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Currents

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Planet-hunting Spectrometer on Track for WIYN: The NEID extreme precision radial velocity spectrometer is on schedule to be installed at the WIYN telescope starting in April 2019 and available to the community in 2019B. This article describes recent instrument development activities by NOAO and the rest of the NEID team. [Read More...](#)

US ELT Program News and Activities: The US Extremely Large Telescope Program, a joint initiative of NOAO, the Thirty Meter Telescope, and the Giant Magellan Telescope, aims to provide the US community with open access to significant observing time on both facilities. This article highlights the following recent news items and activities related to the program:

- Key Science Programs are being developed by the community to illustrate the tremendous science reach of this resource.
- A National Academies report has recommended that NSF invest in both GMT and TMT for exoplanet research.
- Site excavation for GMT's pier and enclosure has begun.
- The Hawai'i State Supreme Court has affirmed the Conservation District Use Permit for TMT construction on Maunakea. [Read More...](#)

2018 TMT Science Forum – “Breakthrough Science with the Thirty Meter Telescope”: The TMT Science Forum, to be held in Pasadena, **10-12 December 2018**, is the prime opportunity for the US community to learn about the Thirty Meter Telescope, receive an update on its design and construction status, discuss its science capabilities, and become involved in shaping the observatory's future. NSF travel support is available for the US community, and registration is now open. [Read More...](#)

Meeting Announcement – “Extremely Big Eyes on the Early Universe”: Registration is now open for the first two parts of an international conference series that will review the current state of the art in studying the high redshift universe and discuss how to best use giant telescopes to go beyond. The Los Angeles event, to be held at UCLA (**28 January – 1 February 2019**), has an early registration deadline of **30 November 2018**. The Tokyo event, to be held at the Kavli Institute for the Physics and Mathematics of the Universe (**25-29 March 2019**), has an abstract submission deadline of 1 December 2018. [Read More...](#)

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NOAO Mini-Workshop – “Resurgence of High-Resolution Spectroscopy at Gemini”:

The US National Gemini Office (US NGO) will host a mini-workshop on Gemini high-resolution spectroscopy at the January 2019 AAS meeting in Seattle. The splinter session will focus on the science opportunities made available by spectrographs spanning the optical to mid-infrared, including the visitor instruments GRACES, IGRINS, and Maroon-X, as well as the new facility optical spectrograph GHOST. [Read More...](#)

Meeting Announcement – “Massively Multiplexed Spectroscopy with MSE: Science, Project and Vision”:

The US community is invited to a meeting on the Maunakea Spectroscopic Explorer (MSE), a proposed 11.5-m wide-field spectroscopic survey telescope that is beginning its Preliminary Design phase. The meeting, to be held in Tucson **26-28 Feb 2019**, is hosted by NOAO in collaboration with the MSE Project and the Canada-France-Hawaii Telescope (CFHT). Interested astronomers are encouraged to help define the MSE Design Reference Surveys and to explore the ability of MSE to address 2020 Decadal science priorities. For more information, and to register for the meeting, visit <https://www.noao.edu/meetings/mse2019/>



NEID Extreme Precision Radial Velocity Spectrometer on Track for Installation at WIYN in 2019

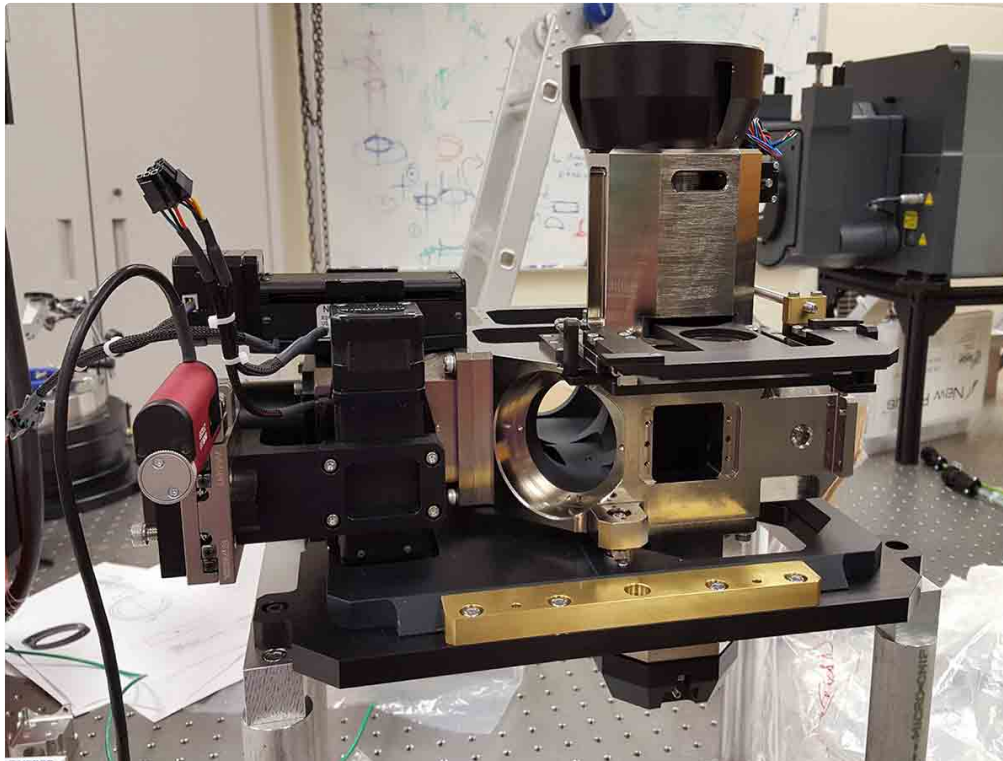
Jayadev Rajagopal, NOAO

The cornerstone of a partnership between NSF and NASA to advance exoplanet science, the NEID extreme precision radial velocity spectrometer is on schedule to be installed and commissioned at the 3.5-m WIYN telescope starting in April 2019 and to be available to the community in the 2019B semester. The aggressive development and deployment schedule is dictated by the main mandate for the project: to support the NASA TESS mission, which launched in April of this year and is already producing data.

A WIYN facility instrument, NEID will be available to the exoplanet community for up to approximately 40% of the observing time on the WIYN telescope (roughly 120 nights). Proposals will be accepted through the NOAO TAC process. Additional details about the NASA-NSF partnership and the NEID spectrometer are available in a [September 2016 NOAO Newsletter article](#). A splinter meeting on NEID has been scheduled at the January AAS meeting in Seattle, where the community can learn more about NEID’s capabilities and operation plans.

As part of the instrument development effort, NOAO has been busy designing and fabricating two major subsystems for NEID:

- **Port Adaptor:** A fiber feed to be mounted on the mirror cell at the Bent Cassegrain Port, the Port Adaptor will provide a highly stable, tip-tilt corrected starlight beam with image motion controlled to better than 50 milliarcseconds.
- **NEID chamber:** Light from the Port Adaptor will be carried by optical fibers down to the ground-floor room where NEID will be housed. The NEID chamber is tightly thermally controlled, to within a tenth of a degree throughout the year, while outside temperatures range from freezing to near 100 degrees.



Images of the NEID chamber, Port Adaptor, and fiber system. Hover your mouse over the image to pause the slideshow. Click the image to step through a larger version of the slideshow, with descriptions of the images. Photos courtesy of NOAO/WIYN and Washburn Labs/University of Wisconsin.

Development Status and Highlights

The Port Adaptor optics were designed at NOAO and fabricated in Tucson by a local vendor (TORC) and are currently at the Washburn Laboratories at the University of Wisconsin (UW). UW will assemble, integrate and test all of the Port Adaptor components, including the custom Coherent Fiber Bundle (CFB) subsystem that will be used to precisely center the target on the science fiber. The CFB fibers are integrated with micron-level precision onto the science focal plane along with the science and sky fibers. Delivery of the Port Adaptor to WIYN for installation and commissioning is anticipated in March-April 2019.

At Penn State University (PSU) and other locations (U. Penn, NIST in Boulder, University of Arizona), the NEID team is fabricating and integrating various NEID components. The vacuum chamber in which the optics are to be housed has successfully undergone thermal testing that demonstrated milli-Kelvin

level stability. Extreme thermal expansion control is needed to meet the requirement on radial velocity precision. A precision of 10 cm per second (the Sun's reflex motion induced by the Earth) corresponds to the lattice separation of a few Silicon atoms on the CCD chip.

A Fabry-Perot etalon is being tested at NIST and will soon be delivered to PSU. The etalon will work with a Laser frequency Comb (LFC) to provide stringent wavelength calibration for NEID. The LFC is a turn-key device from Menlo Systems. Both systems provide a reference scale of spectral lines superposed on the target star spectrum. Calibration lamps will also be used for a robust and precise calibration process.

The NEID CCD (9K x 9K from E2V, ~10cm x 10cm) is being tested and integrated at U. Penn. An engineering grade detector has been characterized and is available for use in early integration work at PSU. Most of the major optical components including the diffraction grating, prism, and camera optics are at PSU and will soon be assembled onto the optical bench and aligned. The off-axis parabola, a vital spectrometer optic, is currently being coated.

Stay tuned for future news and highlights!

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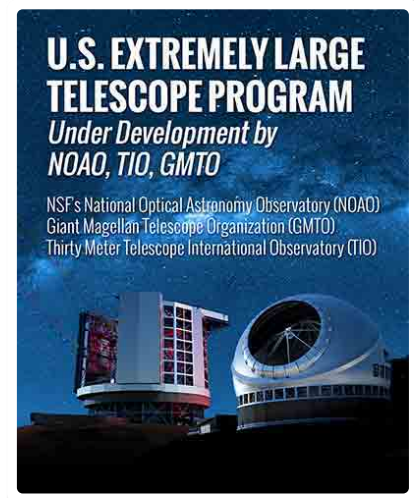
The US Extremely Large Telescope Program

Mark Dickinson, NOAO

NOAO, the [Giant Magellan Telescope \(GMT\) Organization](#), and the [Thirty Meter Telescope \(TMT\) International Observatory](#), are continuing our joint effort to develop a [US Extremely Large Telescope \(ELT\) Program](#). Our primary goal is to enable forefront research by the broad US astronomical community via open access to significant shares of observing time with both TMT and GMT. In the coming decade, ELTs with 20-m to 40-m primary mirror diameters will peer out into the Universe with unprecedented sensitivity and angular resolution, enabling scientific investigations beyond the reach of present-day observatories, in nearly all fields of astronomical research from our Solar System to cosmology. The combination of TMT and GMT provides access to both hemispheres and more diverse observing capabilities, enabling integrated science programs that go beyond the reach of a single facility.

In recent news and activities related to the US ELT Program:

- The importance of national access to (and federal investment in) these capabilities was again highlighted in the recent [Exoplanet Science Strategy](#) report commissioned by the National Academies of Science, Engineering and Medicine. The report recommended that "the National Science Foundation (NSF) invest in both the GMT and TMT and their exoplanet instrumentation to provide all-sky access to the US Community."



- More than 250 astronomers are currently working together to develop concepts for [Key Science Programs \(KSPs\) using TMT and GMT](#). KSPs will address questions of fundamental scientific importance that may require tens to hundreds of observing nights with GMT, TMT, or both observatories working in concert, taking advantage of their combined view of the full sky, or of their complementary instrumental capabilities. It is envisioned that KSPs will follow open collaboration models that encourage broad, diverse participation by observers, theorists, and data scientists throughout the US community. More than 85 scientists will gather in Tucson for a KSP Development Workshop in mid-November. If you would like to contribute to KSP development, please [register using the on-line form](#).
- [Site excavation for the GMT's concrete pier and enclosure](#) began at Las Campanas Observatory in August, and is expected to take about five months to complete.
- The Supreme Court of the State of Hawai'i has upheld an earlier decision by the State Board of Land and Natural Resources to issue a [Conservation District Use Permit for the construction of TMT on Maunakea](#).

2018 TMT Science Forum: "Breakthrough Science with the Thirty Meter Telescope"

10-12 December 2018, Pasadena, CA

<https://conference.ipac.caltech.edu/tmtsf2018>

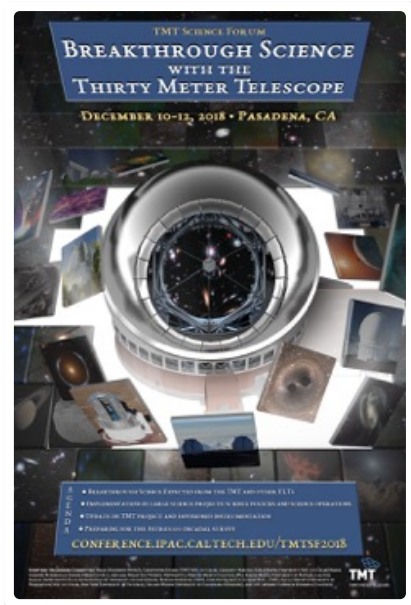
Registration deadline: **25 November 2018**

Registration is now open for the TMT Science Forum, which will be held in Pasadena, CA, 10-12 December 2018. The TMT Science Forum is the prime opportunity to learn about the Thirty Meter Telescope, to get an update on its design and construction status, to discuss its science capabilities, and to become involved in shaping the observatory's future. As this year's Forum will be held in the same city as the project headquarters, **a visit to the TMT technical laboratory** will be offered to all interested participants.

At the 2018 Forum, "*Breakthrough Science with the Thirty Meter Telescope*," participants will discuss the transformative research that will be carried out with the

TMT throughout all domains of astrophysics. Some of this science will be achieved through key projects that require the coordination of a large group of scientists and substantial allocations of TMT observing time. Other investigations will be carried out via standard, smaller, PI-led programs. Breakthrough science programs of all types will aim to answer a set of well-focused questions that require the high sensitivity and exceptional angular resolution of the TMT.

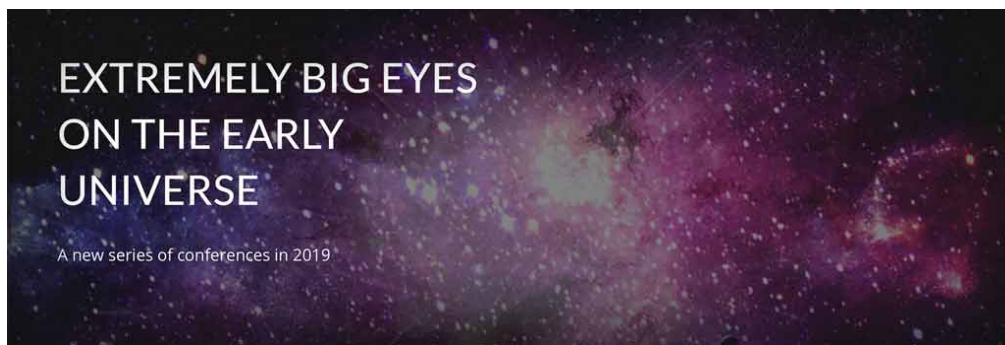
For US scientists, this Forum will provide a unique opportunity to learn about the capabilities offered by the TMT in preparation for the submission of



[Astro2020 white papers](#).

The National Science Foundation, as part of its cooperative agreement with TMT, provides travel support for US astronomers unaffiliated with TMT member institutions (Caltech and the University of California) to attend the TMT Forum. To be considered for support, please write to tmt@noao.edu well before the registration deadline.

All Forum information can be found at [the TMT Science Forum website](#), including the draft agenda, room booking, important upcoming dates, visa information (if required), etc.



Meeting Announcement — “Extremely Big Eyes on the Early Universe”

Registration is now open for the Los Angeles and Tokyo editions of “[Extremely Big Eyes on the Early Universe](#),” the first two installments of a three-part international conference series to be held at

- University of California, Los Angeles, USA, **28 January – 1 February 2019**
- Kavli Institute for the Physics and Mathematics of the Universe, Tokyo, Japan, **25-29 March 2019**
- Accademia dei Lincei, Rome, Italy, **9-13 September 2019**

UCLA: [Regular registration is now open](#). Registration fees increase after **30 November**. Thanks to the generous support of UCLA and Kudu (<https://kudu.com/>), a reduced registration fee is available for a limited number of graduate students and postdocs. Visit the registration web page for further information.

Tokyo: [Registration is now open](#). The abstract submission deadline is **1 December**.

In the next decade, the commissioning of Extremely Large Telescopes (20-40m class) will allow us to see the high redshift universe using new eyes of unprecedented power. By themselves or in combination with other facilities, these new eyes will have the potential to transform our understanding of the formation and early evolution of galaxies and black holes, first light and cosmic reionization, as well as the evolution of the intergalactic and circumgalactic media.

The Big Eyes conferences will bring together an international group of experts to review the current state of the art in the study of the high redshift universe and to discuss how best to use giant telescopes to learn about it. These meetings will address the following questions:

- What potentially transformative observations will be enabled by giant telescopes? What capabilities are required?
- What are the key synergies between giant telescopes and other facilities? What are the areas and topics where a concerted effort will yield far superior results than the sum of all parts?
- What theoretical or observational work is needed in preparation for first light? What are the limitations in our understanding that need to be overcome?
- What calculations are required in order to make testable predictions and interpret the results of future astronomical observations?

It is extremely important to consider these questions now, while the plans for giant telescopes can still be influenced, and there is still sufficient time to carry out preparatory theoretical and observational work that will be needed to make the most of the large investments in these facilities.

For more information and to register, please visit:

<https://conferences.pa.ucla.edu/early-universe-2019/index.html>



NOAO Mini-Workshop at January AAS Meeting: “The Resurgence of High-Resolution Spectroscopy at Gemini”

Ken Hinkle, NOAO

The US National Gemini Office (US NGO) will host a mini-workshop on Gemini high-resolution spectroscopy at the January 2019 AAS meeting in Seattle. The workshop will be scheduled as an afternoon splinter session, possibly on Tuesday afternoon. Scheduling details will be provided by the AAS in late November.

Over the last few years, a variety of high-resolution spectroscopic capabilities have been available at Gemini through its visitor instrument program. Both long- and short-slit spectrographs have been offered, with capabilities spanning the optical to mid-infrared. Gemini is now building a new high-

sensitivity, high-resolution optical spectrograph for the Gemini South telescope.

The AAS splinter session will focus on the science opportunities made available by these instruments:

- The session will begin with an overview from Verne Smith (NOAO) of science results from the high-resolution spectrographs offered at Gemini.
- Jeff Carlin (LSST) will then discuss science from the optical spectrograph GRACES.
- Hwihyun Kim (Gemini) will describe results from the 1.5-2.5 micron near-infrared spectrograph IGRINS, a visitor instrument that was recently scheduled at Gemini South. She will also discuss plans for the return to Gemini of IGRINS or its clone.
- Jacob Bean (Chicago) will update us on the status of the planet hunting high-precision radial velocity spectrograph Maroon-X, which should be available at Gemini North in 2019.
- Finally, Steve Margheim (Gemini) will discuss the status of the new facility optical spectrograph GHOST.

If high spectral resolution is your interest, and if you will be at the AAS meeting, then make this session a priority. Admission is free to anyone attending the AAS.

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Contact Us

We welcome your input on this issue of *Currents*. Please contact us at currents@noao.edu. We look forward to hearing from you!

Currents is a spark plug for communication between NOAO and our community. It provides updates—and solicits community input—on NOAO observing opportunities and NOAO programs and policies on a more rapid timescale than is possible with the *NOAO Newsletter*.

NOAO is the national center for ground-based nighttime astronomy in the United States and is operated by the Association of Universities for Research in Astronomy (AURA), Inc. under cooperative agreement with the National Science Foundation.

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