be healthy

☀ President's column

☀ NASA's Ingenuity Mars Helicopter succeeds in historic first flight

☀ Upcoming events
(On hold)

☀ NASA's NICER finds X-ray boosts in the Crab Pulsar's radio bursts

Presidents column

We are still waiting to hear when we can resume meetings at Abrams Planetarium. I hope within the next few months now that people are getting the vaccine.

For May I recommend watching A Citizen Science Webinar, hosted by David Eicher, Editor-in-Chief of Astronomy magazine.

“Celebrate Citizen Science Month by joining Dave Eicher as he moderates a Q&A with the leaders of the Aurorasaurus, Spiral Graph, and Smartphone Astrophotography citizen science projects.

Webinar is available on YouTube at:

<https://youtu.be/ikgfyN9JCyE>

Discover all three SciStarter projects before, during, and after the event at <https://SciStarter.org/AstronomyMag>

As always, please let me know if you have ideas or suggestions for upcoming programs.

Please email your program suggestions to me at mwrogers7@gmail.com



Pres. Mike's E-mail: mwrogers7@gmail.com
Treasurer E-mail: chuck_taricska@yahoo
New website: <https://caaastronomy.wixsite.com/caaa>
Yahoo group E-mail:
capital_area_astronomy@yahoogroups.com
My E-mail: kmelvin33@gmail.com

NASA's Ingenuity Mars Helicopter succeeds in historic first flight

April 19, 2021

NASA/Jet Propulsion Laboratory

The small rotorcraft made history, hovering above Jezero Crater, demonstrating that powered, controlled flight on another planet is possible.

Monday, NASA's Ingenuity Mars Helicopter became the first aircraft in history to make a powered, controlled flight on another planet. The Ingenuity team at the agency's Jet Propulsion Laboratory in Southern California confirmed the flight succeeded after receiving data from the helicopter via NASA's

Perseverance Mars rover at 6:46 a.m. EDT (3:46 a.m. PDT). "Ingenuity is the latest in a long and storied tradition of NASA projects achieving a space exploration goal once thought impossible," said acting NASA Administrator Steve Jurczyk. "The X-15 was a pathfinder for the space shuttle. Mars Pathfinder and its Sojourner rover did the same for three generations of Mars rovers. We don't know exactly where Ingenuity will lead us, but today's results indicate the sky -- at least on Mars -- may not be the limit." The solar-powered helicopter first became airborne at 3:34 a.m. EDT (12:34 a.m. PDT) -- 12:33 Local Mean Solar Time (Mars time) -- a time the Ingenuity team determined would have optimal energy and flight conditions. Altimeter data indicate Ingenuity climbed to its prescribed maximum altitude of 10 feet (3 meters) and maintained a stable hover for 30 seconds. It then descended, touching back down on the surface of Mars after logging a total of 39.1 seconds of flight. Additional details on the test are expected in upcoming downlinks. Ingenuity's initial flight demonstration was autonomous -- piloted by onboard guidance, navigation, and control systems running algorithms developed by the team at JPL. Because data must be sent to and returned from the Red Planet over hundreds of millions of miles using orbiting satellites and NASA's Deep Space Network, Ingenuity cannot be flown with a joystick, and its flight was not observable from Earth in real time. NASA Associate Administrator for Science Thomas Zurbuchen announced the name for the Martian airfield on which the flight took place. "Now, 117 years after the Wright brothers succeeded in making the first flight on our planet, NASA's Ingenuity helicopter has succeeded in performing this amazing feat on another world," Zurbuchen said. "While these two iconic moments in aviation history may be separated by time and 173 million miles of space, they now will forever be linked. As an homage to the two innovative bicycle makers from Dayton, this first of many airfields on other worlds will now be known as Wright Brothers Field, in recognition of the ingenuity and innovation that continue to propel exploration." Ingenuity's chief pilot, Håvard Grip, announced that the International Civil Aviation Organization (ICAO) -- the United Nations' civil aviation agency -- presented NASA and the Federal Aviation Administration with official ICAO designator IGY, call-sign INGENUITY.

These details will be included officially in the next edition of ICAO's publication Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services. The location of the flight has also been given the ceremonial location designation JZRO for Jezero Crater. As one of NASA's technology demonstration projects, the 19.3-inch-tall (49-centimeter-tall) Ingenuity Mars Helicopter contains no science instruments inside its tissue-box-size fuselage. Instead, the 4-pound (1.8-kg) rotorcraft is intended to demonstrate whether future exploration of the Red Planet could include an aerial perspective. This first flight was full of unknowns. The Red Planet has a significantly lower gravity -- one-third that of Earth's -- and an extremely thin atmosphere with only 1% the pressure at the surface compared to our planet. This means there are relatively few air molecules with which Ingenuity's two 4-foot-wide (1.2-meter-wide) rotor blades can interact to achieve flight. The helicopter contains unique components, as well as off-the-shelf-commercial parts -- many from the smartphone industry -- that were tested in deep space for the first time with this mission. "The Mars Helicopter project has gone from 'blue sky' feasibility study to workable engineering concept to achieving the first flight on another world in a little over six years," said Michael Watkins, director of JPL. "That this project has achieved such a historic first is testimony to the innovation and doggedness of our team here at JPL, as well as at NASA's Langley and Ames Research Centers, and our industry partners. It's a shining example of the kind of technology push that thrives at JPL and fits well with NASA's exploration goals." Parked about 211 feet (64.3 meters) away at Van Zyl Overlook during Ingenuity's historic first flight, the Perseverance rover not only acted as a communications relay between the helicopter and Earth, but also chronicled the flight operations with its cameras. The pictures from the rover's Mastcam-Z and Navcam imagers will provide additional data on the helicopter's flight. "We have been thinking for so long about having our Wright brothers moment on Mars, and here it is," said MiMi Aung, project manager of the Ingenuity Mars Helicopter at JPL. "We will take a moment to celebrate our success and then take a cue from Orville and Wilbur regarding what to do next. History shows they got back to work -- to learn as much as they could about their new aircraft -- and so will we." Perseverance touched down with Ingenuity attached to its belly on Feb. 18. Deployed to the surface of Jezero Crater on April 3, Ingenuity is currently on the 16th sol, or Martian day, of its 30-sol (31-Earth day) flight test window. Over the next three sols, the helicopter team will receive and analyze all data and imagery from the test and formulate a plan for the second experimental test flight, scheduled for no earlier than April 22. If the helicopter survives the second flight test, the Ingenuity team will consider how best to expand the flight profile.

More About IngenuityJPL, which built Ingenuity, also manages the technology demonstration project for NASA. It is supported by NASA's

Science, Aeronautics, and Space Technology mission directorates. The agency's Ames Research Center in California's Silicon Valley and Langley Research Center in Hampton, Virginia, provided significant flight performance analysis and technical assistance during Ingenuity's development. Dave Lavery is the program executive for the Ingenuity Mars Helicopter, MiMi Aung is the project manager, and Bob Balaram is chief engineer. **More About**

Perseverance A key objective for Perseverance's mission on Mars is astrobiology, including the search for signs of ancient microbial life. The rover will characterize the planet's geology and past climate, pave the way for human exploration of the Red Planet, and be the first mission to collect and cache Martian rock and regolith (broken rock and dust). Subsequent NASA missions, in cooperation with ESA (European Space Agency), would send spacecraft to Mars to collect these sealed samples from the surface and return them to Earth for in-depth analysis. JPL built and manages operations of the Perseverance rover. JPL is managed for NASA by Caltech in Pasadena, California.

[Materials](#) provided by [NASA/Jet Propulsion](#)

[Laboratory](#). *Note: Content may be edited for style and length*

NASA's NICER finds X-ray boosts in the Crab Pulsar's radio bursts

April 8, 2021

NASA/Goddard Space Flight Center

A global science collaboration using data from NASA's Neutron star Interior Composition Explorer (NICER) telescope on the International Space Station has discovered X-ray surges accompanying radio bursts from the pulsar in the Crab Nebula. The finding shows that these bursts, called giant radio pulses, release far more energy than previously suspected. A pulsar is a type of rapidly spinning neutron star, the crushed, city-sized core of a star that exploded as a supernova. A young, isolated neutron star can spin dozens of times each second, and its whirling magnetic field powers beams of radio waves, visible light, X-rays, and gamma rays. If these beams sweep past Earth, astronomers observe clock-like pulses of emission and classify the object as a pulsar. "Out of more than 2,800 pulsars cataloged, the Crab pulsar is one of only a few that emit giant radio pulses, which occur sporadically and can be hundreds to thousands of times brighter than the regular pulses," said lead scientist Teruaki Enoto at the RIKEN Cluster for Pioneering Research in Wako, Saitama prefecture, Japan. "After decades of observations, only the Crab has been shown to enhance its giant radio pulses with emission from other parts of the spectrum." The new study, which will appear in the April 9 edition of *Science* and is now available online, analyzed the largest amount of simultaneous X-ray and radio data ever collected from a pulsar. It extends the observed energy range associated with this enhancement phenomenon by thousands of times. Located about 6,500 light-years away in the constellation Taurus, the Crab Nebula and its pulsar formed in a supernova whose light reached Earth in July 1054.

The neutron star spins 30 times each second, and at X-ray and radio wavelengths it is among the brightest pulsars in the sky. Between August 2017 and August 2019, Enoto and his colleagues used NICER to repeatedly observe the Crab pulsar in X-rays with energies up to 10,000 electron volts, or thousands of times that of visible light. While NICER was watching, the team also studied the object using at least one of two ground-based radio telescopes in Japan -- the 34-meter dish at the Kashima Space Technology Center and the 64-meter dish at the Japan Aerospace Exploration Agency's Usuda Deep Space Center, both operating at a frequency of 2 gigahertz. The combined dataset effectively gave the researchers nearly a day and a half of simultaneous X-ray and radio coverage. All told, they captured activity across 3.7 million pulsar rotations and netted some 26,000 giant radio pulses. Giant pulses erupt quickly, spiking in millionths of a second, and occur unpredictably. However, when they occur, they coincide with the regular clockwork pulsations. NICER records the arrival time of every X-ray it detects to within 100 nanoseconds, but the telescope's timing precision isn't its only advantage for this study. "NICER's capacity for observing bright X-ray sources is nearly four times greater than the combined brightness of both the pulsar and its nebula," said Zaven Arzoumanian, the project's science lead at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "So these observations were largely unaffected by pileup -- where a detector counts two or more X-rays as a single event -- and other issues that have complicated earlier analyses." Enoto's team combined all of the X-ray data that coincided with giant radio pulses, revealing an X-ray boost of about 4% that occurred in synch with them. It's remarkably similar to the 3% rise in visible light also associated with the phenomenon, discovered in 2003. Compared to the brightness difference between the Crab's regular and giant pulses, these changes are remarkably small and provide a challenge for theoretical models to explain. The enhancements suggest that giant pulses are a manifestation of underlying processes that produce emission spanning the electromagnetic spectrum, from radio to X-rays. And because X-rays pack millions of times the punch of radio waves, even a modest increase represents a large energy contribution. The researchers conclude that the total emitted energy associated with a giant pulse is dozens to hundreds of times higher than previously estimated from the radio and optical data alone. "We still don't understand how or where pulsars produce their complex and wide-ranging emission, and it's gratifying to have contributed another piece to the multiwavelength puzzle of these fascinating objects," Enoto said. NICER is an Astrophysics Mission of Opportunity within NASA's Explorers program, which provides frequent flight opportunities for world-class scientific investigations from space utilizing innovative, streamlined and efficient management approaches within the heliophysics and astrophysics science areas. NASA's Space Technology Mission Directorate supports the SEXTANT component of the mission, demonstrating pulsar-based spacecraft navigation.

Capital Area Astronomy Association Newsletter

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[Materials](#) provided by [NASA/Goddard Space Flight Center](#).

Original written by Francis Reddy.

Abrams Planetarium

755 Science Rd.

East Lansing, Michigan

48824

FOR SALE:

18" f/4.5 Obsession Classic.

I'm asking \$4,300, and that includes a Denkmeier binoviewer with a pair of eyepieces.

Contact me via e-mail: gene.parker@outlook.com

Long time members will remember Gene and his amazing 18" Obsession Dobsonian. Gene would bring this scope out to the MSU open houses, and it would be jaw dropping for the public to look through his scope. If you are interested, please contact Gene.

UPCOMING EVENTS

Fox park observatory open houses:

Friday May 14 9 pm - 12 am Public Viewing & Photography Night

Saturday May 15 Daytime events TBA
National Astronomy Day; Night observing as well

jb.foxpark@gmail.com

If you have Astronomy items for sale, images, test reports or observations you would like to post to the newsletter, please send them to me at kmelvin33@gmail.com