

# NASA selects Penn State to lead next-generation planet finder

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The WIYN telescope building at sunset. The NEID planet detector, being built by a team led by Penn State University, will be installed on the WIYN telescope at Kitt Peak National Observatory. Credit: NOAO/AURA/NSF

A Penn State-led research group has been selected by NASA's Astrophysics Division to build a \$10-million, cutting-edge instrument to

detect planets orbiting stars outside our solar system. The team, led by Suvrath Mahadevan, assistant professor of astronomy and astrophysics at Penn State University, was selected after an intense national competition. When completed in 2019, the instrument will be the centerpiece of a partnership between NASA and the National Science Foundation called the NASA-NSF Exoplanet Observational Research program (NN-EXPLORE).

"We are privileged to have been selected to build this new instrument for the exoplanet community," Mahadevan said. "This is a testament to our multi-institutional and interdisciplinary team of talented graduate students, postdoctoral researchers, and senior scientists." The instrument is named NEID - derived from the word meaning "to discover/visualize" in the native language of the Tohono O'odham, on whose land Kitt Peak National Observatory is located. NEID also is short for "NN-EXPLORE Exoplanet Investigations with Doppler Spectroscopy." NEID will detect planets by the tiny gravitational tug they exert on their stars.

"NEID will be more stable than any existing spectrograph, allowing astronomers around the world to make the precise measurements of the motions of nearby, Sun-like stars," said Jason Wright, associate professor of astronomy and astrophysics at Penn State and a member of the science advisory team. "Our team will use NEID to discover and measure the orbits of rocky planets at the right distances from their stars to host liquid water on their surfaces."

"Winning this competition is a tremendous honor and a mark of recognition for our Center for Exoplanets and Habitable Worlds," said Donald Schneider, Distinguished Professor and Head of the Department of Astronomy and Astrophysics. Many NEID team members are graduate students and postdoctoral researchers. Schneider added, "We are proud that our junior scientists are a significant part of this ground-breaking project."

NEID Project Manager and Senior Scientist Fred Hearty said, "Building this instrument is a wonderful opportunity for Penn State and our partners. R&D here at Penn State established a foundation to advance the state-of-the-art in planet finding almost thirty years ago. Today's Habitable-zone Planet Finder project is proving the entire system works as planned."

NEID will be built over the next three years in laboratories at Innovation Park on the Penn State University Park Campus and at partnering institutions. It will be installed on the 3.5-meter WIYN telescope at Kitt Peak National Observatory (KPNO) in Arizona. NEID will provide new capabilities for the National Optical Astronomical Observatory (NOAO), which operates the Kitt Peak telescopes. When NEID is completed, astronomers worldwide will have access to this state-of-the-art planet finder.

Astronomer and Penn State Research Associate Chad Bender, who will help to oversee the construction of the instrument, noted that "NEID's capabilities are critical to the success of NASA's upcoming exoplanet missions. NEID will follow-up on planets discovered by the Transiting Exoplanet Survey Satellite and also will identify exciting targets to be observed by the James Webb Space Telescope and the Wide-Field Infrared Survey Telescope."

The NEID team is a multi-institutional collaboration, consisting of exoplanet scientists and engineers from Penn State, University of Pennsylvania, NASA Goddard Space Flight Center, University of Colorado, National Institute of Standards and Technology, Macquarie University in Australia, Australian Astronomical Observatory, and Physical Research Laboratory in India. "NEID is a transformative capability in the search for worlds like our own, Mahadevan said."

NASA and NSF established the NN-EXPLORE partnership in February

2015 to take advantage of the full NOAO share of the 3.5-meter WIYN telescope at KPNO, to provide the science community with the tools and access to conduct ground-based observations that advance exoplanet science, and to support the observations of NASA space astrophysics missions. KPNO is operated on behalf of NSF by NOAO. The NEID project will be managed on behalf of NASA's Astrophysics Division by the Exoplanet Exploration Program Office at the Jet Propulsion Laboratory.

Provided by Pennsylvania State University

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