NEWS RELEASE

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Japan’s PRIMA effort enters a new stage as NASA advances far-infrared mission

Since 2023, researchers in Japan have conducted scientific and technical studies and explored possible contributions to PRIMA, a far-infrared space telescope mission designed to investigate how planets form, how galaxies and their black holes grow together, and how dust and heavy elements build up across the universe.



Courtesy NASA/JPL-Caltech

This release is jointly issued by Hiroshima University, Ehime University, The University of Tokyo, Waseda University, Tokyo City University, University of Tsukuba, Nagoya University, Tsukuba University of Technology, the National Astronomical Observatory of Japan, and RIKEN.

NASA has selected the PRobe far-Infrared Mission for Astrophysics (PRIMA) to move into Phase B, advancing it into preliminary design and technology development and marking a new stage in a three-year effort in Japan to explore the country’s potential role in the mission.

Organized PRIMA-related activities by researchers in Japan began in June 2023. In December 2024, the effort became a working group at the Institute of Space and Astronautical Science (ISAS), part of the Japan

Aerospace Exploration Agency (JAXA), focused on possible Japanese participation. Researchers have since carried out scientific and technical studies and taken part in broader PRIMA science activities. As the mission advances into Phase B, domestic reviews and procedures related to Japan's possible participation will also move forward.

Science hidden in the far-infrared

PRIMA would survey the universe in far-infrared light, wavelengths largely blocked by Earth's atmosphere and not broadly covered by current observatories. The mission would address three major questions:

- How do planets and their atmospheres form?
- How do galaxies and their central supermassive black holes grow and evolve together?
- How have dust and heavy elements built up across cosmic history?

Far-infrared observations could also help scientists investigate the role of water in planet formation.

Dust can obscure star-forming regions by absorbing visible light from young stars and reradiating that energy in the far-infrared. PRIMA would detect and study this far-infrared light with two complementary instruments: an imager that would map dust emission and measure its polarization, and a spectrometer that would trace gas and heavy elements.

PRIMA would observe beyond the infrared range covered by the James Webb Space Telescope and into wavelengths shorter than those studied by facilities such as the Atacama Large Millimeter/submillimeter Array (ALMA). By helping fill this observational gap, the mission could reveal processes that are difficult to see at visible wavelengths and give astronomers a new view of how planets, stars, and galaxies form and evolve.

PRIMA's path to space

Current designs call for a 1.8-meter telescope cooled to about –268 degrees Celsius (4.5 kelvins), reducing infrared emission from the telescope itself so it can detect faint signals from cold material across the universe.

The mission must still pass a confirmation review before moving into implementation in Phase C.

NASA is targeting a 2033 launch for the planned five-year mission. If launched on that schedule, the observatory would reach space about two decades after the European Space Agency's Herschel Space Observatory ended far-infrared science observations in 2013.

PRIMA is the first mission in NASA's new Probe Explorers class. NASA's Jet Propulsion Laboratory in Southern California will manage the mission, with contributions from other agency centers and international partners.

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About the PRIMA Japan effort

Researchers at universities and research organizations across Japan are involved in scientific and technical studies related to PRIMA. Their work also includes contributions to the PRIMA General Observer Science Books, a special issue of the *Journal of Astronomical Telescopes, Instruments, and Systems* (JATIS), and presentations at conferences and research meetings. The institutions jointly issuing this release represent part of a wider community of researchers involved in PRIMA-related activities in Japan.

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