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Currents

In this Issue...

2020 Decadal Survey Community Input Invited, Deadline Extended: NOAO welcomes your input into our planning for the coming decade. Please visit our [Decadal Survey Planning website](#) to read submitted white papers and comments and/or to contribute your own white paper or science-based comment on areas in which NOAO can provide critical resources and/or areas that will strengthen the US ground-based OIR system in the coming decade. Input received by **20 November 2017** will be given full consideration in planning the agenda for the follow-on community workshop scheduled for **20-21 February 2018** in Tucson, AZ. [Read More...](#)

Legacy Surveys Issues 5th Data Release: The Legacy Surveys project is imaging nearly a third of the sky in three color filters in preparation for the Dark Energy Spectroscopic Instrument survey. The new observations extend the previous coverage in area, spectral coverage and depth. Data releases include catalogs, image data and an interactive image viewer. [Read More...](#)

Pre-registration Open – “Big Questions, Big Surveys, Big Data: Astronomy & Cosmology in the 2020s”: A community workshop, to be held **11-16 March 2018** in Snowbird, Utah, will examine the planning and resources needed to address major questions in survey-scale and data-intensive astronomy and cosmology in preparation for the 2020 Decadal Survey in Astronomy and Astrophysics. Pre-register now to help shape the agenda! [Read More...](#)

Registration Open – “Shedding Light on the Dark Universe with Extremely Large Telescopes”: This conference, to be held at the University of California Los Angeles, **2-6 April 2018**, is the second in a three-part conference series aimed at gathering input from the dark matter and dark energy communities to optimize the operations and instrumentation of future extremely large optical/infrared telescopes. Register early at a discounted rate until **30 November 2017**. [Read More...](#)

Save the Date – “Science and Evolution of Gemini Observatory”: The next Gemini community meeting will be held **22-26 July 2018** in San Francisco. Join the Gemini community in reviewing recent science highlights, identifying needs in the context of Gemini’s evolving capabilities, and developing strategies for the future. [Read More...](#)

NOAO in the News:

Cosmic Forge of Rare Heavy Elements Discovered

Telescopes pinpoint optical glow of a binary neutron star merger detected in gravitational waves

The precious elements in our Earth-bound bling are thought to have been forged in

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ancient fiery cataclysms, when pairs of neutron stars spiraled together and merged into black holes. The Blanco, SOAR, and SMARTS 1.3m telescopes at CTIO recently pinpointed and studied the light from such a merger. The first optical counterpart to a gravitational wave detection, the discovery confirms that merging neutron star binaries are indeed major cosmic production sites of rare heavy elements.

[View the Trailer Video](#) and read more in the [NOAO Press Release](#).



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2020 Decadal Survey Community Input Invited, Deadline Extended

In preparation for the 2020 Decadal Survey of Astronomy and Astrophysics, NOAO invites community input regarding scientific opportunities for the coming decade in areas in which NOAO can play a role in providing critical resources and/or areas that offer opportunities to strengthen the US ground-based OIR system.

Please visit our [Decadal Survey Planning website](#) to

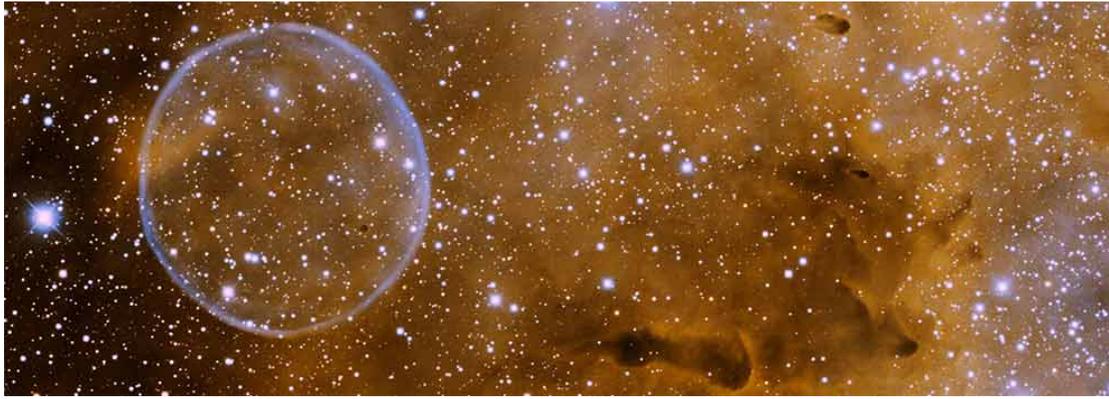
- Read submitted white papers
- Upload your white paper
- Join an ongoing discussion of proposed topics, or
- Initiate a topic of your own.

Current open topics include:

- Future of the Blanco and DECam after the DES survey
- Future of the KPNO Mayall after the DESI survey
- Role of KPNO facilities in the LSST era
- Precision cosmology with gravitational wave standard sirens
- Wide-field, highly-multiplexed spectroscopy in the LSST era
- Value of US national participation in Giant Segmented Mirror Telescopes
- Maximizing science from large datasets
- Maximizing information extraction from astronomical spectra
- Modern computational techniques for everyone

Input received by **20 November 2017** will be given full consideration in planning the agenda for the follow-on community workshop scheduled for **20-21 February 2018** in Tucson, where we will work toward an integrated development program that NOAO will present to the Decadal Survey committee.

An [updated "Dear Colleague" letter](#) describes the request for input in greater detail as well as our planning process.



Fifth Data Release for the Legacy Surveys

Stephanie Juneau and Arjun Dey (NOAO)

The Fifth Data Release (DR5) of the Legacy Surveys (LS) is now publicly available. As described in the [August 2017 issue of Currents](#), the LS will eventually image nearly one third of the entire sky in preparation for the Dark Energy Spectroscopic Instrument (DESI) survey. This release includes all g-, r- and z-band DECam data and new co-added WISE data within the equatorial portion (lying between declinations of -20 deg and +30 deg) of the DECaLS footprint (Figure 1). The new observations extend the previous coverage in area, spectral coverage and depth. In combination with the previous release (DR4), the Legacy Survey coverage now covers most of the high-Galactic-latitude extragalactic sky visible from the northern hemisphere, and includes over 863 million stars and galaxies.

The LS DR5 and DR4 releases include catalogs, image data and an [interactive image viewer](#) that enables exploration of the survey. DR5 also includes a picture gallery of galaxy groups (Figure 2), selected to include galaxies with angular diameters larger than 24 arcseconds with neighbors within a 2.5 arcminute distance. These beautiful images illustrate the variety of galaxy shapes and colors with sometimes extreme distortions caused by merging or interacting galaxies.

As with previous data releases, data products are available to the astronomical community and the public via the [LS team website](#), the NOAO Science Archive and FTP server, and [through the NOAO Data Lab](#). The Data Lab hosts databases to query DR4 & DR5 tables among a few various data access methods, and a full [list of acknowledgements](#). We encourage user feedback on the data products and welcome everyone to make use of the data. Happy discoveries!

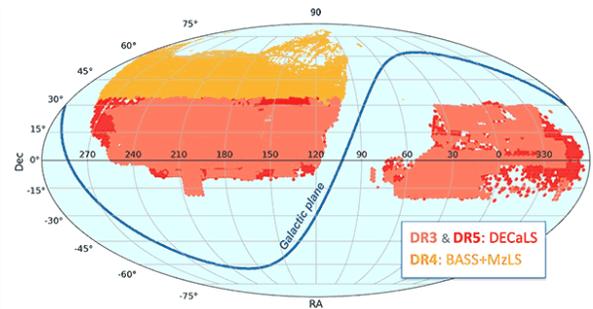


Figure 1. Sky coverage of the equatorial DECaLS footprint (DR5 in red, replacing DR3 in pink) and northern MzLS+BASS footprint DR4 (orange). There is some overlap around declinations of 30 to 34 degrees.

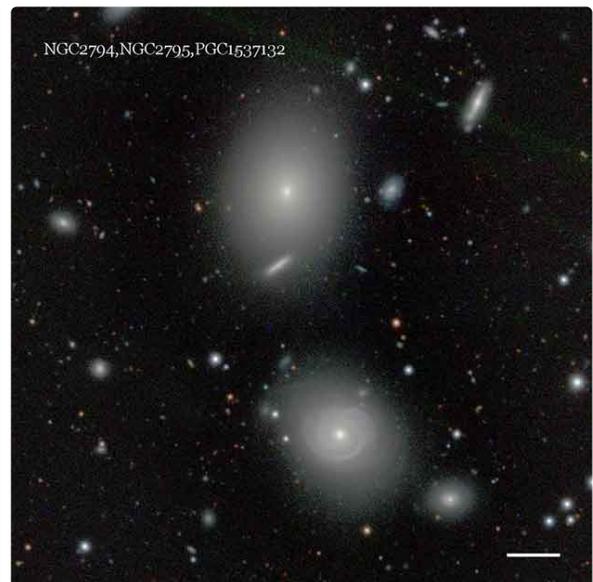


Figure 2. Some of the images from the DR5 picture gallery of galaxy groups. The [online gallery](#) links to the location of

each group on the Sky Viewer for interactive exploration. The horizontal white bar corresponds to 30 arcseconds on the sky. Hover your mouse over the image to pause the slideshow.

**Pre-registration open for SnowPAC 2018: “Big Questions, Big Surveys, Big Data: Astronomy and Cosmology in the 2020s”
Snowbird, Utah, 11-16 March 2018**

<http://www.physics.utah.edu/snowpac/>

Pre-register at: <http://www.physics.utah.edu/snowpac/registration.html>

The 2018 Snowbird Workshop on Particle Astrophysics, Astronomy, and Cosmology (SnowPAC), co-sponsored by NOAO and the University of Utah, will be held at Snowbird Ski Resort **11-16 March 2018**.

SnowPAC 2018 will be a participatory workshop focused on survey-scale and data-intensive priorities in astronomy and cosmology for the 2020s, with the goal of producing outlines and roadmaps of science-driven community whitepapers for submission to the upcoming Decadal Survey and [Particle Physics Project Prioritization Panel](#) (P5) processes.

Pre-registration is your opportunity to shape the agenda! For more information, and to sign up, please visit the above webpages.



Registration open: “Shedding Light on the Dark Universe with Extremely Large Telescopes”

University of California Los Angeles, 2-6 April 2018

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

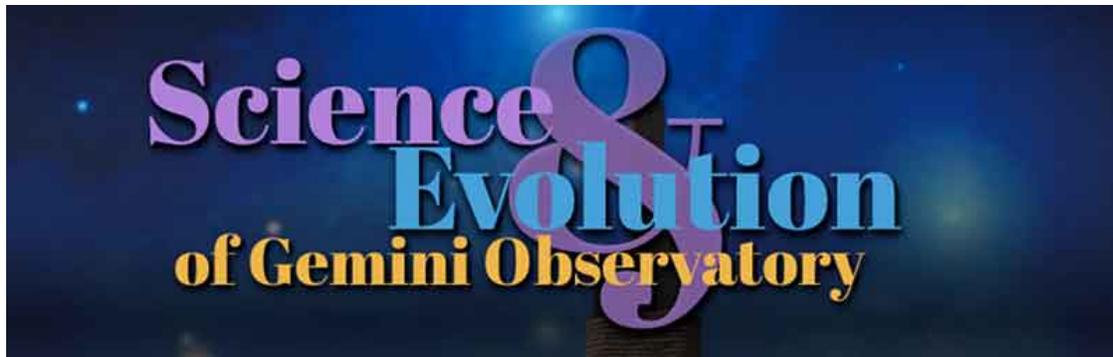
Early registration deadline: **30 November 2017**

Regular registration deadline: **2 February 2018**

This will be the second installment of a three-part conference series aimed at gathering input from the dark matter and dark energy theory, phenomenology, and observational communities to optimize the operations and instrumentation at future extremely large 30-m class optical infrared telescopes. The conference aims to address the following questions:

- What are the most promising observations that 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 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?

The first meeting of the series was held in Lanzhou China, and the third and final one will be held at ICTP Trieste Italy, 2-6 July 2018



"Science and Evolution of Gemini Observatory"
Fisherman's Wharf, San Francisco, 22-26 July 2018

<http://www.gemini.edu/seg2018>

This meeting invites the Gemini community to review recent science highlights, identify needs in the context of Gemini's evolving capabilities, and develop strategies for the future.

Please visit the conference webpage for news and updates on the scientific program and invited speakers as they develop. Registration will open on **4 January 2018**, and the deadline for abstract submission is **15 May 2018**. To receive updates, please subscribe at: http://www.gemini.edu/seg2018#seg2018_signup.

2020 Decadal Survey Community Input Invited

Dear Colleague,

In preparation for the 2020 Decadal Survey of Astronomy and Astrophysics, NOAO invites community input regarding scientific opportunities for the coming decade in areas in which

NOAO can play a role in providing critical resources and/or areas that offer opportunities to strengthen the US ground-based OIR system.

We welcome a broad range of science ideas that motivate the need for resources such as:

- *Large science programs that use existing facilities at KPNO, CTIO, Gemini Observatory, and LSST*
- *Community access to observing time on non-NOAO facilities*
- *Community access to archival datasets not currently in the public domain*
- *Resources for the exploration and analysis of large datasets and the time domain*
- *New investigations and instrumentation at the mid-scale level (\$2M-\$100M)*
- *New observing facilities*
- *Other*

The scientific opportunities may build on the science and resources described in the recent studies “[Optimizing the US Ground-based OIR Astronomy System](#)” (the Elmegreen report) and the report from the Kavli Futures Symposium “[Maximizing Science in the Era of LSST: A Community-based Study of Needed OIR Capabilities](#)”, but they are by no means restricted to these. Concepts may include NOAO as a major or minor partner with universities and/or other federal agencies. To stimulate the flow of ideas, example items from the 2010 Decadal Survey and the above recent reports are listed below this letter.

To participate in this planning process, please visit our [Decadal Survey Planning website](#) where you can:

Submit a brief white paper. Upload a brief description (not more than 3 pages) in pdf format of your science concept and resource needs. Include a brief description of how your concept fits in with the [NOAO mission](#) and the [NOAO Strategic Plan](#).

Contribute to the development of community-based white papers. Suggest a white paper topic and/or contribute to topics suggested by others.

Input received by **20 November 2017** will be given full consideration in planning the agenda for the follow-on community workshop scheduled for **20-21 February 2018** in Tucson, where we will work toward an integrated development program that NOAO will present to the Decadal Survey committee. Please contact me (najita@noao.edu) with questions or suggestions. We look forward to hearing from you!

Sincerely,

Joan Najita

NOAO Chief Scientist



Examples from the Astro2010 Report

- Advanced technologies and instrumentation development
- Data archiving programs
- Highly multiplexed spectroscopy for a big baryon oscillation spectroscopic survey
- Large Synoptic Survey Telescope
- New instrumentation for exoplanet initiatives
- Next generation adaptive optics systems
- Open observing time on existing facilities
- Participation in a Giant Segmented Mirror Telescope (GSMT)
- Telescope System Instrument Program

Examples from “Maximizing Science in the Era of LSST”

- Highly multiplexed, 8-m wide-field optical multi-object spectroscopic capability
- Broad wavelength coverage, moderate-resolution ($R = 2000$ or larger) OIR spectrograph on Gemini South
- Development and early deployment of an alert broker, scalable to LSST
- Support into the LSST era for existing high-priority capabilities (wide-field imaging, multi-color imaging, spectroscopy, AO-fed diffraction limited imaging)
- OIR system infrastructure developments that enable efficient follow-up programs^{[1][2]}
- Data exploration and analysis tools that work at the scale of LSST
- Training for scientists at all career levels in LSST-related analysis techniques and computing technologies

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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