

LSST:UK Newsletter 27 (October 2022)

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Introduction

This month saw the Covid-delayed [LSST@Europe4](#) meeting, which was originally scheduled to take place in the summer of 2020. Continuing Covid restrictions limited in-person attendance at the [Accademia Nazionale dei Lincei](#) in Rome to one hundred participants, but there was also a substantial remote attendance. Naturally, the majority of the in-person attendees were from Italy, but there was a very strong showing from the UK, with talks given by Tom Collett, Steven Gough-Kelly, [@Sugata Kaviraj](#), Ilin Lazar, [@Chris Lintott](#), Steph Merritt, [@Dan Ryczanowski](#), [@Meg Schwamb](#), [@Raphael Shirley](#), [@Graham Smith](#), [@Ken Smith](#), [@Aprajita Verma](#), [@Tom J Wilson](#), and myself, and with session organising/chairing duties undertaken by [@Sugata Kaviraj](#), [@Meg Schwamb](#), [@Graham Smith](#), and [@Aprajita Verma](#). Slides from the presentations are linked from the [Abstracts](#) page, while it is expected that session recordings will be made available in due course.

Much of the introductory material presented by the Rubin staff restated information from the [Project and Community Workshop](#) in August, but there were some notable updates. In particular, Bob Blum noted that Rubin Operations is now working with a planning date of October 2024 for the start of survey operations, with an uncertainty of +/- 3 months. This has consequences for the expected release dates for Data Preview 2 (commissioning data from LSSTCam) and Data Release 1 (based on the first six months of observations: DP2 is now expected in Jan - Aug 2025 and DR1 between Oct 2025 and May 2026. From now onwards, the Observatory will make monthly updates to its listing (on <https://ls.st/dates>) of the primary milestones in the project schedule; currently this list of milestones covers only the



The Corsini Palace, part of the Accademia Nazionale dei Lincei.



The Villa Farnesina, also part of the Accademia Nazionale dei Lincei, and used for some conference sessions.

construction project (and is drawn automatically from its project tracking tools), but the plan is to include the key dates - e.g., data releases - from Operations in that list.

As well as background/update information from Rubin staff, the conference also included sessions from each of the Science Collaborations, as well as sessions on synergies with CTA, E_ELT, Euclid, Gaia, SKA, and X-ray missions, so there will be plenty of interesting material online for everyone to look at.

Another undisputed highlight of October for me was the live-streamed summit tour presented by [@Daniel Philip Weatherill](#). Dan has provided a link to that below, along with a small subset of the many photos he has been sharing with colleagues during his time on the summit.

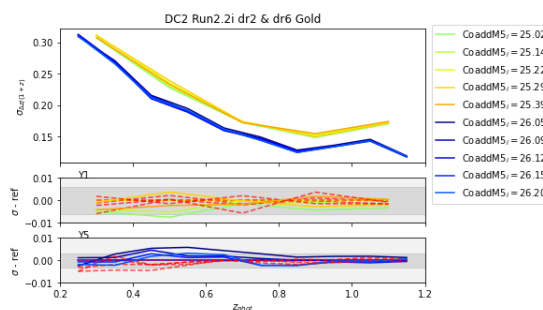
This month also saw the start of a regular seminar series from the LSST Interdisciplinary Network for Collaboration and Computing (LINCC). LINCC is funded by the LSST Corporation and will be running a range of activities over the next few years to support preparation for LSST science - particularly as regards training and analysis software development. [@Raphael Shirley](#) wrote a brief [report](#) on his attendance of the LINCC-sponsored “From Data to Software to Science” workshop in the April Newsletter, and the LINCC have now [launched their Tech Talks](#) series, which will take place every second Thursday of the month at 10am Pacific Time. Details of future talks can be found by following the [announcement post](#) in the Community forum.

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 in-kind contribution: observational systematics for photometric redshift estimates

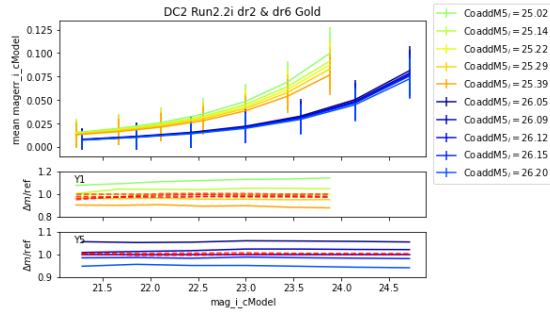
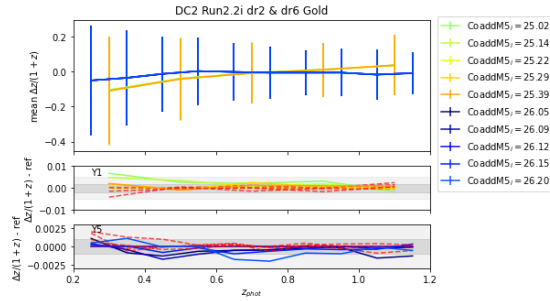
As part of LUSC Phase WP3.5, we have investigated how different observational effects such as sky brightness, seeing, and number of exposures can affect the photometric redshift (photo-z) distribution for LSST. The observation strategy for Rubin is to cover a large survey region before building up the depth. During



the first few years of observation, therefore, it is expected that the inhomogeneity in depth due to e.g. varying weather condition is large. Effectively, one can regard each pointing as a 'mini' survey with different observational systematics and limiting magnitudes. This could potentially be a problem for weak lensing analysis because the signal is sensitive to the mean redshift of the tomographic bin, especially for the precision required by LSST.

In this investigation, we focus on the 'gold' sample from the first (Y1) and fifth year (Y5) data release, for which the simulated observation conditions for the Rubin Observatory (OpSim) as well as the DC2 DM catalogue are used. We split the sample into tomographic binning for lens sample between 0.1 in $0.2 \leq z \leq 1.2$ according to Y1 and Y5 requirements respectively.

One of the main aims is to check whether the spatially varying observing conditions introduce fluctuations to the mean and scatter of each tomographic bins that are larger than the Rubin requirement. The photo-z is estimated using a template-fitting algorithm, *BPZ_lite*. We find that for the sample with reduced photo-z outliers, the shifts in the mean redshift and the scatter in each tomographic bin is consistent with the random noise of the sample,



and comparable to the Rubin requirement.

Additionally, we also looked at the impact of spatially varying observational conditions in each band on the cModel magnitude, the magnitude error, colour, and galaxy over-density.

Plots (to right): (top) *Variation of magnitude error*, (middle) *photo-z bias*, and (bottom) *photo-z scatter with i-band 5σ depth using the coaddM5 MAF map from OpSim for Y1 and Y5 data in the DC2 simulation.*

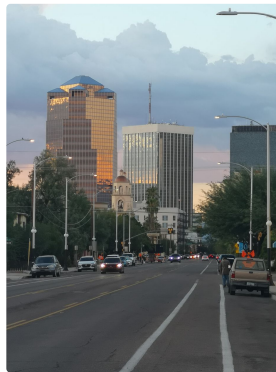
@QianjunHang , @Benjamin Joachimi , @Ofer Lahav

Working with the Rubin Observatory SQuaRE team in Tucson

I recently spent a week in Tucson (Arizona, photos at right) where I met and worked with the Rubin Observatory Science Quality and Reliability Engineering (SQuaRE) team, who are developing and operating the Rubin Science Platform. The targets of the trip were to work through various issues & questions we had as operators of the RSP in the UK Data Access Centre (DAC), to gain a better understanding of the various components of the system and the process used to manage, operate & make upgrades to deployments, to identify areas where contributions could be made back to the project and build a closer working relationship with the team.

Throughout the trip we had a daily meet-up with the team to discuss the ongoing work, with a few focus sessions being held for us to discuss matters specific to the UK DAC. Some of these ended up in debugging sessions to work through some problems we were facing, while one of the meetings consisted of a Q&A session where we went through a number of questions, some technical while some more general future plans-related.

Going into a bit more details regarding technical discussions that were had:



Tucson City Center



The Giant Saguaro cacti in Arizona

We went through the "Patch Thursday" meeting where the team made their weekly patches to all the instances of the RSP that they operate. This process mainly involved the use of ArgoCD, which automatically recognizes changes to the configuration files in Github that the deployments are based on, so the team goes through each of the services and synchronizes them, which automatically deletes/recreates the Kubernetes deployment for that service. There are some intricacies that were involved such as deleting user sessions from a database, and notifying users which I have documented and plan on exercising with the UK RSP as well.

Some of the open issues here in the UK DAC were covered and we have a clear plan on moving forward, in particular regarding making the RSP TAP service available, customizing the Firefly TAP service list as well as parts of the main home page, as well as the process of upgrading tokens & certificates (Vault / SSL) for a production deployment without downtime.

There were a few ideas that are worth mentioning which may be useful to the UK DEV teams:

- **Use of Sup! Slack bot for providing update summaries before meetings.**

This helps keep meeting shorter as managers have an idea of progress/issues before the meeting, allowing the more pressing matters to be discussed during the meeting hours.

- **Use of Commercial Cloud Services**

The Rubin SQuaRE team are very heavily invested into the use of Cloud Services (Google mostly). From discussions I had with the devs of the team and the team manager, the increase in velocity of development and minimization of operations costs and overall cost of solving issues which appear when using an in-house solution, or academic clouds which aren't as polished & easy to use is worth the extra costs, which aren't as high as it may seem if adjusting for hidden costs (cost of power, admins of cloud, etc..)

- **Weekly releases**

As mentioned above the team does weekly releases and this type of agile development has many benefits, which would perhaps be beneficial for us to replicate.

- **Quick daily stand ups**

Useful in agile development, and even more so in teams like the SQuaRE team which are split between remote & in-office developers.

Overall, this was a positive and productive trip, both in terms of improving our experience on how to best operate and maintain the RSP, but also in terms of building a



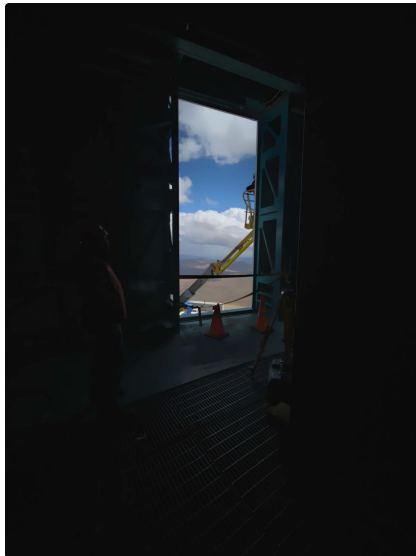
Visiting Biosphere 2, an Earth science research facility

relationship with the Rubin SQuaRE team which will be beneficial for future work on the Rubin project.

@Stelios Voutsinas

Some photographs and musings from Cerro Pachón

I've been working on site with the LSST Sit-Com team for a couple of months now, and there is about one month left in my current tour of duty. I have had the great privilege to meet up with and worked with a lot of colleagues I haven't seen for years (since LSSTCam was just a bunch of sensors in climate controlled boxes and single sensor test stand setups), and met a lot of new people involved with Rubin as well. Updates on the substantive work I've assisted with are for another time, but since there were some very nice comments about the photos I shared both during LSST:UK team meetings and before the virtual observatory tour I did with Bruno Quint. I've written this article to share a few more photographs from in and around Rubin. The link to that video presentation is here: <https://cernbox.cern.ch/index.php/s/KLhN3fohaRIFiAP> (please let me know if you can't get to it, it may require a CERN guest account). One small errata to the video is that in the discussion about the TMA motor control, I said that the encoder feedback for the TMA motors was likely optical tape based. Apparently the main feedback is actually based on precision Hall Effect sensors rather than optical tape, but there are also other encoders in the TMA as well. All the photos here have been fairly heavily JPEG compressed to be reasonable for the web, originals are available on request (they are all licensed with CC-BY-NC-SA 4.0 for non-commercial use). I hope you enjoy them.



A view out the doors from inside the Rubin dome - Taken on 19th October 2022



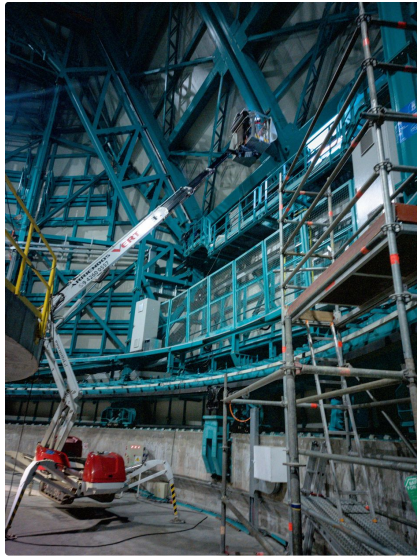
wide angle view of the telescope mount assembly (TMA). The large yellow "X" structure is there for construction purposes and will be removed to accommodate the M1M3 mirror cell in operation



The LSST/Rubin “visitor’s book” which can be found on the table in the conference room of level 2 of the observatory. Signatures and messages inside range from Chilean school kids to directors of the DoE



View from just outside the Rubin control room just after midnight during an Auxtel observing run. Taken on 13th September 2022, The control room and offices are decorated throughout with the colours of the Chilean flag for the celebration of the Fiestas Patrias (or “diesiocho” as Chileans call it, referring to the date of the 18th September).



Welding work on the inside of the Rubin dome - 26th August 2022



“Selfie” from a weekend road-trip to the Atacama by a few of the Rubin on-site Sit-Com team. From left to right: Dan Weatherill (Oxford), Chris Walter (Duke University), Kevin Reil (SLAC), HyeYun Park (BNL), Adrian Shestakov (UCSC)



From the top of the Calibration Hill, taken 12th September 2022 - you can see the Gemini South dome to the right and the SOAR dome to its left



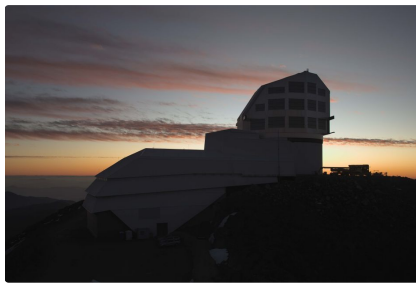
A view of the Rubin observatory on the 29th September 2022 - this was a night I was helping with an auxtel observing run. The Rubin cafeteria ("casino" in Chilean Spanish) is a short walk away from the observatory and this is the view you get when you walk back from the evening meal at about 7pm local time. Since the buses back to La Serena leave at 4:30pm, and the swing and night shifts are generally a few people at most, dinner time is generally a very quiet time



View of "calibration hill" - visible is the LSST Auxtel /LATISS dome at the right, the DIMM to its left, and the remains of the weather tower furthest left. Since this picture (26th August) repairs have begun on the weather tower. In front of calibration hill you can see one of the generator houses and to its right the fuel dump.



standing at the top of calibration hill just beside the Auxtel dome at what photographers call "golden hour" on 12th September. I'm not sure what the significance of the "X" is but it was clearly inscribed very early on in the construction process of the Rubin facility



View of the Rubin Observatory from calibration hill on 12th September 2022 - I love this photograph but as you can see this was a night where the cloudy conditions meant the seeing wasn't absolutely ideal from an astronomical perspective. I think these are cirrocumulous clouds though I'm no expert, and they tend to dissipate during the night.



A view from 26th August 2022 just outside the Rubin facility. I arrived just as the southern winter was turning to spring, and the snow on these mountain tops was disappearing. This was only about 2 weeks after the large storm that wrecked the Rubin weather tower.



During the night of the 14th October I took a very short walk along the road towards the Rubin canteen to take this 200s f/13 exposure which shows the observatory and Calibration Hill. The seeing was excellent that night and in this image you can see some of the characteristic star trails, though they come out much better in the original



I showed a view of the level 3 “maintenance hangar” of the Rubin facility in the video tour, but was also fortunate enough another day (22nd September) to snap this picture of the parts of the M1M3 coating chamber standing separate while I was walking to the electronics lab. You can see here the mass surrogate for M1M3 on top of the M1M3 cell at the right, the coating chamber magnetron assembly to its left and the dish to the left of that. Just in front of the balcony you can see the turquoise cylinder of the LSSTCam mass surrogate (now replaced on the TMA with the actual comcam instrument)



I stepped outside on one of the nights I was assisting with Auxtel observing to take this 30 second f/13 exposure of the moon over calibration hill. I particularly like how the faint blue glow of the emergency light in the generator house which is completely invisible to the naked eye in daytime becomes the dominant “human-made” light source in this image. And yes, I left the lens hood off deliberately for that JJ Abrams style lens flare, but from the moon!

@Daniel Philip Weatherill

Forthcoming meetings of interest

Meetings of potential interest for the coming months include:

- 27th February – 3rd March – DESC Collaboration Meeting (virtual). Details to be published on [DESC members website](#) (login required).

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 <https://lsst-uk.atlassian.net/wiki/spaces/HOME/pages/52424060> .

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](#).