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Currents

In this Issue...

SATCON1 Report Delivered to NSF: A report by experts representing the global astronomical community concludes that large constellations of satellites in low Earth orbit will fundamentally change ground-based OIR astronomy and identifies strategies to mitigate their impact. The report, delivered to NSF and announced at a press conference this week, is the outcome of the recent SATCON1 workshop organized by NOIRLab and AAS, which brought together more than 250 scientists, engineers, satellite operators, and other stakeholders. [Read more...](#)

US ELT Program Update: Recent developments include the submission of three planning and design proposals to NSF and the receipt of an NSF award to support the planning of user support services that NOIRLab has proposed to provide for the US Extremely Large Telescope Program. The latter includes particular emphasis on enabling forefront science by a broad and diverse research community. In the coming months, we will be reaching out to solicit your input on requirements for the proposed user support systems. Stay tuned! [Read more...](#)

From the Gemini e-Newscast:

- **Gemini North Fast Turnaround Proposals Solicited:** The next proposal deadline is **31 August 2020**. Proposals for Gemini South are not yet solicited. For further details see <https://www.gemini.edu/observing/phase-i/ft/ft-cfp>.
- **COVID-19 update and 2021A Call for Proposals:** In preparing the 2021A Call for Proposals, Gemini Observatory expects to offer time at both telescopes. Further details will be provided in the Call, scheduled for the end of August as usual.

[Read more in the Gemini e-Newscast](#)



NOIRLab in the News:

Cool New Worlds in Our Cosmic Backyard: Astronomers and a team of citizen scientists participating in *Backyard Worlds: Planet 9* have [discovered roughly 100 cool brown dwarfs near the Sun](#). Several are among the very coolest brown dwarfs known, with a few approaching the temperature of Earth — cool enough to harbor water clouds. Archival data from CTIO and KPNO and data services from CSDC were critical to the result. NOIRLab astronomer and Backyard Worlds co-founder Aaron Meisner led the investigating team.



Astronomers Sink Their Teeth into a Special

Supernova: Astronomers using the SOAR Telescope at CTIO and other facilities recently probed the [inner workings of a calcium-rich supernova](#) through a detailed study of the final month of a star's life. The calcium produced in these events account for up to half of the calcium found in the Universe, as well as the calcium found in our bones and teeth. NOIRLab astronomer Régis Cartier is a member of the investigating team.



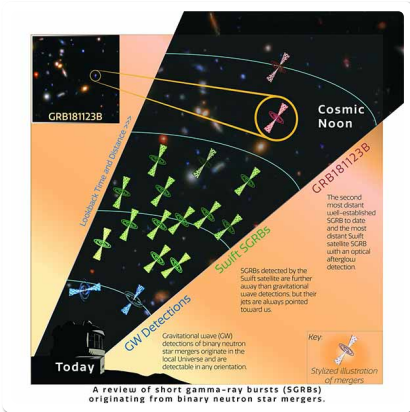
Surprisingly Dense Exoplanet Challenges Planet

Formation Theories: Observations made with the WIYN 0.9-meter Telescope and other facilities have revealed that the young exoplanet K2-25b is [unusually dense for its size and age](#). Weighing in at 25 times the mass of Earth and slightly smaller than Neptune, its properties are difficult to explain with conventional planet formation theory. The WIYN 0.9-meter observations employed a clever, inexpensive, optical component that enabled high precision photometry.



Gemini Captures Fleeting Flash from a Short GRB:

Rapid follow-up of the optical afterglow from one of the [most distant confirmed short gamma-ray bursts](#) (SGRB) has confirmed the object's distance and placed it squarely in the epoch of cosmic high noon. The appearance of an SGRB so early in the history of the Universe could alter theories about their origin, in particular how long it takes two neutron stars to merge to produce these events.

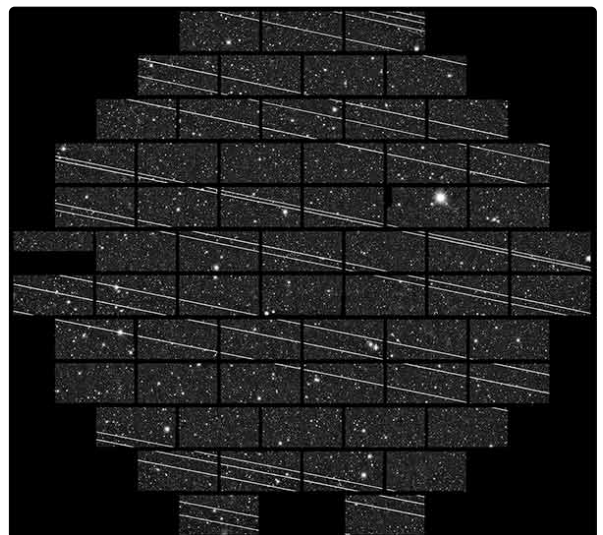


If you have a NOIRLab-related result that we can help publicize, please contact us! (Amanda Kocz, NOIRLab Press Officer, akocz@aura-astronomy.org; or Joan Najita, *Currents* editor, najita@noao.edu)

SATCON1 Report Delivered to NSF — Offers Roadmap to Mitigate Effects of Large Satellite Constellations on Astronomy

A report by experts representing the global astronomical community concludes that large constellations of satellites in low Earth orbit will fundamentally change ground-based OIR astronomy and identifies strategies to mitigate their impact. The report, delivered to NSF and announced at a press conference this week, is the [outcome](#) of the recent [SATCON1 workshop](#) organized by NOIRLab and AAS in late June, which brought together more than 250 scientists, engineers, satellite operators, and other stakeholders.

As described in the report, recent technology developments for astronomical research — especially wide-field imaging on large



telescopes — are threatened by the launch of many thousands of low-Earth-orbiting satellites (LEOsats) by companies deploying new space-based communication technologies.

[Starlink satellites](#) imaged on 18 Nov 2019 from the Victor M. Blanco 4m Telescope at CTIO.
Image Credit: CTIO/NOIRLab/NSF/AURA/DELVE

Tens of thousands of satellites were already in orbit before the first Starlink launch in May 2019, but now nearly a hundred thousand are planned within a decade. While the satellites will affect much of astronomy, their impact on the Legacy Survey of Space and Time (LSST), to be carried out by the Vera C. Rubin Observatory, is a major concern.

Constellations of LEOsats are designed in part to provide communication services to underserved and remote areas. Recognizing the worthiness of that goal, astronomers have engaged satellite operators in a discussion about how to achieve that goal while avoiding undue harm to ground-based astronomical observations. The SATCON1 workshop is the latest, and most significant, step in this ongoing dialogue.

The report offers two main findings. First, LEOsats disproportionately affect science programs that require twilight observations. During twilight, the Sun is below the horizon for observers on the ground, but not for satellites hundreds of kilometers overhead, which remain illuminated. As long as satellites remain below 600 kilometers, their impact on astronomical observations is limited during the night's darkest hours. However, satellites at higher altitudes, such as the 1200-km-high constellation planned by OneWeb, may be visible all night long during summer and for much of the night in other seasons, with serious negative consequences for many ground-based research programs.

Second, there are multiple ways to mitigate harm to astronomy from large satellite constellations:

1. Launch fewer or no LEOsats. However impractical or unlikely, this is the only option identified that can achieve zero astronomical impact.
2. Deploy satellites at orbital altitudes no higher than ~600 km.
3. Darken satellites or use sunshades to shadow their reflective surfaces.
4. Control each satellite's orientation in space to reflect less sunlight to Earth.
5. Remove or mask satellite trails and their effects when processing astronomical images.
6. Make more accurate orbital information available for satellites so that observers can avoid pointing telescopes at them.

The full workshop report and individual reports from the four workshop working groups (Observations, Simulations, Mitigation, and Metrics) are available at the links below, as are additional resources. A follow-on workshop, SATCON2, which will tackle policy and regulation issues, is tentatively planned for early- to mid-2021.

Stay tuned for further details! If you are interested to get involved in future events or in the above topics on the impacts of satellite constellations, please contact Connie Walker (cwalker@noao.edu).

Links to additional resources:

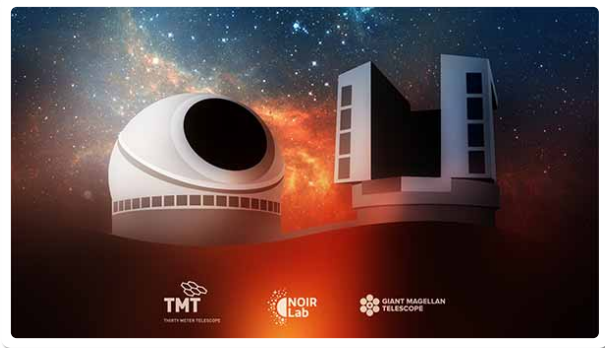
- [Report from SATCON1 workshop](#)
- [Reports from the four workshop Working Groups](#)
- [NOIRLab press release](#)
- [Press conference organized by NOIRLab and AAS](#), held on 25 August 2020
- [SATCON1 workshop website and presentations](#)

US ELT Program Update

Mark Dickinson (CSDC/NOIRLab)

[The US Extremely Large Telescope Program](#)

(US-ELTP) is a joint endeavor of [NSF's NOIRLab](#) and the organizations building the [Thirty Meter Telescope](#) (TMT) and the [Giant Magellan Telescope](#) (GMT). Its mission is to strengthen scientific leadership by the US community-at-large through access to extremely large telescopes (ELTs) in the northern and southern hemispheres with coverage of 100 percent of the night sky. The two-hemisphere system would provide the US science community with greater and more diverse research opportunities than could be achieved with a single telescope.



In late May 2020, the US-ELTP partners jointly submitted three Planning and Design proposals to the [National Science Foundation](#) (NSF). The partners have released [a statement regarding the submission of these proposals](#). The recommendation of the [National Academies' Decadal Survey of Astronomy and Astrophysics](#) (Astro2020), which is currently expected in the first half of 2021, and the readiness of the GMT and the TMT to enter NSF's major facilities review process, would be important next steps. NOIRLab, TMT, and GMT are working closely together to prepare the US ELT Program for external reviews associated with further engagement with federal agencies.

In July, in response to an earlier proposal, NSF issued an award to the [Association of Universities for Research in Astronomy](#) (AURA) and NOIRLab for development of the US ELT Program. The anticipated three-year award includes approximately \$5.6M to support the development of detailed requirements and planning documents for user support services that NOIRLab has proposed to provide for the US-ELTP. These services include a time allocation system for US open-access observers, proposal submission (Phase I) and observation implementation (Phase II) tools, adaptive queue scheduling systems for GMT and TMT, a US-ELTP data archive, support for data reduction pipelines, a US-ELTP data science platform, help desks, documentation, and training. NOIRLab will develop these services with particular emphasis on enabling research with TMT, GMT, and their data by a broad, diverse scientific community, including scientists and students at under-resourced undergraduate institutions. The NOIRLab US-ELTP effort will build on decades of experience supporting users of Gemini, CTIO, and KPNO.

The US-ELTP team at NOIRLab has started to collect use cases and to develop requirements for the proposed user support systems. In the coming months we will be reaching out to community astronomers for your input on these systems. Please stay tuned for further information on opportunities to contribute. We expect to present details at the [AAS meeting #237](#) in January, and through other channels.

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 us and our community. It provides updates—and solicits community input—on observing opportunities and programs and policies on a more rapid timescale than is possible with our *Newsletter*.

The NSF's NOIRLab is the US center for ground-based optical-infrared astronomy 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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