LSST:UK Newsletter 43

April 2024

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Introduction

Bob Mann

Major construction milestones are now coming thick and fast. On 3 April, SLAC announced the completion of the camera construction project, along with the release of a slick video explaining the science that the camera will enable. As noted in the video, this marks the culmination of two decades of work by a camera team (some shown, right) comprising scientists and engineers from SLAC and other DOE labs, plus international collaborators, notably from IN2P3 in France and Ian Shipsey's group in Oxford.

Credit: Jacqueline Ramseyer Orrell/SLAC National Accelerator Laboratory

Meanwhile, back on the summit, the glass blank for the 8.4-metre primary/tertiary mirror (M1M3) was lifted into its cell. The mirror cell was then moved under the coating chamber to verify the configuration to be used in the coating and, as a final preparation for the coating, the blue protective layer (visible in the photo at the top of the following page) has been removed.
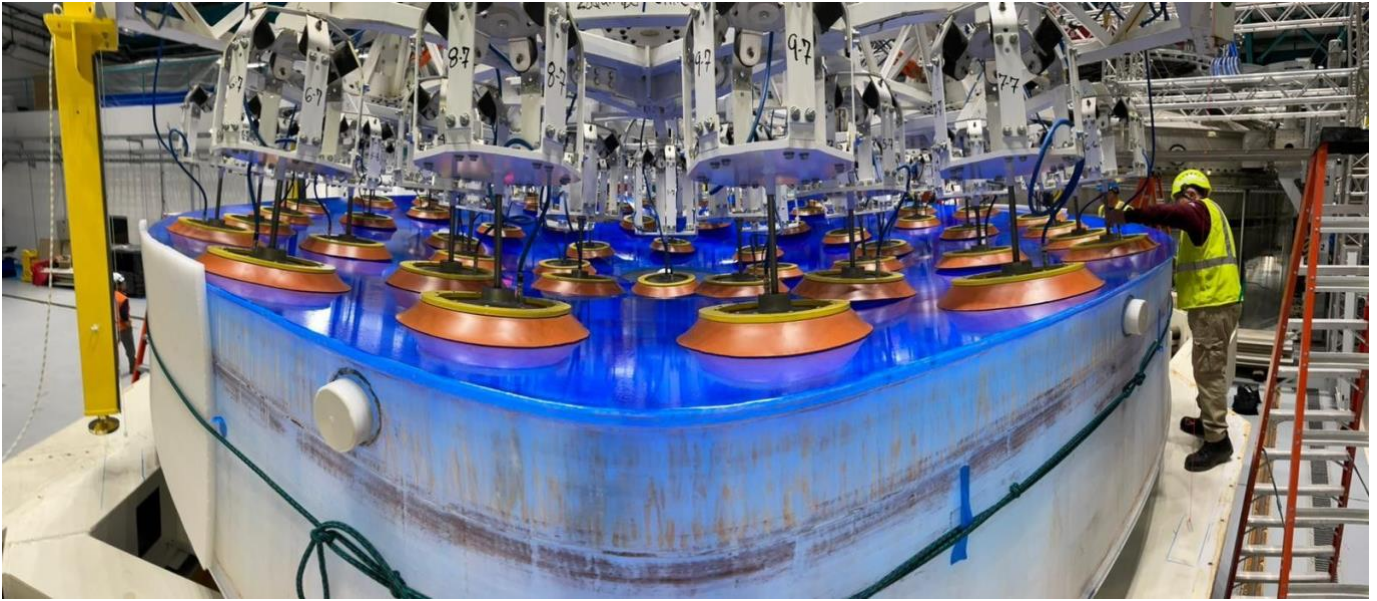
This month has also seen an operations rehearsal, in which two data streams – one real, from AuxTel, and one simulated, but passed through the ComCam data acquisition system – were transferred from the summit to the US Data Facility in California over the course of three 24-hour cycles. At the USDF, the LSST pipelines were run over the data files, generating the full set of LSST data projects, including alerts from the difference imaging pipeline. These operations were monitored throughout by various Rubin teams, to exercise a number of near-real-time data quality assessment and anomaly detection tools. Further rehearsals are due over the next few months, as the observatory prepares for the first on-sky images.

As noted in the February Newsletter, the Rubin Community Science Team will be running the 2024 Rubin Data Academy on 17, 18, 20 and 21 June. This event is open to all Rubin data rights holders who have registered to be Data Preview 0 (DP0) Delegates (see here for how to do that) and will present an introduction to the DP0.2 and DP0.3 datasets and how to analyse their data products using the Rubin Science Platform (RSP). Sessions will be delivered twice per day to suit attendees in different timezones, with those starting at 16.00 BST likely to be the best for us in the UK. Registration for the Rubin Data Academy remains open, but will close on 16 June.

LSST:UK Project Scientist Recruitment

Mike Watson

The LSST:UK Consortium is recruiting a Project Scientist. The successful candidate will replace Stephen Smartt who has decided to step down after almost seven years of service to accept a prestigious Royal Society Research Professorship. This position is funded at a level of 0.2 FTE and is available from July 2024, with an initial appointment running to 31 March 2027.

Further details and instructions for those interested in applying can be found at LSST:UK Project Scientist Recruitment (2024). The deadline for applications is 7 June 2024.

New paper: The morphological mix of dwarf galaxies in the nearby Universe

[Sugata Kaviraj](#)

MNRAS has recently published an article by Ilin Lazar and collaborators (including [Sugata Kaviraj](#) and [aaron.watkins](#)) describing the morphological diversity of nearby dwarf galaxies.

The paper, [*The morphological mix of dwarf galaxies in the nearby Universe*](#), performs a novel, unbiased statistical study of dwarf morphology at z < 0.08. It offers both an unprecedented view of dwarfs using the deep Hyper Suprime-Cam surveys (the precursor to LSST) and a demonstration of the type of science that will be possible in the forthcoming LSST era.

Typical dwarfs are too faint to be visible, outside the local neighbourhood, in past surveys like the SDSS. Unbiased studies of dwarfs require surveys that are both deep and wide. Lazar et al. use a complete, unbiased sample of 257 dwarf ($10^8 \, M_\odot$ < $M_\star$ < $10^{9.5} \, M_\odot$) galaxies at z < 0.08 in the COSMOS field, where deep ultraviolet to mid-infrared imaging is available, to study the morphological mix of dwarfs in low-density environments.

The study uses visual inspection of extremely deep optical images from the Hyper Suprime-Cam and their unsharp-masked counterparts to reveal three principal dwarf morphological classes (as shown in the figure). 43 and 45 per cent of dwarfs exhibit the traditional 'early-type' (elliptical/S0) and 'late-type' (spiral) morphologies respectively.

However, 10 per cent populate a 'featureless' class, that lacks both the central light concentration seen in early-types and any spiral structure - this class is missing in the massive-galaxy regime.

14, 27 and 19 per cent of early-type, late-type, and featureless dwarfs respectively show evidence for interactions, which drive around 20 per cent of the overall star formation activity in the dwarf population.

Lazar et al. find that, compared to their massive counterparts, dwarf early-types show a much lower incidence of interactions, are significantly less concentrated and share similar rest-frame colours as dwarf late-types. This suggests that the formation histories of dwarf and massive early-types are different, with dwarf early-types being shaped less by interactions and more by secular processes. The lack of large groups or clusters in COSMOS at z < 0.08, and the fact that the dwarf morphological classes show similar local density, suggests that featureless dwarfs in low-density environments are created via internal baryonic feedback, rather than by environmental processes.

Finally, the study finds that, while interacting dwarfs can be identified using the asymmetry parameter, it is challenging to cleanly separate early and late-type dwarfs using traditional morphological parameters, such as 'CAS', M20, and the Gini coefficient (unlike in the massive-galaxy regime). >>>>

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Examples of the three principal morphological classes found by Lazar et al. in nearby (z < 0.08) dwarf galaxies. The top two rows show examples of early-type galaxies, the middle two rows show examples of late-type galaxies and the bottom row shows examples of dwarf galaxies classified as featureless. For each galaxy, the left-hand panel shows a gri colour-composite image constructed using Hyper Suprime-Cam images, while the right-hand panel shows its unsharp-masked counterpart.

[Read the open access paper](#): *[The morphological mix of dwarf galaxies in the nearby Universe](#)*
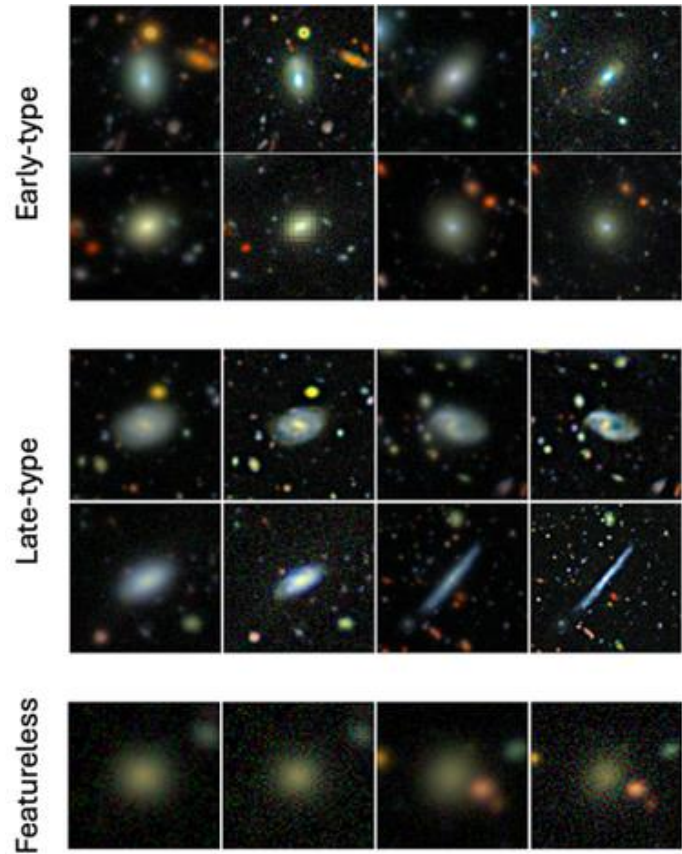
LSST:UK at NAM2024: abstract submission open

[Bob Mann](#) and [Stephen Smartt](#)

[Abstract submission](#) is now open for [NAM2024](#) (and will close on **3 June**). The conference will be taking place this year in Hull in the week of 14-19 July; we have a pair of two-hour sessions on the Monday (09.00-11.00 and (15.00-17.00). As in recent years, we intend these to include a mixture of updates for the wider UK astronomical community and contributed talks covering both the UK's in-kind contributions and preparatory work underway in the Science Collaborations and elsewhere. As this will be the last NAM before on-sky observing begins, the focus will be on preparations for early science with Rubin LSST data. We particularly welcome abstract submissions from early career researchers and will endeavour to select a diverse range of speakers.

> Please feel free to contact [Bob Mann](#) and [Stephen Smartt](#) if you have any questions about these sessions.

The LSST:UK Pool Travel Fund

[George Beckett](#)

For meetings that are likely to be particularly popular, we may choose to issue a specific call for applications to help ensure we can review and prioritise the range of cases fairly. Typically this is done for larger events such as the Rubin Community Workshop or the LSST@Europe meetings. Any such calls are publicised via the [LUSC-ANNOUNCE mailing list](#) and posted on the [Relevant Meetings](#) page. >>>>

Funding is awarded at 80% FEC as is the norm for UKRI grants: the remaining 20% of the cost would usually be contributed by the applicant's institution. If in doubt, we recommend you speak to your local finance team to confirm this.

New in Phase C is the opportunity to request funding for hosting meetings. Up to 25% of the Pool Travel Fund has been earmarked by the LSST:UK to support Rubin-focused meetings held in the UK. As for travel applications, more details are available on the [wiki page noted above](#).

> If you have any questions about the Pool Travel Fund, please [contact the project management team](#).

Meeting report: Rubin ToO 2024

[Graham Smith](#)

The observing strategy implemented by the Vera C. Rubin Observatory's (Rubin's) Legacy Survey of Space and Time (LSST) will be the outcome of a significant multi-year community consultation exercise. UK astronomers continue to play key roles in this process through participation in the Survey Cadence Optimization Committee (SCOC), prominent roles in Rubin/LSST Science Collaborations, and representation on the Scientific Advisory Committee (SAC). With first light approaching, and the cadence of routine LSST survey observations now largely settled, attention recently returned to the 3% of observing time that the SCOC have recommended to Rubin leadership to spend on target of opportunity (ToO) observations.

From 18-20 March 2024, over 100 colleagues from around the world joined *Rubin ToO 2024: Envisioning the Vera C. Rubin Observatory LSST Target of Opportunity program,* a workshop hosted at the University of California Berkeley to build the community consensus on the content of the Rubin/LSST ToO program.

The team worked round the clock for three days, benefitting from asynchronous working across multiple time-zones in this hybrid meeting. Collaborating in thematically organised groups, workshop participants developed a consensus position on the design of ToO observations for follow-up of gravitational wave sources including candidate gravitationally lensed gravitational waves, high energy neutrino sources, Galactic supernovae, and potentially hazardous asteroids.

The community consensus was documented in a 60-page report that has been submitted to the SCOC, and will be made publicly available. Further community-wide discussion of the ToO program will take place at the Rubin Community Workshop 2024 (22-26 July; SLAC), and feedback from the SCOC is anticipated late-summer this year. In the meantime, further information is available from within the respective Rubin/LSST Science Collaborations, and from [Graham Smith](#) (Member, Rubin ToO 2024 Scientific Organising Committee).

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New paper: Enabling Science from the Rubin Alert Stream with Lasair

[Roy Williams](#)

A new paper by [Roy Williams](#) and collaborators published on arXiv sheds light on [Lasair](#), the UK community broker for transient alerts from LSST.

[Enabling Science from the Rubin Alert Stream with Lasair](#) explains the system's capabilities, how users can achieve their scientific goals, and how Lasair is implemented. As a mature system, Lasair has been processing and serving data from the similarly formatted stream of the Zwicky Transient Facility (ZTF) alerts.

Pronounced *L-AH-s-uh-r,* Lasair means *flame* or *flash* in Scots and Irish Gaelic.

Read the open access paper: [Enabling Science from the Rubin Alert Stream with Lasair](#)

Greater insights into stellar streams – latest Rubin science release

[Eleanor O'Kane](#)

The latest science release from Rubin explains how the observatory's camera will use six different colour filters to detect stellar streams that are around five times more distant than is currently possible.

The article explains how these glittering streams of stars often show telltale signs of disturbance which scientists suspect may be caused by dark matter. The Rubin's camera will allow these slender trails to be studied in more detail than ever before to uncover their back story. Observing stellar streams allows scientists to probe a different aspect of dark matter because they bear the impact of dark matter's gravitational effects at small scales.
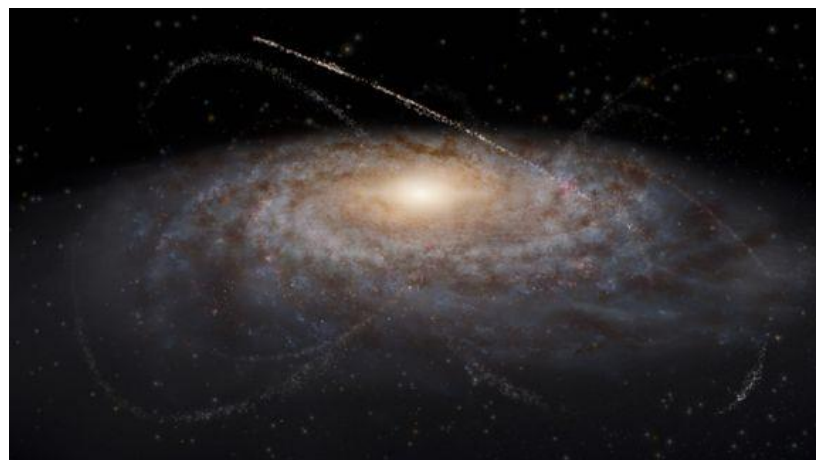
RubinObs/NOIRLab/NSF/AURA/J. daSilva, M. Zamani

The artist's impression, above, shows a myriad of stellar streams in and around the Milky Way. These stretched-out remnants of dwarf galaxies and star clusters showcase gravitational interactions between stars, clumps of dark matter, and the entire galaxy.

Read the article: [Dark matter's ghostly disruptions of stellar streams revealed – latest Rubin science release](#)

Leadership positions held by LSST:UK members

[Terry Sloan](#)

Here is the latest list of significant leadership positions held by members of the LSST:UK consortium in the project and international Science Collaborations. If you are aware of any corrections or additions please contact the LSST:UK Project Managers ([George Beckett](#) and [Terry Sloan](#): lusc_pm@mlist.is.ed.ac.uk).

David Alonso	Co-convenor of the DESC External Synergies Working Group; CMB-S4 DESC Liaison; Simons Observatory DESC Liaison; UK representative on DESC Operations Committee; Core Cosmology Library (CCL) Team lead.
David Bacon	Member of DESC Speakers Bureau
Manda Banerji	Member of the Rubin-Euclid DDP Working Group; Galaxies SC member of the Rubin International In-Kind Contribution Evaluation Committee (CEC).
George Beckett	Member of the LSST DESC High-performance computing resources committee; UK representative on Rubin Data Production Leadership Committee.
Rebecca. Bowler	Co-chair of the SED fitting and Photometric Redshifts Working Group in the LSST Galaxies Science Collaboration.
Erminia Calabrese	DESC Advisory Board
Thomas Collett	Member of the Rubin-Euclid DDP Working Group
Victor Debattista	Co-lead of the Galactic Bulge WG in the LSST Stars, Milky Way and Local Volume Science Collaboration
Tassia Ferreira	Member of DESC Collaboration Council; Member of the DESC Equality, Diversity and Inclusion Committee
Chris Frohmaier	4MOST Extra-Galactic Deputy Project Scientist
Carlos Garcia-Garcia	Co-convenor of the Weak Lensing and Large Scale Structure Working Group
Qianjun Hang	co-lead of the DESC RAIL Topical Team
Joachim Harnois-Déraps	DESC Higher Order Statistics (HOS) topical team co-lead

Peter Hatfield	Co-chair of the Galaxy Environment Working Group in the LSST Galaxies Science Collaboration
Jenny Hiscock	Member of DESC International Resources Committee
Sebastian. Hoenig	Co-Chair of the Variability group in the AGN Science Collaboration; In-kind contribution coordinator for the AGN Science Collaboration; AGN SC alternate member of the International In-Kind Contribution Evaluation Committee.
Sugata Kaviraj	Co-chair of the LSST Galaxies Science Collaboration; Co-chair of the Low Surface Brightness Coordination Group.
Ofer Lahav	Member of DESC Publication Board
Boris Leistedt	Co-convenor of the Weak Lensing and Large Scale Structure (LSS) Working Group
D. Leonard	Co-lead of the DESC Modelling and Combined Probes Analysis Working Group
Chris Lintott	Leads the LSST EPO development of Zooniverse as a citizen science platform
James Mullaney	Chair of the Active Galactic Nuclei WG in the LSST Galaxies Science Collaboration
Cyrielle Opitom	Co-lead Active objects WG in the LSST Solar System Science Collaboration
Subir Sarkar	Lead of DESC Project 52 -- Testing the isotropy of the universe
Meg Schwamb	Co-chair of Solar System Science Collaboration
Stephen Smartt	member of the Survey Cadence and Optimisation Committee; DESC Rubin Observatory Project and Facility Operations liaison for Survey Cadence and Optimisation Committee.
Graham Smith	Co-chair of the Strong Gravitational Lensing Science Collaboration (SLSC); Commissioning Liaison for the SLSC.
Sreevarsha Sreejith	Member of the DESC Equality, Diversity and Inclusion Committee
Mark Sullivan	Co-lead of the DESC Time Domain Analysis Working Group; Member of the DESC Membership Committee; 4MOST/TiDES DESC Liaison.
Aprajita Verma	In-kind Program Coordination Team Lead; Lead of the Galaxies Science Collaboration Strong Lensing Working Group; Member of SLSC Advisory Group; SLSC member of the International In-Kind Contribution Evaluation Committee; Chair of the Software Sub-committee and International Program Coordinator in the Rubin Director's Office.

Maria Vincenzi	Co-convener of the DESC Time Domain Analysis Working Group
Aaron Watkins	Co-lead of the LSST LSB challenge 1: "How do LSST algorithms do at detecting LSB sources?" ; Co-chair of the low-surface-brightness working group within the LSST Galaxies Science collaboration; Co-chair of the Low Surface Brightness Coordination Group.
Carola Zanoletti	Co-lead of the DESC Beyond wCDM team

Forthcoming meetings of interest

Dates, locations and links… The current list of forthcoming meetings is always available on the Relevant Meetings page. You may also wish to check information held on the LSST organisation website LSST-organised events and the LSST Corporation website.

Dates	Meeting Title / Event	Meeting Website/ Contact	Meeting location / venue
20/May/24-23/May/24	Rare Gems in Big Data. The discovery potential of large astrophysical surveys: science opportunities, tools, and techniques	https://mailchi.mp/d8d4daa3ed0a/first-announcement-rare-gems-in-big-data?e=5176cbbd93	USA | Tucson, AZ
08/Jul/24-12/Jul/24	DESC Collaboration Meeting	https://lsstdesc.org/	Switzerland | ETZ Zurich
14/Jul/24 - 19/Jul/24	RAS National Astronomy Meeting 2024	https://nam2024.hull.ac.uk/	Hull
22/Jul/24-25/Jul/24	Catching supermassive black holes with Rubin-LSST: Towards novel insights and discoveries into AGN science	https://indico.ict.inaf.it/event/2784/ Registration is now open. Abstract submission deadline is 12 April.	Italy | Turin

22/Jul/24-26/Jul/24	Rubin Community Workshop	More details about the meeting will be available once the meeting website is set up and registration opens. The [call for session suggestions and talk/poster abstracts](https://) is 4 April. Email questions about the meeting to pmo.rubin@noirlab.edu.	USA	SLAC, California (hybrid)
16/Sep/24—20/Sep/24	LSST@Europe6	https://meetings.iac.es/LSSTEurope6/	Spain	Island of La Palma

Members of the Consortium (not in receipt of travel funding through one of the Science Centre grants) may apply for travel support for meetings of this kind via the LSST:UK Pool Travel Fund. Details are available at [Forthcoming LSST-related Meetings](https://)

If you have significant news or announcements that are directly relevant to LSST:UK and would like to share them in a future newsletter, contact [Eleanor O'Kane](https://) *(email* eokane@roe.ac.uk*)*

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