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Currents

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DESI Legacy Surveys Issues 6th Data Release: A collection of three imaging surveys that is jointly mapping 14,000 square degrees of the northern sky, the Legacy Surveys have now issued their sixth data release. The release covers ~ 4000 square degrees and includes images and catalogs in optical (r-, g-, and z-) bands as well as mid-infrared photometry, all [available online](#). Dive into survey images and explore the Universe with the survey's [Sky Viewer](#). [Read more...](#)

Presentations Posted – NOAO Community Needs for Science in the 2020s: Our 2020 Decadal Survey community planning workshop, held in February 2018 in Tucson, was an opportunity for the NOAO community to share their visions of science in the coming decade and the resources needed to accomplish that science. Presentations from the workshop – which include high-level science overviews, reviews of current implantation plans and possibilities, and breakout sessions on needed capabilities – are now available online. [Read more...](#)

Registration Open – “DECam Community Science Workshop 2018”: Current, past, and prospective users of DECam and its archival data are invited to share their science results and help identify and develop future DECam projects. Input received at the **21-22 May 2018** workshop will help NOAO optimize instrument and telescope operations. Please register by **20 April 2018**. [Read more...](#)

La Serena School for Data Science – Applied Tools for Data-driven Sciences: Designed to help students meet the challenge of increasingly large and complex astronomical data, this year's school, to be held **20-29 August 2018**, will feature lectures and team-based projects that make use of real-world data and examples. The application deadline is **30 April 2018**. [Read more...](#)

Call for Membership in the Maunakea Spectroscopic Explorer Science Team: A proposed 11.25-m wide field telescope designed for highly multiplexed spectroscopy (more than 4000 optical and near-infrared spectra per pointing), the Maunakea Spectroscopic Explorer invites US-based scientists to join their Science Team and participate in the next phase of science and survey development. [Read more...](#)

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Registration Open – “Shedding Light on the Dark Universe with Extremely Large Telescopes”: This conference, to be held at the International Center for Theoretical Physics (ICTP), **2-6 July 2018**, is the last of 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. The registration deadline is **30 April 2018**. [Read more...](#)

Registration Open – 2018 GMT Community Science Meeting: “Stars: Birth and Death”: The Sixth Annual GMT Community Science Meeting, to be held in Honolulu, Hawaii on **13-15 September 2018**, brings together experts in the fields of star formation and stellar disruptions, eruptions and explosions. The meeting will focus on key open questions that can be solved in the upcoming era of extremely large telescopes. The registration deadline is **6 August 2018**. [Read more...](#)

Sixth Data Release of the DESI Legacy Surveys: More Stars & Galaxies, More Science Opportunities

Stephanie Juneau, Arjun Dey, John Moustakas, on behalf of the Legacy Survey Teams & the NOAO Data Lab

The DESI [Legacy Surveys](#) are a collection of three imaging surveys jointly mapping approximately 14,000 square degrees of the extragalactic sky visible from the northern hemisphere. The Legacy Surveys have just published their sixth data release (DR6) which covers ~4000 square degrees, primarily north of declination +32 degrees.

The [Legacy Surveys DR6](#) release includes images and catalogs based on z-band data from the Mayall z-band Legacy Survey (MzLS; PI Arjun Dey), r- and g-band data from the Beijing-Arizona Sky Survey (BASS; PIs Xu Zhou and Xiaohui Fan), and mid-infrared photometry from the Wide-Field Infrared Survey Explorer (WISE)

satellite for all optically detected sources. The WISE photometry is measured on new coadded images from the WISE mission and its subsequent reactivation as NEOWISE. DR6 includes astrometry, photometry and shape parameters for approximately 310 million sources. Combined with DR5, the Legacy Surveys catalogs contain information on roughly 990 million astronomical objects.

The primary motivation behind the Legacy Surveys is to providing targeting data for the Dark Energy Spectroscopy Instrument (DESI) surveys. DESI, which is currently being installed at the Mayall 4m telescope at Kitt Peak, will probe the largest volume of the universe to date by compiling distances to 30



Figure 1: [A selection of image cutouts from the DR5 and DR6 Legacy Surveys](#) data illustrating the variety of astronomical objects covered by the surveys and highlighting the capability of the surveys to image low surface brightness features. The horizontal white bar in the lower-right corner of each image corresponds to one arcminute.

million galaxies and quasars, reaching further out than previous work, and providing us with a new 3-D map of the universe. Comparing the observed structures to predictions from cosmological models will tell us about the nature of dark energy, the distribution of dark matter, and the backbone structure of the matter distribution in the universe onto which the galaxies are painted.

The ~ 4000 sq deg footprint covered by the latest DR6 release complements the $\sim 10,000$ sq. deg. footprint covered by the [DR5](#) release. The DR5 and DR6 releases overlap in a strip in the north Galactic cap near declination +32 and in some scattered equatorial fields.

In addition to a broader footprint and improved depth, the substantially increased overlap with the SDSS/BOSS spectroscopic survey creates exciting opportunities to conduct a variety of astrophysical studies (e.g., galaxy evolution, searching for high-redshift quasars, probing stellar populations, or the discovery of moving objects). The astronomical community is invited to conduct science projects and get in touch with the [LS team](#) and/or [NOAO Data Lab team](#) as needed.

As in previous data releases, DR6 includes images, photometric catalogs, as well as an Image Gallery compiled by LS team member John Moustakas. The [DR6 Gallery](#) includes different categories of astronomical objects such as globular clusters, spiral disk galaxies, lenticular or elliptical galaxies (see Figures 1 & 2). Many more beautiful examples can be discovered by exploring interactively in the [online sky viewer](#).

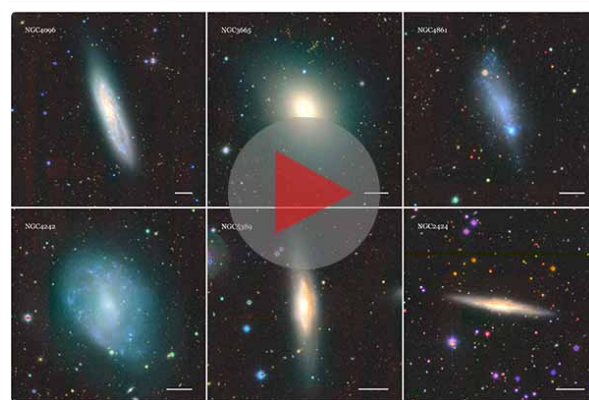


Figure 2: [A movie of selected galaxy image cutouts](#) (5.9 MB .mov) from the DR5 and DR6 Legacy Surveys data. The horizontal white bar in the lower-right corner of each image corresponds to one arcminute.

We encourage usage of the data from the Legacy Surveys. The DR6 data products are available through: [1] direct access through the [Legacy Survey Team website](#); [2] the [NOAO Science Archive](#); and [3] the [NOAO Data Lab](#). The NOAO Science Archive provides access to both the DR6 raw, and processed images. The [NOAO Data Lab](#) provides tools to [access databases](#) containing the catalogs. The Data Lab tools enable complex user queries and analyses of the data using a Jupyter Notebook server, a Simple Image Access (SIA) service and a TAP handle (which allows, for example, users to connect to the databases via commonly used tools such as TOPCAT). Example Jupyter Notebooks are also provided to users. We also note opportunities for combined analyses using other datasets accessible through the Data Lab such as the first data release from the [Dark Energy Survey \(DES\)](#), and the NOAO Source Catalog (NSC).

The next data release of the Legacy Surveys is planned for July 2018, and will include all DECam data obtained by the survey through March 2018.



Presentations from NOAO's 2020 Decadal Survey Community Planning Workshop "NOAO Community Needs for Science in the 2020s" Available Online

Our 2020 Decadal Survey community planning workshop, held 20-21 February 2018 in Tucson, was designed with multiple goals in mind: as an opportunity for the NOAO community to share their visions of science in the coming decade and the resources needed to accomplish that science; an opportunity for the community to make recommendations to NOAO regarding their priorities; as well as a way to facilitate community-led input to the Decadal Survey.

The workshop featured high-level science overview presentations:

- Science with LSST (Keith Bechtol, LSST)
- JWST Science in the 2020s (Jen Lotz, STScI)
- Exoplanet Science in the 2020s (Courtney Dressing, UCB)
- High Angular Resolution Universe (Gail Schaefer, CHARA)
- Era of Bright (Star) Astronomy (Jim Fuller, Caltech)
- Galaxy Evolution and Stellar Pops (David Nidever, MSU/NOAO)
- Time Domain and Near-field Cosmology in 2020s (David Sand, UA)
- SDSS-V: Pioneering Panoptic Spectroscopy (Juna Kollmeier, Carnegie)
- Science with GSMTs (Megan Donahue, MSU)
- Maximizing Science Return from Large Surveys (Chad Schafer, CMU)
- Solar System Science in the Next Decade (Henry Hsieh, PSI)

Reviews of current implementation plans and possibilities:

- Gemini Observatory plans (Bryan Miller, Gemini)
- KPNO/CTIO + Time Domain Follow up (Lori Allen, NOAO)
- NOAO Data Group (Adam Bolton, NOAO)
- Wide-aperture Exoplanet Telescope (Ben Monreal, Case Western)
- Wide-field Spectroscopy Concepts (Jeff Newman, U. Pitt)
- GSMTs (Mark Dickinson, NOAO)

as well as breakout sessions on science themes and needed capabilities:

- Bright Universe
- Faint Universe
- Science with Large Samples
- Time Domain Science
- GSMTs
- Wide-field Spectroscopy
- High Angular Resolution Science

If you were unable to join us or would like to relive the experience, please visit our meeting website, where the presentations and summaries from the meeting [have been archived](#).



Registration open for "DECAM Community Science Workshop 2018: Science Highlights, Coming Opportunities, LSST Synergies"

Tucson, Arizona, 21-22 May 2018

<https://www.noao.edu/meetings/decam2018/>

Calling all past and prospective users of DECAM and its archival data!

The Dark Energy Camera (DECAM), in operation on the Blanco telescope at CTIO for just over 5 years, has been remarkably successful in carrying out the Dark Energy Survey (DES) as well as a multitude of community science projects, some of which are extensive surveys in their own right.

Science highlights from DECAM include a state-of-the-art map of the dark matter density of the local universe, study of optical counterparts to gravitational waves events, discovery of multiple satellite galaxies around the Milky Way and other galaxies, constraints on the size distribution of near earth objects, and evidence for the existence of a Planet Nine.

As it is now three years since the previous DECAM community science workshop, and DES will soon be completed, the time is ripe to highlight DECAM science results and discuss and plan future DECAM observing programs. We anticipate offering DECAM on the Blanco well into the era of LSST operations.

The aim of this workshop is to bring together past and future users of DECAM and its archival data to identify possible future projects and to foster collaborations. Input received at the workshop will help NOAO optimize instrument and telescope operations.

The meeting will showcase and discuss:

- Science applications of major DECAM data sets – DES, DECaLS, SMASH etc.
- The breadth of DECAM science, from NEOs to $z = 7$ galaxies
- Near-future projects subsequent to DES and DECaLS
- Synergy with LSST, including parallel observations, follow-ups, and more
- Creative uses of DECAM, including remote observing, targets of opportunity, new filters, and non-sidereal observations.

[Please register](#) by **20 April 2018**. Posters are welcome, however we already have a full schedule of talks

LA SERENA SCHOOL FOR DATA SCIENCE

Applied Tools for Data-driven Sciences

La Serena School for Data Science: Applied Tools for Data-driven Sciences

20-29 August 2018, La Serena, Chile

http://www.aura-o.aura-astronomy.org/winter_school/

Application deadline: **30 April 2018**

With the volume and complexity of astronomical data continuing to grow as the current generation of surveys come online (PanSTARRS, Dark Energy Survey, VISTA, LSST), astronomers increasingly need to work with giga-, tera- and even petabytes of data in real time, which poses the challenge of developing and using new tools for data discovery, access, and analysis.

This year's La Serena School for Data Science: Applied Tools for Data-driven Sciences will comprise an intensive week of interdisciplinary lectures focused on applied tools for handling big astronomical data. Participants will be instructed in how astronomical data are processed, accessed and analyzed, including reduction pipelines, databases, and scientific programming. The School will be taught by an international and interdisciplinary group of professors using real-world data and examples. Participants will work on team-based projects and be provided training and access to the National Laboratory for High Performance Computing located at the University of Chile's Center for Mathematical Modeling.

Applications are now being accepted. The program is designed for advanced undergraduate and early graduate students in Astronomy, Physics, Statistics, Math, Computer Science, Biology and related fields. Students currently in US and Chilean institutions are eligible for full or partial scholarships.

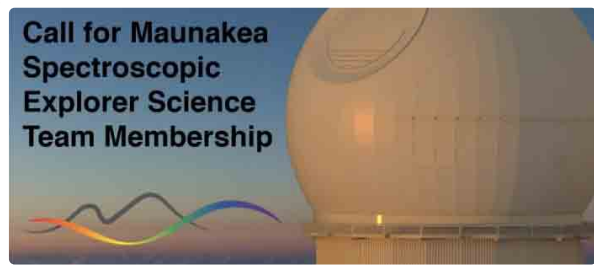
For more information, please [visit our website](#).

Call for Membership in the Maunakea Spectroscopic Explorer Science Team: the MSE Design Reference Survey

Adam Bolton (NOAO)

The Maunakea Spectroscopic Explorer (MSE) is a proposed 11.25m wide field (1.5 square degree) telescope equipped with a suite of dedicated multi-object spectrographs that will obtain more than 4000 optical and near-infrared astronomical spectra per pointing. US-based scientists wishing to join the MSE Science Team to participate in the next phase of its science and survey development should email Adam Bolton at bolton@noao.edu (Subject line: MSE Science Team Membership).

**Call for Maunakea
Spectroscopic
Explorer Science
Team Membership**



Following a busy and successful 2017, which saw 10 different subsystem conceptual design reviews and culminated in a successful Systems Level Review in January 2018, MSE is wrapping up the Conceptual Design Phase and is preparing to move into the Preliminary Design Phase.

A major science development phase will get underway in April/May 2018, one that will be spearheaded by the international science team. Specifically, they will develop the first phase of the MSE Design Reference Survey (DRS). The DRS is planned as a 2-year observing campaign that will demonstrate the science impact of MSE in a broad range of science areas and will provide an excellent dataset for community science. It will describe and simulate an executable survey plan that addresses the key science described in the Detailed Science Case. The DRS will naturally undergo several iterations between now and first light of MSE: this first phase (nicknamed DRS1) will set the foundation for its future development.

DRS1 will be supported by the MSE Project Office and will use various simulation tools, including Integration Time Calculators, fiber-assigning software, and a telescope scheduler. It is anticipated that the DRS will become the first observing program on MSE come first light of the facility, and it will be used by the Project Office going forward to understand the consequences for science for all decisions relating to the engineering and operational development of MSE.

Further information about the development of the DRS and how to participate will be circulated to the members of the MSE Science Team in April/May 2018.

More about MSE: <http://mse.cfht.hawaii.edu>

Detailed Science Case: <http://mse.cfht.hawaii.edu/docs/> or <https://arxiv.org/abs/1606.00043>

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

ICTP, Trieste, Italy, 2-6 July 2018

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

<http://indico.ictp.it/event/8320/>

Registration deadline: **30 April 2018**

Registration is now open for the third installment of this conference series, to be held at the International Center for Theoretical Physics (ICTP) in Trieste, Italy. These workshops are an opportunity to gather 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?

Please register by 30 April 2018; there is no registration fee. The first two meetings in this series were held in Lanzhou China (September 2017) and at UCLA (April 2018).

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The 2018 GMT Community Science Meeting: "Stars: Birth and Death"

13-15 September 2018, Waikiki, Hawai'i

<http://www.gmtconference.org>

Registration deadline: **6 August 2018**

The Sixth Annual GMT Community Science Meeting will be held at the Hilton Hawaiian Village Waikiki in Hawai'i on 13-15 September 2018. These annual conferences bring people together across the community to hear about the most exciting current research and to think about the next big questions in the field. This year's topic is Stars: Birth and Death.



While stars spend most of their lives as stable, fusion-powered objects, stellar birth and death involve some of the most dramatic and diverse physical processes known to astrophysicists. Stellar beginnings are shrouded in dust and difficult to observe, and the next generation of large telescopes will offer transformative opportunities to understand this first chapter of the star formation story. Stellar death is often explosive, and a burgeoning swell of data on transient objects offers great opportunities for advancing our understanding of the last chapter of the stellar story. This conference brings together experts in the fields of star formation and stellar disruptions, eruptions and explosions. We will focus on key open questions that can be solved in the upcoming era of extremely large telescopes.

An introduction and current status of the GMT will be presented to kick off the meeting.

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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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