

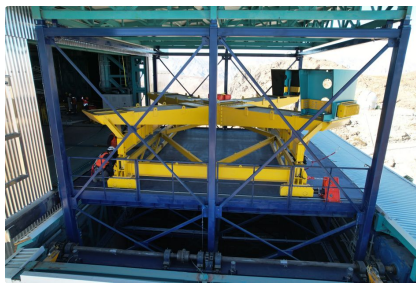
LSST:UK Newsletter 33 (May 2023)

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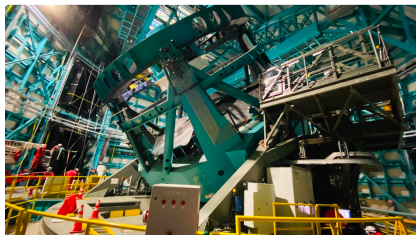


Introduction

This month's obligatory summit photos (right) illustrate recent work commissioning the Telescope Mount Assembly (TMA). The yellow structure in the upper photo is the M1M3 mass surrogate, which approximates the weight of the M1M3 mirror and its support structure. In recent months it has been attached to the TMA for the testing that led to the handover of the TMA from the contractors that built it to the Observatory. With that complete, the M1M3 mass surrogate has been removed from the TMA and is shown part of the through its return journey to the maintenance floor in the summit building. It has been replaced on the TMA by the M1M3 cell assembly, which will eventually hold the M1M3 mirror. That is required for the next stage of testing, which assesses how the M1M3 mirror support system performs as the elevation is varied, as shown in the lower photo.



Credit: RubinObs/NSF/AURA



Credit: RubinObs/NSF/AURA

Most of the rest of the news this month concerns workshops.

The [DPO Virtual Summer School](#) will be taking place during the week of June 12-16 and the Ruben Community Science Team have set up a Buddy Programme for it, whereby DPO newbies can be paired with people willing to share their prior experience of the Ruben Science Platform

and the DPO dataset in the networking sessions during that week. There is a [form](#) for those willing to be a Workshop Buddy or wanting one.

Registration has opened both for the [2023 Project & Community Workshop](#) (August 7-11 in Tucson) and for the [LSST@Europe5](#) conference (September 25-29 in Croatia). The PCW2023 registration deadline is July 14th, while July 15th is the deadline for “early bird” registration for [LSST@Europe5](#).

Finally, the Research Corporation for Science Advancement has announced that it will be holding one of its *Scialog* series of workshops on [Early Science with the LSST](#). These events are targetted at early career faculty, where early career is here defined as “*spanning the time from the first year on the faculty through recently post-tenure*”. The series will see ~50 selected Fellows interact with ~10 senior scientists with the goal of mitigating “*two impediments to realizing the full scientific potential of LSST: the lack of seed funding to ignite early LSST discoveries with these data, and the critical need to create the cross-disciplinary connections required to tackle the biggest questions LSST is poised to address*”.

Another opportunity is presented by the [second call for proposals for the LINCC Frameworks Incubator programme](#). This is an LSSTC-funded initiative to support collaboration and fund software engineering effort in support of the development of “*robust open-source software tools to support analysis of LSST data at scale*”. There is a **deadline of 15 June** (23.59 Pacific Time) for short, stage-one proposals, submitted via an [online application form](#), with projects to start this autumn. A recording of a presentation about the programme can be found [here](#).

In other news, the latest iteration of the [Astronet Science Vision and Roadmap](#) has been published, covering the period 2022-2035. Astronet is a consortium of astronomy funding agencies and associated bodies (e.g. ESO, ESA) from across Europe and its objective is to provide a strategic framework for planning coordinated investment in European astronomy. This latest update has been delayed by Covid-19, and features a series of reports by thematic panels, which feed a roadmap for the coming decade or so. As such, this represents a significant document, summarising the aspirations of the community, but with, inevitably, a focus on those projects funded at a Europe-wide level - e.g. through ESO, ESA, or included in the *European Strategy Forum on Research Infrastructures (ESFRI)*. Equally inevitably, this leaves LSST in a somewhat anomalous position, since it will clearly play a major role in the next decade of European astronomy, but European involvement in LSST is being organised through a number of national and institutional in-kind contributions, rather than under the aegis of a Europe-wide entity. To try to address that anomaly,

[@Stephen Smartt](#) and I organised a letter to Astronet, signed by the leaders of almost all the European in-kind contributions attesting to the importance of LSST for their communities in the coming decade, and encouraged our [Science Collaboration Points of Contact](#) to provide input to the various thematic reports. Reassuringly LSST is well represented in many of those, but it remains outside the coordinated framework. That repeats what happened with the previous iteration of the roadmap, which included, as one of its primary recommendations, the development of a wide-field spectroscopic facility on an 8-10m telescope, motivated largely by the requirements of LSST follow-up. It seems a missed opportunity for Astronet that one of the key science drivers for European astronomy remains outside its framework just because the substantial European involvement is funded by Astronet members acting individually, rather than together.

Those with ideas for future newsletter items should contact the LSST:UK Project Managers ([@George Beckett](#) and [@Terry Sloan](#) lusc_pm@mlist.is.ed.ac.uk), while everyone is encouraged to subscribe to the [Rubin Observatory Digest](#) for more general news from the US observatory team.

[@Bob Mann](#)

LSST:UK Communications Officer

The LSST:UK Consortium is seeking a part-time Communications Officer to coordinate its communications activities. The postholder will coordinate the development and implementation of the LSST:UK Communications Strategy, and, during LSST operations, act as a first point of contact for media enquiries relating to LSST:UK. Prior to the start of LSST operations the activities of the Communications Officer will focus on:

- Developing a good working relationship with the Rubin Observatory communications team
- Recruiting a cohort of UK researchers, across institutions and science areas, and supporting their obtaining media training
- Building a social media presence for LSST:UK
- Determining a process for multi-institutional LSST:UK press releases
- Supporting communications within the LSST:UK Consortium (e.g. website, newsletters)

Once these processes and relationships are in place, and LSST operations have begun, the focus will shift somewhat to:

- Acting as first point of contact for media interested in LSST:UK science stories
- Coordinating press releases related to LSST:UK science

It is expected that this role will be filled by buying time (nominally 0.2 FTE, dependent on grade) of a communications professional already holding a similar post in a UK institution and with a good set of contacts with UK media sources, but all interested parties are welcome to apply. Applications are particularly welcomed from candidates who would increase the diversity of the LSST:UK leadership team. Details of the application process, along with a more detailed specification of the post and a copy of the draft LSST:UK Communications Strategy is available in this [document](#). Applications should be submitted by **16.00 BST on Friday, June 23rd**, and it is intended that interviews will take place online in early July.

[@Adam Amara](#) , [@Martin Hendry](#) , [@Bob Mann](#) , [@Kathy Romer](#) , [@Aprajita Verma](#)

Lasair's role in uncovering the most energetic transient ever, AT2021lwx

A team led by @Philip

Wiseman at the University of

Southampton has uncovered what is

being dubbed the "largest cosmic

explosion ever witnessed", named

AT2021lwx. This remarkable explosion

occurred nearly 8 billion light-years away and

was initially detected by the Zwicky Transient

Facility (ZTF). Its

luminosity exceeds that

of any known supernova by tenfold, and despite its vast distance has been visible for over

three years. The light curve is single-peaked and shows a 150-day rise followed by very

slow, steady decline. The event has been widely covered in the world's media, both online

as well as on the radio and television news bulletins.

The team first became interested in the event in 2021 as a possible superluminous supernova due to its long rise-time, and it was observed by the ePESSTO+ collaboration after being ingested into their classification queue from the Lasair broker. However, the first ePESSTO+ spectrum was inconclusive and the transient was archived. In 2022, AT2021lwx reappeared during a Lasair query for orphan transients – those with no apparent host galaxy – and the 2021 spectrum was subsequently re-examined. Upon close inspection, absorption lines at $z=1$ were present, which placed the absolute magnitude at M_{-26} and made AT2021lwx one of the most luminous transients ever observed.

There is no clear explanation behind the cause of the event. The extreme luminosity likely requires the presence of a supermassive black hole of around 100 million solar masses.

The [UK-led work](#) favours a giant gas cloud being accreted by a dormant supermassive black hole, while a [US-centered team](#) favour the tidal disruption of a star fifteen times the mass of the Sun. Follow-up observations are ongoing in an aim to distinguish between these scenarios, while the search is on in archival data to find similar historical events.

LSST is the prime survey to discover similar objects in the future and the Lasair broker will be the centre of the search for such extreme events.

@Philip Wiseman



Screenshot from the Lasair page for AT2021lwx/ZTF20abrbeie

LSST:UK session at NAM2023

The [schedule has been published](#) for our three sessions at NAM2023. It reads as follows:

Date	Time	Speaker	Title
Thursday, July 6	16.00	Bob Mann (Edinburgh)	UK involvement in the LSST
	16.12	Bob Blum (Rubin)	Rubin Observatory update
	16.38	Christina Williams (NOIRLab)	Community Science update
	16.55	Ashley Villar (Harvard)	LSST Science Collaborations
	17.12	George Beckett (Edinburgh)	Delivering a UK Independent Data Access Centre for LSST
Friday, July 7	09.00	James Mullaney (Sheffield)	LSST Data Release Processing: what, when, where and the UK's involvement
	09.12	Manda Banerji (Southampton)	The HSC-VISTA fusion dataset and prospects for LSST+VISTA extragalactic science
	09.24	Tom Wilson (Exeter)	Enabling early Rubin science with robust cross-matches in the crowded LSST sky
	09.36	Chris Frohmaier (Southampton)	LSST and the Time-Domain Extragalactic Survey (TiDES)
	09.48	Aaron Watkins (Herts)	Modifying the HSC pipeline sky-subtraction algorithms for low-surface-brightness science with LSST
	10.00	Sugata Kaviraj (Herts)	Dwarf galaxies in deep-wide surveys like LSST: a new frontier in the study of galaxy evolution
	10.12	Madison Walder (Surrey)	Probing the dark matter haloes of external galaxies by modelling stellar streams
	14.15	Mike Walmsley (Manchester)	Galaxy Zoo for LSST
	14.27	Adam McMaster (Open U)	Black hole hunters: a microlensing search for quiescent black holes
	14.39	Francesco Petri (Imperial)	Inferring cosmology using Lyman-break galaxies from Rubin
	14.51	Naomi Robertson (Edinburgh)	The interplay between different analysis choices for LSST-Y1 cosmic shear
	15.03	Isabelle Ye (Manchester)	Detecting the Doppler magnification dipole from LSST images
	15.17	Sebastian von Hausegger (Oxford)	Testing the cosmological principle with Rubin
15.29	Suhail Dhawan (Cambridge)	Strongly lensed supernovae: discovery to cosmology in the LSST era	

There will also be one poster associated with this session. It is entitled *Tensorised Analytic Marginalisation over Tomographic Redshift Distribution for Accurate and Efficient Cosmic Inference* and will be presented by Yunhao Zhang (Edinburgh).

@Bob Mann and @Stephen Smartt

Team meeting in London

After a long wait, due to a world-wide pandemic, on 19/MAY/23 the LSST:UK Science Centre (LUSC) was finally able to hold an in-person all-team meeting at University College, London.

Phase B of the LUSC funding started in July 2019 and since then the LUSC all-team meetings have taken place regularly online, usually every quarter. The original intention, however, had been for every other LUSC all-team meeting to be in-person but ... COVID-19 obviously had other ideas.



The LUSC team in the Haldane Room at UCL

At this 19/MAY/23 meeting in London, all the Phase B Workpackages (WPs) were represented by staff attending either in-person or remotely. The various DAC (Data Access Centre), DEV (software DEVELOPMENT) and DRP (Data Release Processing) teams in LUSC gave presentations on their many achievements during Phase B. These were followed by a discussion on possible changes to further strengthen the team's activities.

A special thanks must go to Benjamin Joachimi (UCL) for hosting the event and organising a wonderful lunch.

@Terry Sloan

Recent LSST:UK Science Centre outputs

The LSST:UK Science Centre has recently produced the following technical reports.

Title	Author(s)	Description
D1.1.3 Long-Term Plan	Bob Mann (University of Edinburgh)	This Long-Term Plan (LTP) is the principal, top-level planning document for UK participation in the Legacy Survey of Space and Time (LSST). Its primary focus is the grant-funded effort of the LSST:UK Science Centre (LUSC), but, where appropriate, it may include other activities, such as preparatory or follow-up observations with other telescopes, that are conducted on behalf of the LSST:UK Consortium, but funded from other sources. The LTP is a living document, to be maintained by the Project Leader, and updated periodically. This current version (along with previous versions) is available from the LSST:UK wiki site at the following URL: https://lsst-uk.atlassian.net/wiki/display/BOAR/Long-Term+Plan .
D3.2.3 Summary documentation for final (Phase B) Lasair system (Mar 2023)	Gareth Francis, Andy Lawrence, Roy Williams (all Edinburgh), Ken Smith, Dave Young (all Belfast), Stephen Smartt (Oxford)	With the release Lasair version 4.2, its documentation has been extensively updated and moved online to readthedocs at https://lasair.readthedocs.io/en/main/ .

<p>D3.7.4 Prototype LSB-Optimised Sky-Subtraction Package for LSST Software Stack</p>	<p>Aaron Watkins (Hertfordshire), Chris Collins (LJMU), Sugata Kaviraj (Hertfordshire)</p>	<p>Low-surface-brightness (LSB) science composes a large fraction of LSST's potential discovery space, yet it is also uniquely sensitive to the LSST data reduction pipeline. Specifically, sky-subtraction can be biased by LSB flux, resulting in over-fitting and removal of said flux from images. As part of an ongoing project, working with Data Management, we tested the existing sky-subtraction used for processing Subaru Hyper Suprime-Cam images, which is likely to serve as a model for the algorithm used for LSST, to determine whether or not it can be modified at run-time to ensure that most or all LSB flux is preserved. Modifying the existing algorithm in this way would serve as a prototype LSB-optimised sky-subtraction package for the LSST software stack. We conducted a variety of experiments on the pipeline sky-subtraction software by running the task skyCorr using a variety of pre-set parameters on images with synthetic sources. Doing this, we have isolated the third step in the skyCorr task, bgModel2, as the most impactful on LSB (or other extended) sources. Objects with sizes greater than or equal to the bin size used to produce bgModel2 tend to systematically lose flux to the sky-subtraction, with the amount lost showing increasing scatter about the mean flux loss with increasing model stamp size. While using larger bin sizes in this step does mitigate these effects, uncertainty in the photometry of the injected models increases for all models types over that for models processed using only skyCorr's first two steps (bgModel and doSky). Therefore, if some form of the HSC algorithm is to be implemented for LSST data, we conclude the following:</p> <ul style="list-style-type: none"> • To deliver on the full potential of LSST galaxies science, bgModel2 should not be implemented. Implementing this step both limits the sizes of objects for which reliable photometry will be available in the
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@Terry Sloan

Forthcoming meetings of interest

There is a busy schedule of potentially interesting meetings in the coming months. Registration is now open for the National Astronomy Meeting, in Cardiff, during 3rd--7th July ([National Astronomy Meeting 2023](#)) at which LSST:UK will run three sessions (see above). The website for the [Rubin Project and Community Workshop 2023](#) is now available, with options to suggest sessions and to contribute a poster or talk abstract. Earlier in the Summer, Rubin Data Delegates might be interested to join the [DP0 Virtual Summer School](#) (online, 12th--16th June).

Other meetings of potential interest for the coming months include:

- 12th-14th June: [LSST Galaxies Collaboration meeting](#), Paris
- 20th--22nd June: [The Transient and Variable Universe](#), held at University of Urbana Champaign, Illinois, USA
- 3rd-7th July: [The National Astronomy Meeting 2023](#), held in Cardiff, with a three-part session on "UK involvement in the Vera C. Rubin Observatory: Legacy Survey of Space and Time"
- 24th--28th July: DESC Collaboration Meeting (SLAC), California, USA
- 24th--28th July: [ZTF Summer School](#), University of Minnesota/ virtual

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 the LSST:UK Pool Travel Fund. Details are available at [Forthcoming LSST-related Meetings](#).

Note that the current list of forthcoming meeting 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](#).

@George Beckett

Announcements

If you have significant announcements that are directly relevant to LSST:UK and would like to share the announcement in a future newsletter, please contact the [LSST:UK project managers](#).