

Opportunity Title: JWST Studies of Luminous, Obscured Active Galactic Nuclei

Opportunity Reference Code: 0231-NPP-JUL24-JPL-Astrophys

Organization National Aeronautics and Space Administration (NASA)

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Application Deadline 7/1/2024 6:00:59 PM Eastern Time Zone

Description A key objective for NASA's Wide-field Infrared Survey Explorer (WISE) was to find the most luminous galaxies in the Universe. Such objects open a window into the assembly of mass at the nodes of the cosmic web. The hot, dust-obscured galaxies (Hot DOGs) discovered by WISE are a population that may comprise half of the most luminous objects. Hot DOGs have extreme bolometric luminosities powered by heavily obscured quasars (making them difficult to detect even in X-rays) that may be radiating above the Eddington limit. At $z = 4.601$ and with $L_{\text{bol}} = 3.5 \times 10^{14} L_{\text{sun}}$, WISE J224607.56-052634.9 is the most distant Hot DOG identified, and the most luminous galaxy known in the Universe. ALMA observations reveal a turbulent interstellar medium in the object, likely due to quasar feedback, and three companion galaxies within ~ 35 kpc connected by streamers of dust to the central galaxy, suggesting WISE 2246-0526 is in the process of accreting its neighbors.

JWST will observe WISE 2246-0526 for 23 hours in cycle 1, obtaining NIRSpec and MIRI integral field spectra. These observations will be used to characterize the central quasar and its feedback on the host galaxy and to study the star formation properties and kinematics of the companion galaxies, tidal streamers, and other extended structures in the multiple-merger system, connecting the large-scale cosmological environment to the feeding of the central super-massive black hole.

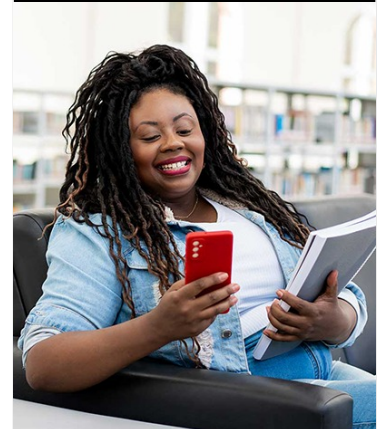
This opportunity is for a postdoctoral fellow to play a leading role in analyzing and interpreting the JWST data for WISE 2246-0526, and possibly for an additional JWST program on $z > 3$ luminous, obscured AGN. Experience with integral field spectroscopy is highly desirable, and familiarity with AGN, stellar population synthesis, and/or dust modeling is also preferred. The successful candidate will be expected to devote a significant percentage of their time to their own research programs, which could make use of JPL's access to the Palomar 200-inch telescope. The successful applicant will work with a group led by Dr. Peter Eisenhardt (Peter.R.Eisenhardt@jpl.nasa.gov) and Dr. Daniel Stern (Daniel.K.Stern@jpl.nasa.gov) at JPL, as well as with Dr. Tanio D'Áz-Santos (tanio@ia.forth.gr) at the Institute of Astrophysics in Crete, and potential applicants are encouraged to contact them.

References:


Wright, Edward L., Eisenhardt, Peter R. M., et al., The Wide-field Infrared Survey Explorer (WISE): Mission Description and Initial On-orbit Performance, [Astronomical Journal](#), **140**, 1868, 2010

Eisenhardt, Peter R. M., et al., The First Hyper-Luminous Infrared Galaxy Discovered by WISE, [Astrophysical Journal](#), **755**, 173, 2012

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Heavily Obscured, WISE-Selected Quasars at $z \sim 2$, [Astrophysical Journal 794, 102, 2014](#)

Assef, R. J., Eisenhardt, P. R. M., Stern, D., et al., Half of the Most Luminous Quasars May Be Obscured: Investigating the Nature of WISE-Selected Hot Dust-Obscured Galaxies, [Astrophysical Journal, 804, 27, 2015](#)

Tsai, C.-W., Eisenhardt, P.R.M., Wu, Jingwen, Stern, Daniel, et al., The Most Luminous Galaxies Discovered by WISE, [Astrophysical Journal, 805, 90, 2015](#)

Díaz-Santos, T., Assef, R. J., Blain, A. W., Tsai, C.-W., Aravena, M., Eisenhardt, P., Wu, J., Stern, D., and Bridge, C., The Strikingly Uniform, Highly Turbulent Interstellar Medium of the Most Luminous Galaxy in the Universe, [Astrophysical Journal Letters 816, L6, 2016](#)

Tsai, Chao-Wei, Eisenhardt, Peter R. M., Jun, Hyunsung D., Wu, Jingwen, Assef, Roberto J., Blain, Andrew W., Díaz-Santos, Tanio, Jones, Suzy F., Stern, Daniel, Wright, Edward L. and Yeh, Sherry C. C., Super-Eddington Accretion in the WISE-Selected Extremely Luminous Infrared Galaxy W2246“0526, [Astrophysical Journal, 868, 15, 2018](#)

Díaz-Santos, T., Assef, R., Blain, A. W., Aravena, M., Stern, D., Tsai, C.-W., Eisenhardt, P., Wu, J., Jun, H., Dibert, K., Inami, H., Lansbury, G., and Leclercq, F., The Multiple Merger Assembly of a Hyper-luminous Obscured Quasar at $z = 4.6$, [Science, 362, 1034, 2018](#)

Díaz-Santos, Tanio, Assef, Roberto J., Eisenhardt, Peter R. M. et al., “Kinematics and Star Formation of High-Redshift Hot Dust-Obscured Quasars as Seen by ALMA“, Astronomy & Astrophysics, in press, [arXiv: 2104.09495](#)

Location:

Jet Propulsion Laboratory
Pasadena, California

Field of Science: Astrophysics

Advisors:

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Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of the United States. A complete list of Designated Countries can be found

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at: <https://www.nasa.gov/oiiir/export-control>.

Eligibility is currently open to:

- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Eligibility Requirements

- **Degree:** Doctoral Degree.