LSST:UK Newsletter 37 (September 2023)

Introduction

The photo on the right shows the Auxiliary Telescope, which continues to be used to test LSST systems. AuxTel is currently operating in three-night runs each fortnight, and is soon to increase to five nights per week, following the recruitment of additional staff. Data from each run are fully reduced by 10am on the morning after the final night, and the difference image analysis pipeline is now being run at SLAC in near real-time. A variety of QA metrics are automatically generated as part of the data processing runs, providing valuable experience ahead of the end-to-end commissioning of LSSTCam on the Simonyi Survey Telescope, since AuxTel features the same kind of CCD, read out with the same kind of electronics and even moved with the same kind of motor.

Credit: Rubin Observator/NOIRLab/NSF/AURA/P. Horálek (Institute of Physics in Opava)

Integration activities on the summit continue, with the installation of the secondary mirror cell and surrogate mirror onto the Telescope Mount Assembly, followed by the reinstallation of ComCam in the camera integrating structure, to allow continuation of dynamical testing of the TMA.

Rubin have recently released the output from the latest - Baseline 3.2 - run of OpSim, which generates a database of simulated pointings for the ten-year survey.

This release does not differ greatly from the previous Baseline 3.0, but continues the process of simulating survey strategies incrementally implementing recommendations from the Survey Cadence Optimization Committee. This release updates the plans for when filters will be swapped out of the camera, and the balance of exposures between them during the first year of observations.

The LSST Discovery Alliance - the renamed LSST Corporation - has announced the next call for proposals (with deadline **16 October**) for its LINCC Incubator programme, which provides software engineering effort and computing resources to work with researchers developing software for LSST. UK researchers have been very successful in this programme to date, leading two of the four projects funded in the first two rounds: @Meg Schwamb having led a proposal that obtained LINCC support to optimize the LSST Solar System Survey Simulator, and @Tom J Wilson receiving funding to integrate the catalogue cross-matching software that he has been developing as part of the LSST:UK Science Centre (LUSC) programme into the LINCC catalogue-matching framework.

Finally, the end of September marks the retirement of Colin Vincent (right) from the position of Associate Director Astronomy at STFC. UK astronomy as a whole owes Colin a great debt of gratitude for the skill with which he has overseen the STFC Astronomy Programme over many years, while LSST:UK has particular reason to be grateful to Colin. He recognised early the breadth of interest in LSST within the UK community and provided invaluable guidance and support as we developed plans for UK involvement in the survey. I'm sure that all LSST:UK members will want to wish Colin a long and enjoyable retirement and I hope that when, in the coming years, he reads news of the great science being performed by LSST:UK members he will enjoy a feeling of satisfaction at the role that he played in making it possible.

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

Introduction to the Rubin Science Platform Sessions 2023/24

Many of the astrophysical insights that the LSST will provide will stem directly from the sheer volume of data delivered by the Vera Rubin Observatory. In many cases it will be impracticle, if not impossible, to download and locally process the large amounts of data that will deliver the most groundbreaking research. With this in mind, the Rubin project will instead employ a “bring-you-code-to-the-data” model, whereby most data remains *and is analysed* within the Data Access Centres via the Rubin Science Platform (RSP).

Since most LSST data analysis will not be performed locally on one’s own filesystem and data formats, users will first need to become familiar with the RSP. While the learning curve is not especially steep, there are a number of concepts that are likely to be unfamiliar to many researchers when they start accessing LSST data products. With this in mind, James Mullaney is offering to run a number of sessions for UK-based astronomers which will introduce the Rubin Science Platform and demonstrate some of its features.

It is anticipated that most of these sessions will be held in-person at various locations around the country, so we are looking for people to express an interest and a number of locations will be chosen to minimise travel time for participants from multiple nearby institutes. Part of the justification for having in-person events is to help foster discussions regarding what UK researchers want from the RSP. An online event may be organised for those who are unable to attend any in-person sessions.

If you are interested in attending an Introduction Session, please complete this short Google Form and we will liaise with your LSST:UK Board Member to identify a suitable time and location.

@James Mullaney

Lasair Meetup at Oxford

The developers of the Lasair community broker have connected with the users of the system in a very productive face-to-face meeting in Oxford, Sept 13/14 (agenda here). Many email addresses and zoom pictures transformed into real

people! Lasair is a community broker for the LSST alert stream, and the function of a broker is to filter the firehose of data into a stream of precisely what a user wants, and delivering it to them. Users are looking for exotic supernovae, kilonovae, tidal disruption events, exotic binaries in our galaxy, and other publication-worthy transients.

A first use was demonstrated of mining the ZTF database to lightcurves to discover more objects like AT2021lwx -- the most energetic non-quasar optical transient astronomical event ever observed (Wiseman++ 2023). The objects returned by a filter against Sherlock are examined lightcurve by lightcurve to find one rising slowly and fading slowly.

There were three talks on finding lensed supernovae, which use a watchlist of galaxy clusters to identify candidates -- their main request to the Lasair team was better access to the real-bogus score of detections, since a lensed source may be rather unlike the normal PSF.

Several users are using Lasair to return dozens of possibilities every day, and would like it to be easier to "eyeball" large numbers. Requests to the developers include a page where many lightcurves and cutouts can be seen together; also a list of veto objects that will not be seen again, so they don't need to be eyeballed again. These are just a few examples of productive discussion between users and developers, which will result is a more useful system for LSST. Challenges for the future include:

- Transitioning from ZTF to LSST, with 30 times the alert numbers, while maintaining quality and performance;
- Characterising light-curves through numerical features, that accurately capture the aspects users want;
- Extending the scope of Lasair with new capabilities requested by users, as well as by including solar system objects.

@Roy Williams

Alan Turing Institute's Space Science Interest Group

We draw the LSST:UK community's attention to the the new Space Science Interest Group at the Alan Turing Institute. It aims to provide a platform for UK collaboration in Artificial Intelligence and Machine learning in the broad area of space, astronomy, astrophysics, and planetary science. The initiative will foster collaborative approaches and exchange of ideas and we encourage the LSST:UK community to engage with the SSIG team. You can read the aims of the SSIF and see the upcoming online talks (from Jason McEwan and Matthijs Mars on 28th Sept, then Nial Jeffrey on 26th October) here.

The LSST:UK Executive would like to encourage the UK's Rubin community to engage with the initiative and coordinate some activities that are of interest in this general area. We would also like to appoint a "Point of Contact" specifically with the remit of engaging with the Alan Turing institute and taking a leadership role in promoting the link. This could be general information dissemination, speaker suggestions, workshops etc. As you can read on the website, the Alan Turing Institute is able to host meetings in London and at UK institutes. We encourage LSST:UK scientists with ideas to reach out to the Alan Turing Fellows responsible for organising the SSIG : Ingo Waldman, Jason McEwan, Anna Scaife and Peter Tiny : see here for details T Space science .

Any LSST:UK scientist who would like to become the LSST:UK Point of Contact for this AI and ML engagement with the Turing Institute, please contact @Stephen Smartt and

@Bob Mann by 31st October with a short expression of interest.

@Stephen Smartt

ESO Workshop on planning follow up for Transients, Variables, and Solar System Objects in the era of LSST

This workshop is to prepare for effective follow up of alerts from the Vera C. Rubin Observatory's Legacy Survey of Space and Time (LSST) using European Southern Observatory (ESO) telescopes. The workshop will cover a broad range of science topics associated with variable, transient or moving objects that will be discovered in vast numbers by the LSST. We intend to mix overview talks on how LSST will impact these fields, lessons learned from previous surveys and ESO programmes, the expected yield of discoveries from LSST, and the planned capabilities of ESO facilities in the coming decade. We will have talks that introduce the LSST, its alert brokers and other tools and services designed to enable follow-up observations. The workshop will include dedicated breakout sessions to plan broad community follow up programmes at ESO.

The workshop will take place at ESO headquarters in Garching, Germany, between the 22nd and 26th of January 2024. In person attendance is encouraged to facilitate collaboration building, but virtual attendance will also be supported. Further information can be found at ESO - LSST .

@Colin Snodgrass

Recent LSST:UK Science Centre outputs

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

Title	Author(s)	Description
D2.2.5 Design for ingestion of User-generated Products	Mike Read, George Beckett	In addition to the main LSST survey products and external ancillary survey datasets, the UK-DAC will host and serve data products generated by some of the UK work-packages. In LSST:UK Phase B, there are two such work-packages, WP3.11 (Cross matching and astrometry at LSST depths) and WP3.5 (LSST and near-infrared data fusion). The same infrastructure used for the LSST products is to be utilised, namely Qserv for the relational database and the data butler for the flat file products (images etc). The data will be accessed via the Rubin Science Platform. This document gives an overview of the steps involved in publishing data from these two work-packages and the next steps for this work.
D3.5.1 Lasair Version 5	Roy Williams. Gareth Francis, Andy Lawrence, Ken Smith, Stephen Smartt	Lasair Version 5 is a prototype running on LSST simulated alert data supplied by the Vera C. Rubin Observatory. This prototype LSST alert broker is located at https://lasair-lsst-dev.lsst.ac.uk. The schema of LSST alerts has many more components than the ZTF schema, and has a formal change system through a schema registry. This prototype has improved and automated handling of schema and schema evolution. The software for computing lightcurve features is

		much more modular and extensible, with comprehensive testing and debugging facilities. @Terry Sloan

Forthcoming meetings of interest

Things are relatively quiet, meeting-wise, over the next month or so. However there are still several upcoming meeting, which may be of interest, plus some provisional dates for your diary in early 2024:

Dates	Meeting Title/ Event	Meeting Website/ Contact	Venue
12/Mar/24—15/Mar/24	Preparing for the Statistical Age of Strong Gravitational Lens Science with the Rubin Observatory Legacy Survey of Space and Time (LSST)	Pre-registration will open in October (meeting dates are tbc). More information available from @Aprajita Verma .	Oxford, UK
22/Jan/24 - 26/Jan/24	What was that? - planning ESO follow up for transients, variables and solar system objects in the era of LSST	ESO - LSST	
11/Dec/23—15/Dec/23	Unveiling the Dynamic Universe: Cosmic Streams in the Era of Rubin	Scientific Rationale	Puerto Varas, Chile
16/Oct/23—20/Oct/23	DESC Sprint Week	DESC Confluence (login required)	Carnegie Mellon University (CMU), Pittsburgh

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.