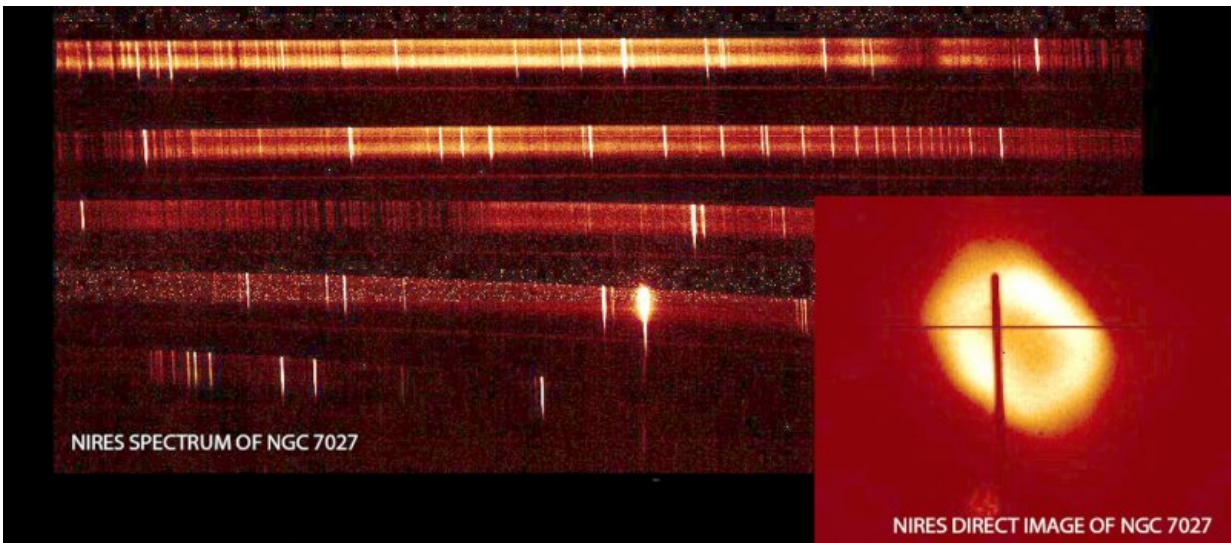


W. M. Keck Observatory achieves first light with NIRES

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The “first-light” image from NIRES is of NGC 7027, a planetary nebula. The NIRES spectrum shows the near-IR spectrum of this nebula dominated by emission lines of hydrogen and helium. The direct image shows NBC 7027 in the K’ filters at 2.2 microns. Credit: W. M. Keck Observatory

Astronomers at W. M. Keck Observatory have successfully met a major milestone after capturing the very first science data from Keck Observatory's newest instrument, the Caltech-built Near-Infrared Echellette Spectrometer (NIREs).

The Keck Observatory-Caltech NIREs team just completed the

instrument's first set of commissioning observations and achieved "first light" with a spectral image of the planetary nebula NGC 7027.

"The Keck Observatory continually strives to provide instrumentation that meets the high aspirations of our scientific community and responds to changing scientific needs," said Keck Observatory Director Hilton Lewis. "NIRES is expected to be one of the most efficient single-object, near-infrared spectrographs on an eight to ten-meter telescope, designed to study explosive, deep sky phenomena such as supernovae and gamma ray bursts, a capability that is in high demand."

"The power of NIRES is that it can cover a whole spectral range simultaneously with one observation," said Keith Matthews, the instrument's principal investigator and a chief instrument scientist at Caltech. "It's a cross-dispersed spectrograph that works in the infrared from where the visual cuts off out to 2.4 microns where the background from the thermal emission gets severe."



NIRES arrived at Keck Observatory from Caltech on April 17 and was installed on Keck II on September 28. This long-awaited instrument is perfectly suited for time domain astronomy follow-up observations of targets identified by new surveys that are designed to find transients and exotic objects. Credit: W. M. Keck Observatory

Matthews developed the instrument with the help of Tom Soifer, the Harold Brown Professor of Physics, Emeritus, at Caltech and member of the Keck Observatory Board of Directors, Jason Melbourne, a former postdoctoral scholar at Caltech, and University of Toronto Department of Astronomy and Astrophysics Professor Dae-Sik Moon, who is also associated with Dunlap Institute, and started working on NIRES with Matthews and Soifer when he was a Millikan postdoctoral fellow at Caltech about a decade ago.

Because NIRES will be on the telescope at all times, its specialty will be capturing Targets of Opportunity (ToO) – astronomical objects that unexpectedly go 'boom.' This capability is now more important than ever, especially with the recent discovery, announced October 16, of [gravitational waves](#) caused by the collision of two neutron stars. For the first time in history, astronomers around the world detected both light and gravitational waves of this event, triggering a new era in astronomy.

"NIRES will be very useful in this new field of 'multi-messenger' astronomy," said Soifer. "NIRES does not have to be taken off of the telescope, so it can respond very quickly to transient phenomena. Astronomers can easily turn NIRES to the event and literally use it within a moment's notice."

With its high-sensitivity, NIRES will also allow astronomers to observe extremely faint objects found with the Spitzer and WISE infrared space telescopes. Such ancient objects, like high-redshift galaxies and quasars, can give clues about what happened just after the Big Bang.

"NIRES is yet another revolutionary Keck Observatory instrument developed by Keith and Tom; they built our very first instrument, NIRC, which was so sensitive it could detect the equivalent of a single candle flame on the Moon," said Lewis. "Keith and Tom also developed its successor, NIRC2, and Keith was key to the success of MOSFIRE. They are instrumentation pioneers, and we are grateful to them and the entire NIRES team for helping Keck Observatory continue to advance our technological capabilities."

Provided by W. M. Keck Observatory

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