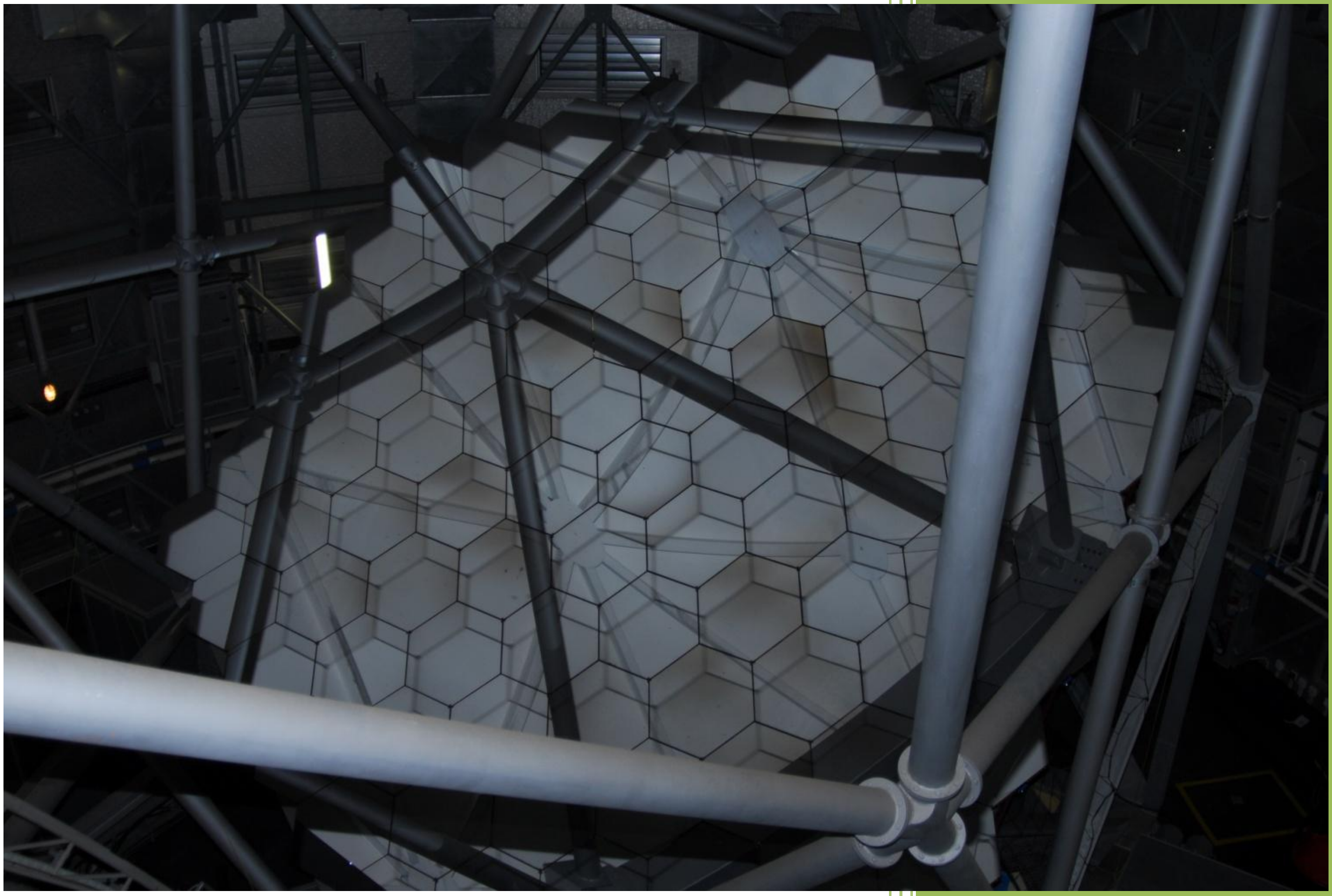
SALT NEWSLETTER

ISSUE SEPTEMBER 2021

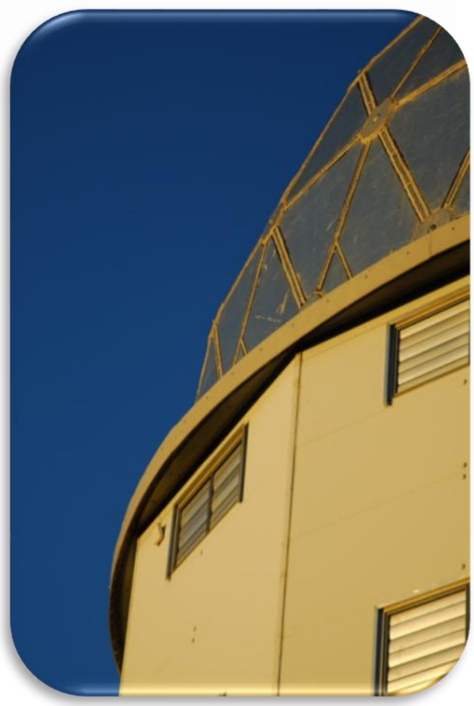


Southern African Large Telescope,

Sutherland, South Africa

Cover image: Lisa Crause

TOPICS



Contributors to this issue:

Encarni Romero Colmenero, Riccardo Arcodia, Christian Hettlage, Marsha Wolfe, Matt Bershady, Lee Townsend, Melanie Saayman, Kathryn Rosie, Rosalind Skelton, Lisa Crause, Elizabeth Naluminsa, Xola Ndaliso, and Anja Schröder (editor).

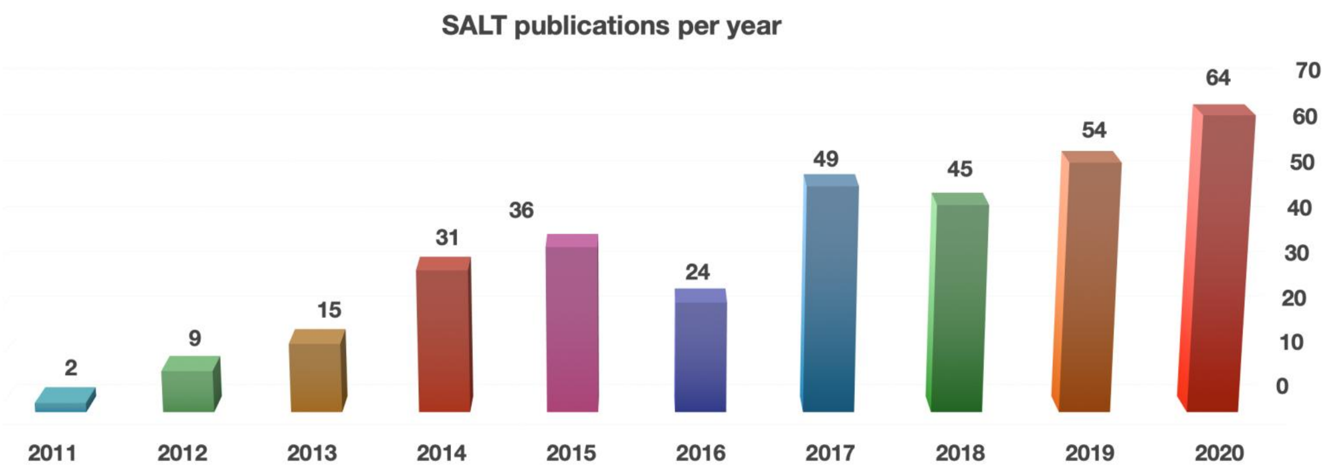
LETTER FROM THE HEAD OF ASTRO OPS

Dear SALT Community,

It has been quite a while since our last newsletter — one month just flew into the next and before we noticed, nearly a year has passed! And it has been quite a busy year, despite working remotely and COVID-19 doing its best to disrupt our lives, variant after variant. As a result, we have quite a few updates for you in this newsletter.

To begin with, I would like to introduce to you our newest AstroOps team members. A new SALT Operator, Mr Xola Ndaliso, joined us in April — and I'll let him introduce himself below. Dr. Solohery Randriamampandry also joined us in April as our newest SALT Astronomer, and Mr Chaka Mofokeng joined Christian's software team in June. Dr. Anja Schröder has also re-joined the SALT team (remotely!) to manage the SALT Annual Reports and the newsletters. In addition, the work permit for Dr. Liz Naluminsa, our Fabry−Pérot postdoc, finally came through at the end of May (it took over a year!), and she is finally in Cape Town. They will all introduce themselves in the next few newsletters, and Liz gives us a brief Fabry−Pérot status update below.

We also would like to share our most exciting news: we had *a record* of SALT publications for 2020, with 64 publications in total! Well done with publishing all those papers, especially during the hectic 2020 pandemic! :-)



Another important piece of information for our users is that we are planning a SALT shutdown soon. We do not yet know when this will happen because we need all hands on deck for this and we are currently still at the peak of the third wave of coronavirus infections in Cape Town — we will let you know as soon as the dates are fixed. The plan is to have a full telescope shutdown for about a week, and then we will go back on sky with SALTICAM and HRS while RSS stays on the ground for another 1 − 2 weeks. I promise there is a reason behind this madness and we explain this in an article below.

Some more exciting news: the process of replacing the multi-chip RSS detector with a single, monolithic chip has already started. The plan is to use identical detectors for RSS and for the new upcoming simultaneous red-arm of RSS, and both detectors have already been ordered. The project passed the preliminary design review (PDR) in July. Read more details about this below.

The full analysis of the HRS HS mode with simultaneous ThAr was completed by Alexei at the end of last year, and the results were so exciting, the SALT Board have initiated the process of obtaining a Laser Frequency Comb for HRS! This project is also underway — more on this from Lisa below.

Another exciting development for our users from Christian's team is our upcoming new Web Manager, which is so much faster and efficient! This is especially noticeable for proposals with many targets, and we're hoping it will go live in the next couple of months, so watch this space. Christian gives more information below.

We are also getting ready at SALT for the arrival of the NIR in early 2022, and hoping to begin on-sky commissioning from around May 2022! More on this also below.

And this isn't everything we've been busy with! In addition to this, we have been busy with many other projects, such as working on a new queue-scheduler for the telescope, improving our pointing and focus model, and developing the Mini-trackers concept further, which led to a community-wide zoom discussion on 'science with Mini-Trackers' video-discussion in July, followed by an updated Science Case being submitted to the SALT Board. It is now up to them to decide whether to continue with this project (and find the necessary funds!).

Clear skies and stay safe!

Encarni

SCIENCE HIGHLIGHT

Credit: DLR

eROSITA and SALT discover the awakening of two massive black holes in previously quiescent galaxies

SALT has recently contributed to eROSITA discoveries of highly energetic phenomena as part of the Large Science Programme on transient follow-up, led by David Buckley. One kind of transients are the so-called quasi-periodic eruptions (QPEs), which are high-amplitude X-ray bursts recurring every few hours from near the supermassive black holes in galactic nuclei. Before the new eROSITA discoveries, only two QPE sources were known, found in the nuclei of two active galaxies (Miniutti et al. 2019, Nature 573, 381; Giustini et al. 2020, A&A 636, L2). It is of particular interest that they were observed in low-mass galaxies, therefore providing a new channel through which the black holes at their centres are activated. Using data from the ongoing eROSITA all-sky surveys, scientists at the Max Planck Institute for Extraterrestrial Physics, led by PhD student Riccardo Arcodia, have found two more.

Both the new sources discovered by eROSITA showed high-amplitude X-ray variability within only a few hours, which was confirmed by follow-up observations with the XMM-Newton and NICER X-ray telescopes. In Figure 1 we show the optical images of the two galaxies, with the X-ray light curves overlayed on top: interestingly, in the first QPE the peak-to-peak separation of the X-ray outbursts is about 18.5 hours, while in the second it is only about 2.4 hours.

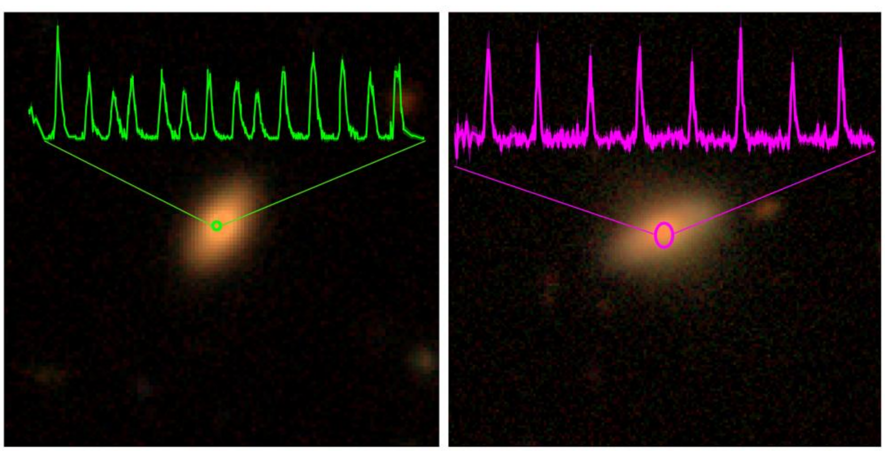


Figure 1: Optical images of the two galaxies found with quasi-periodic eruptions in the eROSITA all-sky survey data, with the X-ray light curves (as observed by NICER and XMM-Newton, respectively) overlayed. Credits: MPE/R.Arcodia and DESI Legacy Imaging Surveys/D. Lang (Perimeter Institute).

The two galaxies were spectroscopically unknown before, and SALT observations were promptly scheduled by David Buckley (SAAO) and reduced by Mariusz Gromadzki (Univ. Warsaw). Contrary to the two known similar objects, the host galaxies of these new QPE sources found by eROSITA did not show any signs of previous black hole activity (Figure 2). Scientists currently do not know what causes these bursts. Current data might indicate that if these eruptions are triggered by the presence of a second orbiting object, its mass has to be much smaller than that of the central massive black hole (for instance, of the order of the mass of a star or a white dwarf), and it might be partially disrupted by the huge tidal forces close to the black hole at each passage. This scenario could make QPEs observable via both electromagnetic and gravitational wave signals, thus opening up new possibilities for the future of multi-messenger astrophysics and cosmology.

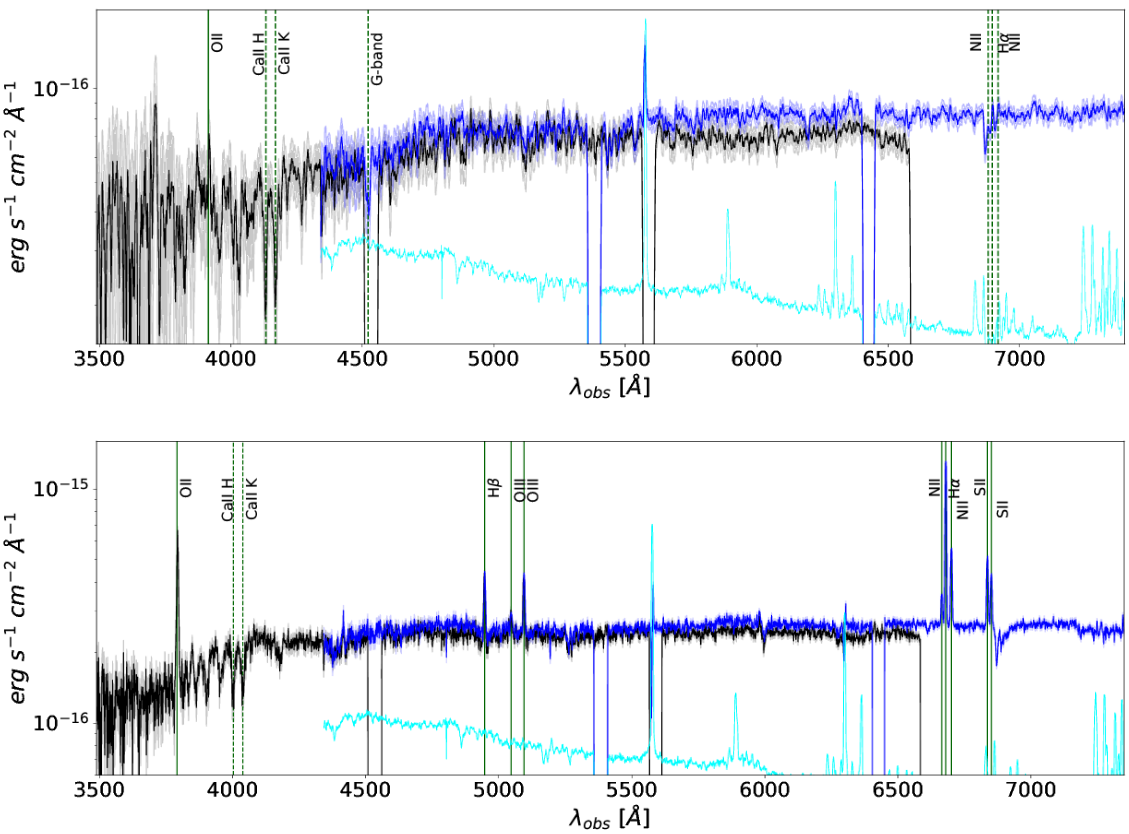


Figure 2: SALT optical spectra of the two inactive galaxies shown in Fig. 1 (the two SALT/RSS exposures are shown in black and blue, the sky spectrum in cyan). The absence of any emission lines in the spectrum of the first galaxy (top) easily classifies it as passive, while for the second (bottom), narrow lines indicate ionisation from star formation.

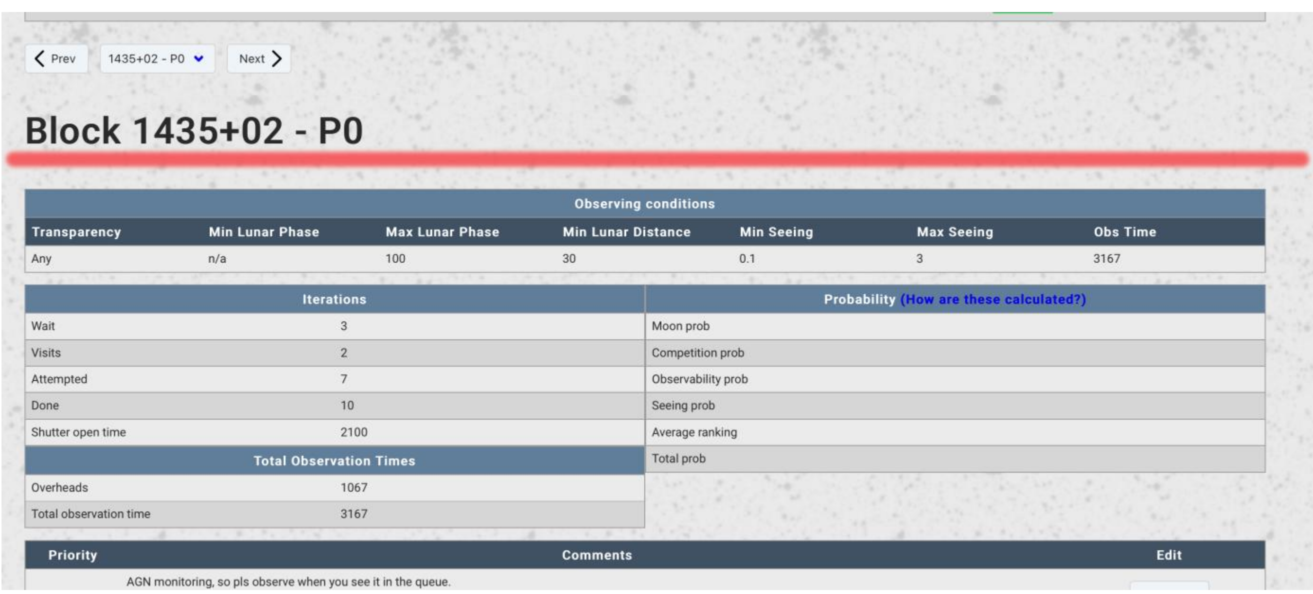
Published in Nature as Arcodia et al. (2021), *Nature* Vol 592, pp 704–707.

A New Web Manager is Coming Soon

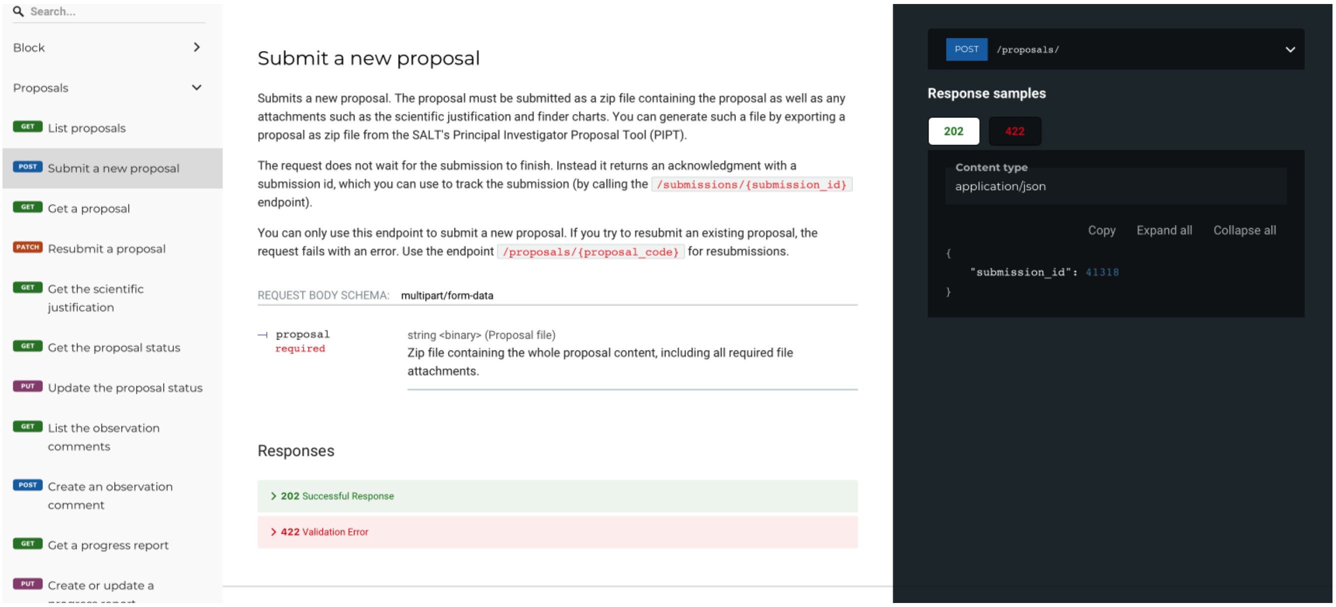
The Web Manager (https://www.salt.ac.za/wm) is a tried-and-tested piece of software, which has served SALT well over the years. However, its original design was based on the use case of a proposal with a few blocks, and it has now serious performance issues for the large multi-semester and long-term proposals. If your proposal has dozens or even hundreds of targets, you may have to wait a considerable time for your proposal to load.

As large proposals have become more and more important over the years, it became apparent that a major overhaul of the Web Manager is called for. While this could be attempted with the current code, the technology stack for web development has seen dramatic changes since the inception of the Web Manager. Most notably, Python has established itself as the go-to language in an astronomical context, and public REST-based APIs have become ubiquitous.

So, to address the challenges and to make use of the potential offered by new technologies, it was decided that the SALT Astronomy Operations software team develops a new Web Manager. The plan is not to reinvent the wheel and come up with a completely new workflow, but to add user-friendly features wherever possible. One of these new features will be strikingly obvious: While at the moment, it is easy to get lost in dozens of blocks on a proposal page, the new Web Manager will only display one block at a time.



One block at a time will be displayed.



Access to your proposal and blocks will be possible via a public API.

Sometimes programmatic access to a proposal is more helpful than a user interface-based one. For example, you might want to use a Python script to automatically put blocks on and off hold. Or you might want to use a script to create and submit a block, maybe for a target of opportunity based on some automated event notification. Currently this is not easily possible. However, in future there will be a clear separation of the code for the web frontend (which is just static files) and the code for handling the actual data content. The latter will be available in form of a public API, which enables the kind of scripts mentioned above.

We are planning to move from the old to the new Web Manager incrementally, and both versions will be available in parallel for a while. **At this point we are looking for beta testers — drop us an email at salthelp@salt.ac.za if you are interested!**

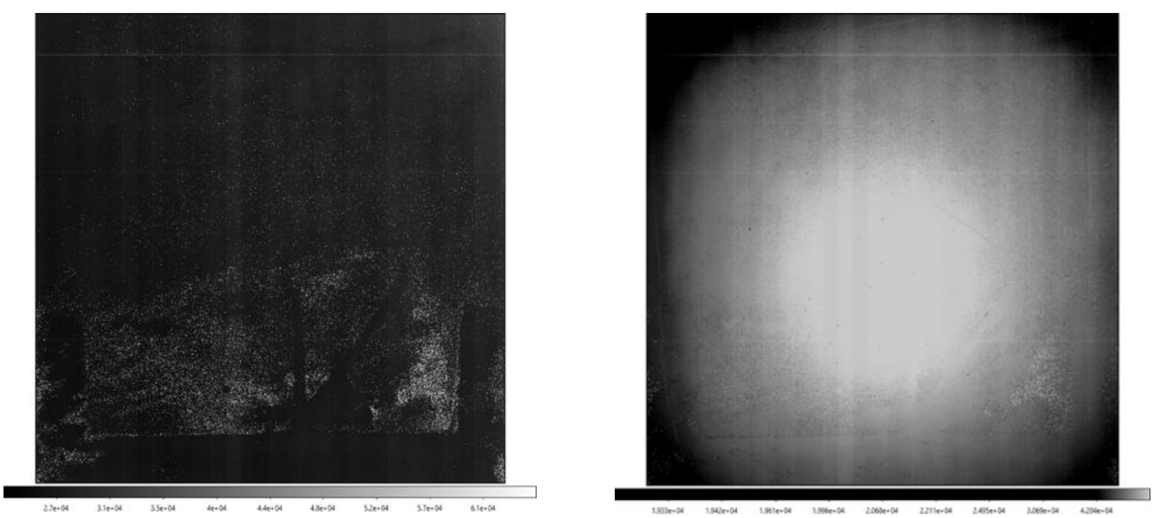
Christian Hettlage.--

NIR Update

Earlier in the year, the optical testing of the new collimator and refurbished camera was completed: Lab spectra were obtained over the entire spectral range and calibrated. The solutions were used to determine the optimal set of arc lamps to calibrate the entire spectral range, which informs the required modifications to the existing SALT calibration system.

The temperature and humidity performance of the instrument cold enclosure and cooling system now meet operational specifications. The instrument mechanism testing has been completed at room temperature and cold operating temperature (−40˚ C). Camera, dewar and collimator have recently been installed in the cold enclosure for final integration and testing.

The detector dewar was reworked to improve thermal baffling. In so doing, the measured background was reduced by nearly a factor of 30. While testing the detector it was noted that the number of "warm" pixels had increased. The reason is that, for this lot of Teledyne detectors, pixel operability degrades over time, and more quickly at higher temperatures. The NIR detector was stored under vacuum at room temperature for five years. The observed behaviour is a 10 − 100 times higher dark current in about 11% of the pixels. The proposed mitigation is to keep the detector cold as much as possible to slow the degradation. Linearity characteristics of the pixels are still being analysed, but there is hope that linearity corrections can be applied to each pixel to calibrate out its degraded operability.



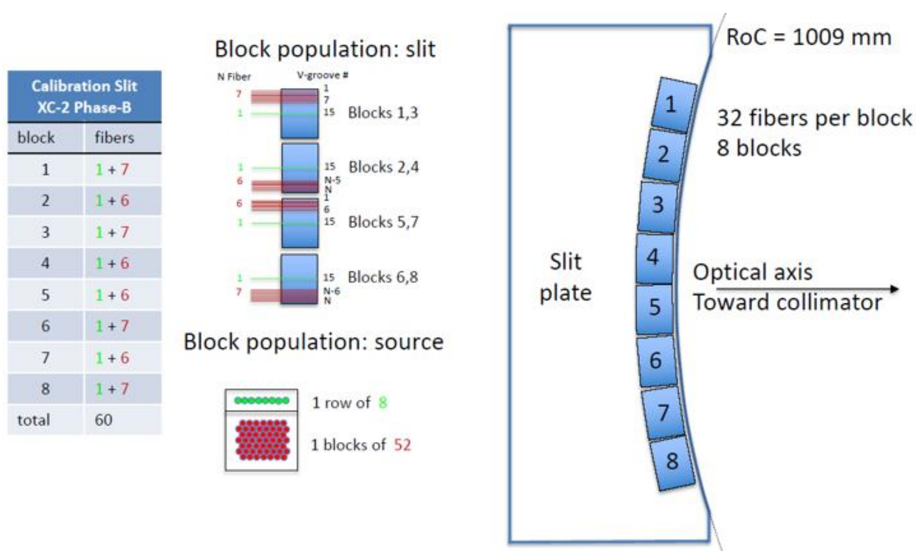
Left: 600-second dark exposure (left). Right: Under illumination the pixels appear darker. Analysis shows that their full well depth is on average 6% lower than unaffected pixels.

Steps currently underway (July 2021) include optical alignment of the dewar, camera and collimator optics in the cold enclosure using an illuminated 3-fibre mount that was used in lab bench testing. The grating has been installed and aligned relative to the detector. The design and fabrication of the slit plate with its baffles and alignment hardware have also recently been completed.

Steps to be undertaken now are

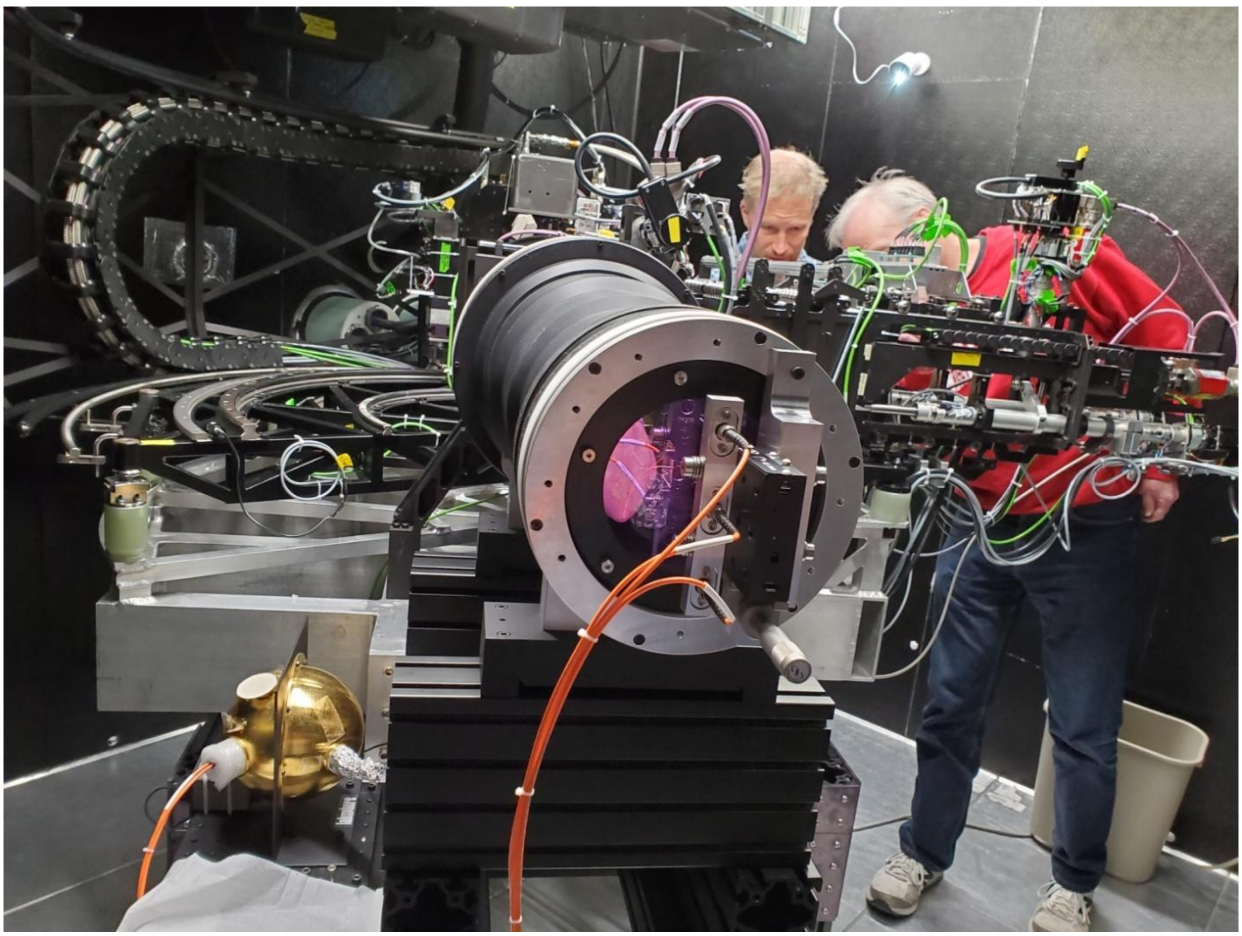
- to install a test and integration fibre-optic cable (TIC) with 60 science-grade fibres on a proto-type slit, designed to span the full science field and provide measures of image quality, fibre-to-fibre cross-talk and scattered light;
- to conduct thermal testing of the cold enclosure with the full instrument;
- to complete the end-to-end optical path testing and pre-ship performance testing.

In parallel with these efforts, the science fibre cable and telescope interface is being completed. All four cable elements are now populated with fibres (256 in total). The final IFU and sky bundle layout is being determined by optimising telecentricity offsets in IFU fibres and matching their distribution in a smaller sky bundle. Next steps to be taken are the termination and polishing of the V-groove blocks on all cables. Then the cables will be joined and their fibres mapped from the slit V-groove blocks to the IFU and sky bundle. Finally, room-temperature fibre performance (throughput and focal-ratio degradation) will be measured for a subset of fibres.



The test-and-integration fibre layout at slit.

The instrument will be shipped to South Africa at the beginning of 2022. The commissioning plan is staged for three campaigns (Feb − Jul 2022). Campaign #1 commissions the mechanical structure: the cold room enclosure will be assembled and tested, the mechanical instrument structure inside the cold room installed, the instrument and enclosure wired up, and the mechanisms will be functionally tested at room temperature and cold. Campaign #2 sees the full optical integration up to First Light: optics and dewar will be installed, the detector checked out, optics aligned using TIC. The science fibre cable then will be installed onto the telescope and instrument, and the full system checked out, ending with the first light on-sky. Campaign #3 finally completes the science verification and operational commissioning.



Instrument inside the enclosure. People next to the instrument
are Mechanical Engineer Mike Smith and Software Scientist Jeff Percival.

Marsha Wolfe & Matt Bershady.--

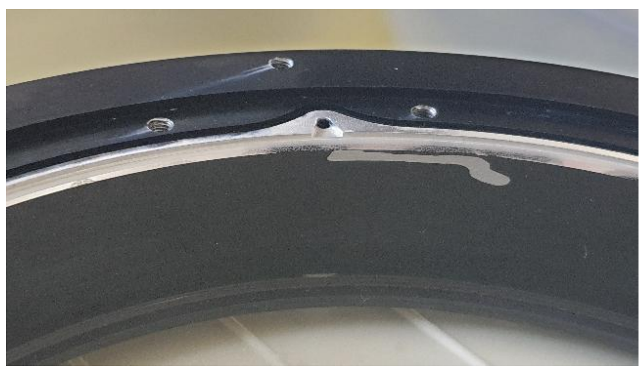
Progress on the RSS Big 5 and Upcoming Shutdown Plans

Shutdown

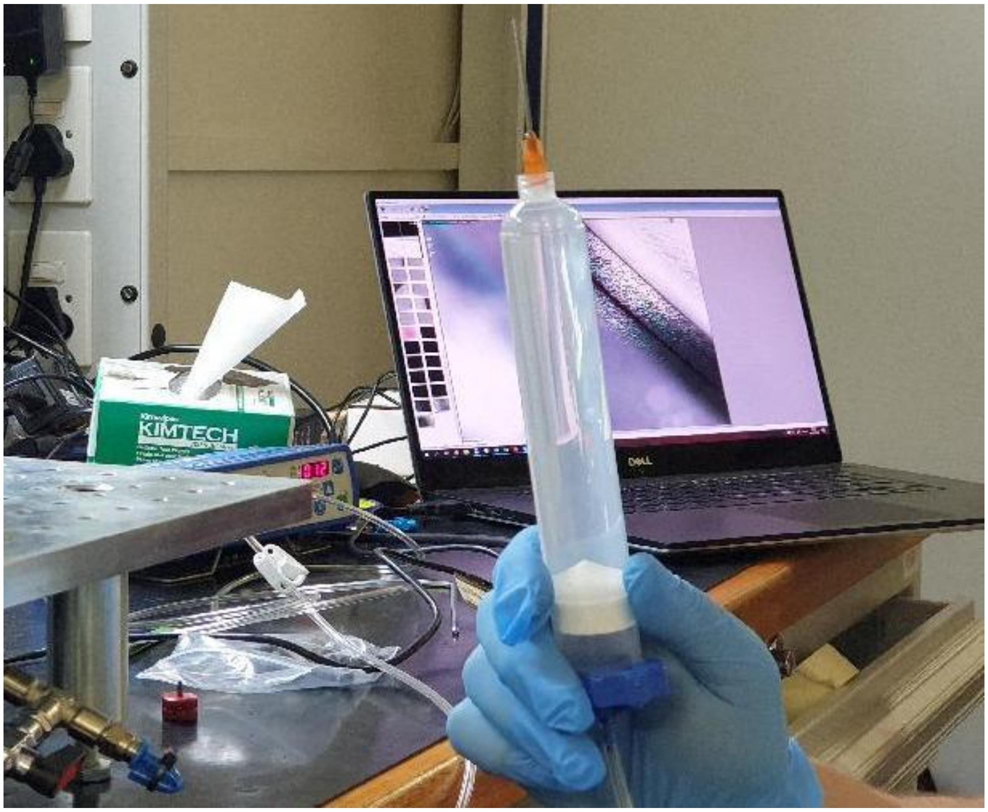
The details of the telescope shutdown required to implement the RSS projects are dependent on COVID-19 levels in the Western and Northern Capes as well as the national lockdown level. The current plan is to divide the work between two shutdowns: one as soon as possible (COVID-19 dependent) and the other sometime around March next year. The first shutdown will probably take around 3 weeks and is expected to happen in late-September/early-October 2021. The telescope will be completely offline for about one week, whilst the team works on the rotating structure; after this, HRS will be back on sky for science for the rest of the shutdown period. Scheduled are the installation of the new long-slit letterbox, various tests and measurements for the NIR-arm, some collimator measurements, and other routine tests and maintenance. The new grating, doublet and triplet are likely to all be installed during the second shutdown in 2022.

a) Doublet

The spare Doublet lenses were first bonded to their cells in December 2020 and January 2021. A few weeks after bonding some strange debonding patterns started appearing. At first the debonding patterns seemed to have stabilised and their areas were judged to be not large enough to compromise the bonds. But after some months and some extensive temperature cycling and normal handling procedures the debonding areas had grown to such an extent that the risk was deemed too high to continue with filling and using the Doublet with compromised bonds. A rescue operation was needed.



Debonded areas have grown significantly from after a few weeks (top) to after a few months (bottom).

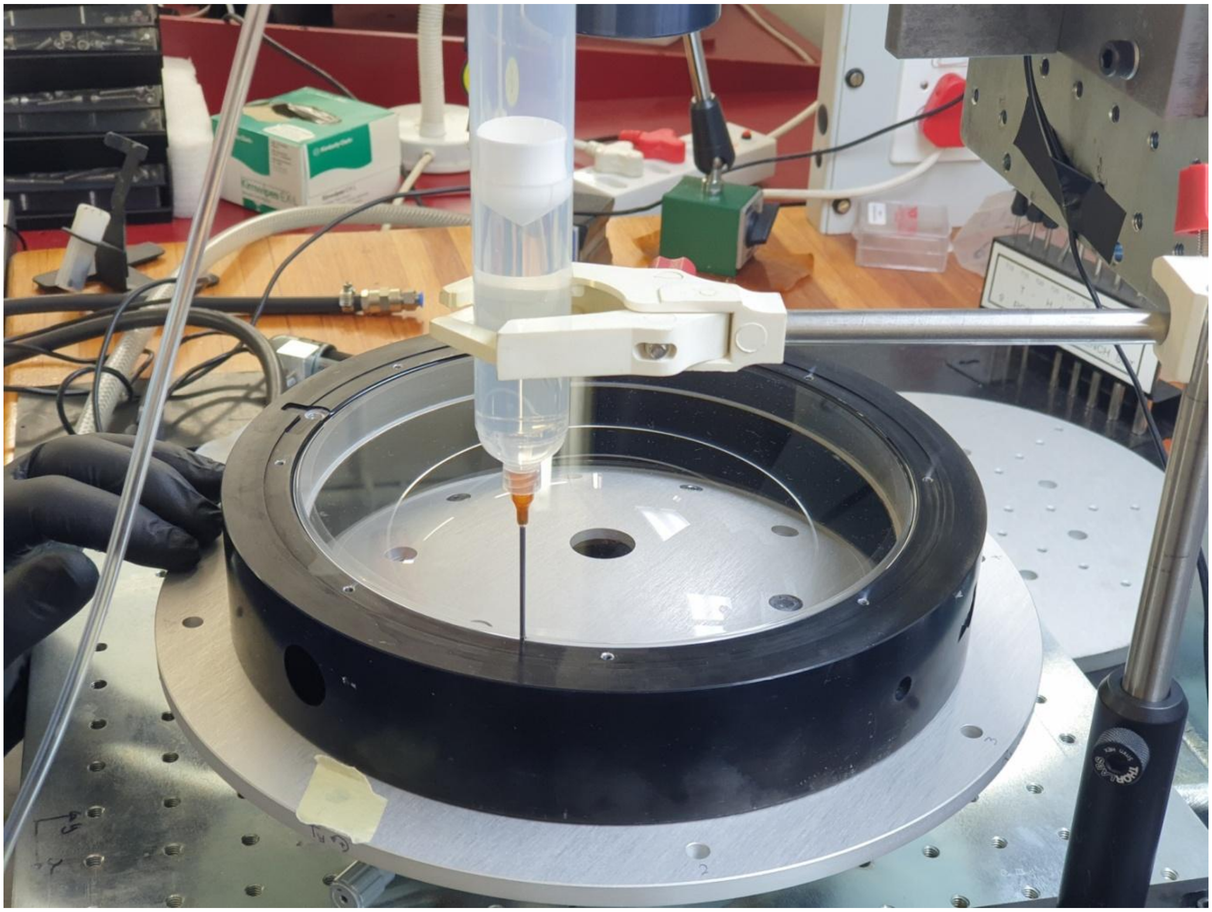


The new COVID-19 vaccine? No, just readying Sylard for usage.

After investigating it was concluded that the most probable cause of the Sylgard debonding was the application of too little primer as well as the application method that was used. Other possible causes considered was contamination of the primer and/or Sylgard. The team conducted many experiments with lens and cell samples, perfecting the primer application method and adapting the Doublet assembly procedure to minimise any possible chance of debonding happening again. The prepared samples were also used to develop and practice the procedure to recover the Doublet lenses from their cells.

Finally the time arrived to do the risky/delicate rescue operation to recover the Doublet lenses from their cells. Aaannd … success!

The Doublet lenses have since been rebonded and the last bond is currently curing in the optical lab in Cape Town. So far the results look promising, and the team is optimistic. After the bonds have completely cured and are deemed stable, the Doublet will be filled with coupling fluid, transmission tested, and ready for installation during one of the next SALT Shutdowns. The team has gained a great deal of valuable knowledge and hands-on experience during this process.



… and this is how the Sylard is being applied.

b) Triplet

As reported in the last newsletter, it was decided to outsource the triplet integration to the company that previously built the RSS optics. The lenses and associated parts were shipped to the Pilot Group in the US earlier this year so that they could begin the process. It turned out that a previously abundant material vital for the integration (Sylgard) is not currently available in the US, delaying the start of the integration. SAAO ended up ordering the material in South Africa and shipping it to the Pilot Group. All of the necessary materials are now in hand, and if a trial bonding process proves successful (and it is likely to), integration ought to be completed by the middle of September. After which the triplet will be shipped to South Africa, tested in the lab and be ready for installation in the spectrograph.

c) Detector

Two identical chips, as described in the last newsletter, were procured as planned (one for the existing RSS detector replacement, the other for the new red arm). The detector team recently completed their PDR (see the article below), much to the relief of Kathryn who did an amazing job pulling everything together for review! There have been several advancements this year, the biggest of which is probably the new CCD controller (IDSAC) and integrated system testing carried out using the new Sibonise imager on the SAAO's Lesedi telescope.

d) PG0700 grating

The PG0700 grating substrates have arrived at the manufacturer (Wasatch) and the grating is in manufacturing. The order for the coating has also been placed with OptoSigma, so they are ready to receive the grating once finished. Wasatch indicated 6 − 8 weeks for manufacturing (they started end July), and the coating will take two weeks, so this is unlikely to be ready by October. However, we are not constrained to the shutdown schedule for this, as the grating can be installed with RSS on the telescope if needed.

e) Long-slits

Due to the ongoing degradation of the existing long-slits (chips, scratches etc), we began the process of procuring a new, improved set. This includes a full set of 8'-long-slits (0.6", 1.0", 1.25", 1.5", 1.75", 2", 2.5", 3", 4" wide) and a subset of 4'-long-slits for other observing modes. The initial samples received from the manufacturer were very far out of spec in terms of smoothness of the slit edges. They were returned for re-working and have now been received back at SAAO. Eben will make some measurements on these new samples to determine if they are closer to our specs. These measurements will then be looked at and a compromise will likely have to be made between the manufacturing tolerances and the science requirements. Only a small number of companies that were contacted world-wide said they were able to help us with these long-slits. Nobody expected them to be the problem project of the 'Big 5', but we are all hopeful to end up with a much improved selection of shiny new long-slits to work with! The shutdown is not dependent on the long-slit procurement, since the letterbox can be installed prior to obtaining the final product.

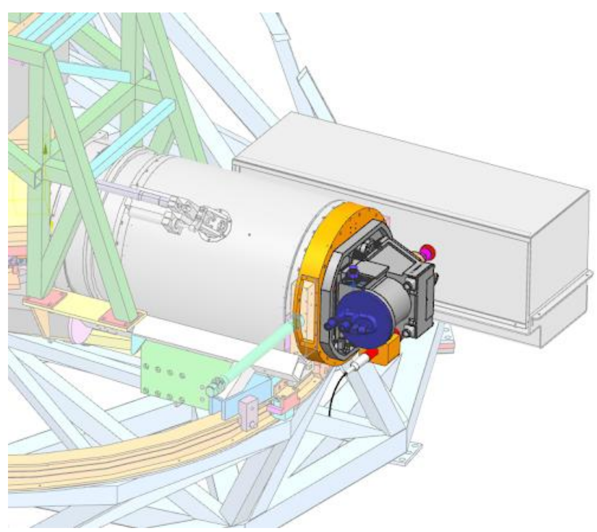
Lee Townsend & Melanie Saayman.--

RSS Detectors Passed the PDR

It has been a busy year for SALT and the SAAO Instrumentation Team who are collaborating on the design for the upgraded RSS detector. As a reminder to the community, the upgrade takes advantage of the new CCD and driver technology available today and is an opportunity to renew various other aspects of the system which are reaching the end of life. Replacing the current mosaic of three CCDs with a large monolithic chip removes the chip gaps in the image, while still offering the same image area. Additionally, advances in coatings and CCD construction will improve the efficiency, with a higher throughput and reduced fringing in the red. A very similar detector setup will be used for the RSS red arm (MaxE) spectrograph, which is also currently under development.

A preliminary design review (PDR) meeting was held in early July for the proposed instrument design and architecture. This was an opportunity for the team to present a design to the community which is mature enough that conclusions about its performance can be drawn. A PDR is also an opportunity to raise any uncertainties, risks, or consequences of the offered design, and is generally the last opportunity in a development life cycle where you want to identify any major course corrections.

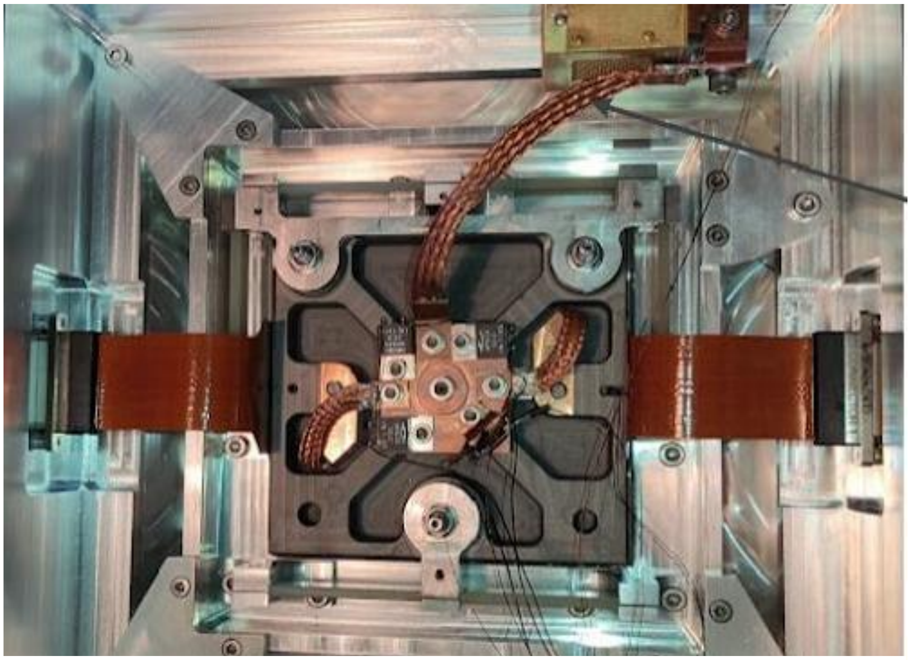
Some notable questions and ideas were raised, which the team is giving attention to. One suggestion was to actively tilt the cryostat in the dispersion direction to reduce chromatic aberrations, thereby optimising the focus for each grating setup. This takes a bit of investigation to confirm whether the expected performance gain justifies the effort –- watch this space! The review also grappled with the ever-present constraints on space and mass on the RSS structure, both of which have to be monitored carefully to make sure RSS can still be handled and manoeuvred safely. An open forum like the review allows everyone with a vested interest to debate and compromise. The work now continues to answer the issues raised and to formally close out the review.



Proposed detector head mounted to RSS.

Test cryostat assembly.

In development news, the order for the 6k x 6k CCD (CCD231-C6) has been placed with Teledyne e2v, and the electrical sample to be used for testing and development has already been received. The SAAO detector team has also built a test cryostat (see figure) which will enable testing of various aspects of the system before the science cryostat design is finalised, and active development of the detailed mechanical design and control of the detector using an IUCAA Digital Sampler Array Controller (IDSAC) is underway. On the SALT side, the software team has been investigating the most efficient ways to get the new instrument integrated in the SALT software environment — an advantage is that NIR is destined to use the same controllers, so lessons learned on one instrument are beneficial to the other. As with all the projects on the go simultaneously, it is quite a juggle to rope resources in as and when needed, but that keeps life interesting!



Test cryostat interior layout.

Kathryn Rosie & Rosalind Sketton.--

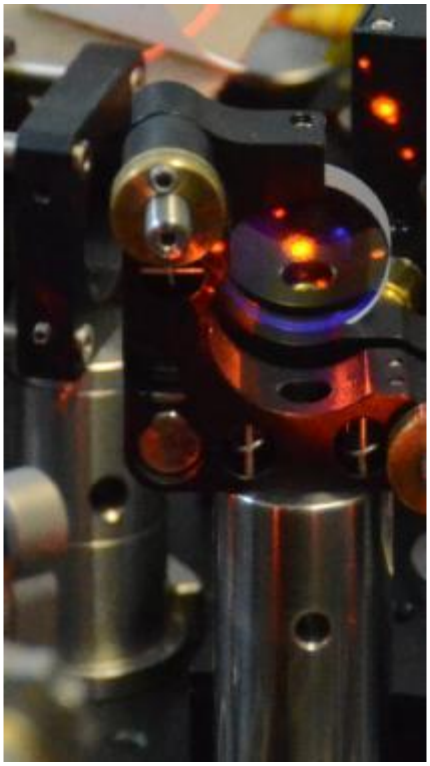
A Laser Frequency Comb for SALT's HRS

SALT's High-Resolution Spectrograph (HRS) has the potential to contribute to the exciting field of exoplanet science. We have not had much demand for this capability within the SALT community to date, but that makes this a great opportunity: by developing the untapped scientific potential of the instrument's High-Stability (HS) mode, we hope to attract new partners to the consortium.

Work has been underway for a couple of years now to explore the various precision wavelength calibration options available to the HRS. These insanely demanding calibrations are what is needed to detect the minute wobbles that planets orbiting a star impose on its motion — the less massive the planet, the smaller the resulting Doppler shift and the more extreme the challenge!

SALT is not equipped to hunt for Earth-like planets — that is the very tip of the spear and it calls for extraordinary precision and eye-watering attention to detail in the design, construction and operation of dedicated precision radial velocity (PRV) instrumentation. But given the worldwide interest in exoplanet research and the progression from trying to find exoplanets, to now trying to characterise and understand them, there is plenty of somewhat less glamorous work to be done as well. Particularly with a PRV-enabled high-resolution spectrograph on a queue-scheduled large telescope in the southern hemisphere!

Disappointingly, the HRS is not well suited to the Iodine Cell technique that we explored first, so we are now pursuing the more technically demanding alternative. This involves injecting arc light down a separate calibration fibre during the observations. The HRS is sufficiently stable for this to work (the object and calibration fibres need to "see" exactly the same shifts and hence why the whole instrument needs to be carefully stabilised — housed in a vacuum tank, inside a temperature-controlled room and isolated against vibrations). Having demonstrated the stability of the system, we are now embarking on a project to upgrade the calibration light that we inject — by replacing the conventional thorium-argon (ThAr) arc lamp with a laser frequency comb (LFC).



LFCs are vastly superior to arc lamps as they produce >50x as many lines, all equally spaced in frequency and perfectly traceable over time. LFCs are therefore widely considered to be the PRV calibration source of choice. However, turn-key commercial systems are still prohibitively expensive and surprisingly unreliable, so advancing experimental comb technology could yield benefits for the worldwide PRV community.

It is already five years since SALT temporarily hosted an experimental LFC built by laser physics researchers at Heriot-Watt University (HWU) in Edinburgh, Scotland. Various blog posts written at the time tell the story:

https://saltastro.blogspot.com/2016/04/a-laser-frequency-comb-at-salt.html

https://saltastro.blogspot.com/2016/04/getting-lfc-set-up.html

https://saltastro.blogspot.com/2016/04/so-how-do-these-things-work.html

https://saltastro.blogspot.com/2016/04/a-great-analogy-to-explain-lfc.html

https://saltastro.blogspot.com/2016/05/first-light-on-sky-observations-with-lfc.html

That productive interdisciplinary collaboration set the stage for where we are now, kicking off the exciting development of a permanent LFC for SALT's HRS. The plan is for all of the LFC components to be ordered and shipped to SALT before members of Heriot-Watt's UltraFast Optics group will travel to South Africa to assemble, test and commission the comb.

We are also excited to have now identified a suitable person, who happens to be from within the UK SALT Consortium (Daniel Holdsworth), to work closely with a PRV software specialist (Arpita Roy at the Space Telescope Science Institute in Baltimore, USA), to develop the critically important data reduction pipeline to support the HS mode + LFC.

The timeline for developing the comb is approximately a year from when the contract with HWU is signed (which is due to happen within a month or two). The pipeline development will follow a phased approach that ought to provide basic functionality by the time the hardware is available, while the full pipeline will likely take a further year to complete.

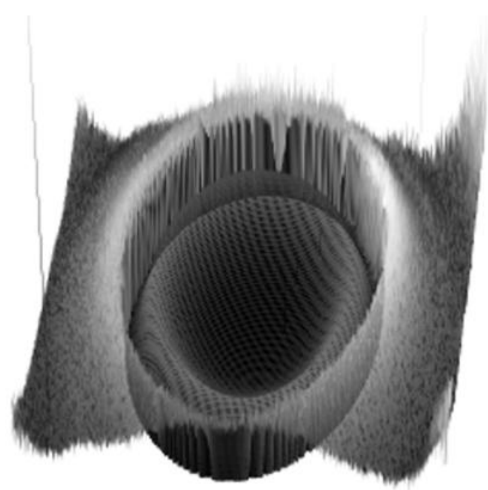
Lisa Crause.--

Fabry–Pérot Update

The refurbishment plan for the LR and MR Fabry–Pérot etalons is underway, and we are beginning to see some positive progress. Many hands will be on the deck at different points in this journey, but the core team shall consist of Prof. Ted Williams as the PI of the project, Dr. Encarni Romero-Colmenero, Eng. Nico Van der Merwe, and Dr. Liz Naluminsa (yours truly) as the FP postdoc.

Briefly, FP etalons are made of two parallel glass plates having highly reflective coatings on the inner surfaces and anti-reflective coatings on the outer surfaces. Our etalons' reflective surfaces had degraded so far from their original specifications to not be functional, hence the long desert spell in SALT FP science. New coatings, sealed housings, a new sturdier mount as well as remote operability of the controllers are the physical upgrades that will be coming our etalons' way, thanks to approval of a comprehensive refurbishment plan by the SALT board. The contracted company, working with Ted, had the new coatings designed and developed in lab, and their ideal performance determined using models. The next stage will be to test their real performance on a test substrate in place of the etalon surfaces before they are finally applied to the etalons and their performance tested again before acceptance. This will be followed by the rest of the refurbishment goals. Despite past delays due to the lockdown in the UK, we are hopeful that once the test substrate phase is done, things will move faster.

To go with the physical upgrades above, we have embarked on writing new calibration software. Fabry–Pérot spectroscopy calibrations are different from traditional spectroscopic calibrations due to the uniqueness of the data output. For a monochromatic source, the transmitted interference pattern are concentric rings of the successive interference orders, with the wavelength varying as the inverse square of the radius. Wavelength calibration thus involves taking a ring image of the arc lamp, determining its centre and radius, and finding a conversion between



Ring profile from an arc lamp on SALT with the FP.

pixel position and wavelength. This ring fitting routine is a crucial part of the calibration process as it directly determines the data fidelity. The new routine will cater for the transition from the 3-CCD detector to a single chip detector for compatibility with the upcoming RSS detector upgrade. We also plan for the routine to be independent of PyRAF for flexibility of user support. In addition to the wavelength calibration software, the post processing pipeline will likewise be updated. The work on software will enable us to hit the ground running when the etalons arrive, so as to right-away start with the acceptance tests, re-calibration and re-commissioning.

Elizabeth Naluminsa.--

MEET THE TEAM: Xola Ndaliso

Hi everyone,

I am Xola Ndaliso. I was born in Dutywa, which is a small town located on the N2 in the Eastern Cape. I finished my lower grades at T.S. Matsiliza JSS, in the rural areas of Good Hope location, thereafter moving to J.S Skenjana SSS in town for high school. I moved, for the first time, to Cape Town in 2015. I did my undergraduate in Physics and Masters in Astrophysics at the University of the Western Cape. I am now enrolled for part-time Ph.D. with the University of Witwatersrand. My interests are mostly computation modelling, machine learning and statistics. I like playing FIFA, but I'm mostly like to get a 6 – 1 or something. At least I score something ;). I also can cook, one of my favourite dishes is the simple creamy spaghetti with chicken. Sometimes I go for a hike, paintball (this is where I return the 6 – 1 favour, yup) and ice skating, which I'm terrible at.

My Ph.D. research has me working on the MeerKAT Cluster Legacy Survey. Currently, I am trying to build a model that will generate dynamics of several galaxies at once. These galaxies are at very low resolution, thus it is a bit challenging to get a working model from the first few attempts. For my Masters, I used neutral hydrogen (HI) data from the Australia Telescope Compact Array (ATCA) of the nearby interacting galaxy pair NGC 1512/10 to carry out a detail study of the HI content of the galaxy. We further inferred its dark matter content from the dynamical model. I think let me stop here, before I write a second M.Sc. thesis.

I am now delighted to be working for SALT as an operator at night and a developer during the day. I will learn as much as I can from this amazing team, and I will obviously contribute as much as possible.

Cheers, Xola

Planting maize back home.

SALT SCIENCE PAPERS

NOVEMBER 2020 – JUL 2021

Below is the list of SALT publications since our last newsletter (for our full list of publications, please visit http://astronomers.salt.ac.za/data/publications/). We encourage SALT users to inform us of any papers making use of SALT data, and to double check the link above after publication.

- Aromal, P., Srianand, R., & Petitjean, P. 07/2021: Correlated time variability of multicomponent high-velocity outflows in J162122.54+075808.4, MNRAS 504, 5975 https://ui.adsabs.harvard.edu/abs/2021MNRAS.504.5975A/abstract
- Mikołajewska, J., Iłkiewicz, K., Gałan, C., et al. 06/2021: The symbiotic recurrent nova V3890 Sgr: binary parameters and pre-outburst activity, MNRAS 504, 2122 https://ui.adsabs.harvard.edu/#abs/2021MNRAS.504.2122M/abstract
- Coe, M. J., Kennea, J. A., Evans, P. A., et al. 06/2021: The Be/neutron star system Swift J004929.5-733107 in the Small Magellanic Cloud-X-ray characteristics and optical counterpart candidates, MNRAS 504, 1398 https://ui.adsabs.harvard.edu/#abs/2021MNRAS.504.1398C/abstract
- Treiber, H., Vasilopoulos, G., Bailyn, C. D., et al. 06/2021: RX J0529.8-6556: a BeXRB pulsar with an evolving optical period and out of phase X-ray outbursts, MNRAS 503, 6187 https://ui.adsabs.harvard.edu/#abs/2021MNRAS.503.6187T/abstract
- Gilligan, C. K., Chaboyer, B., Marengo, M., et al. 06/2021: Metallicities from high-resolution spectra of 49 RR Lyrae variables, MNRAS 503, 4719 https://ui.adsabs.harvard.edu/#abs/2021MNRAS.503.4719G/abstract
- Wołowska, A., Kunert-Bajraszewska, M., Mooley, K. P., et al. 06/2021: Caltech-NRAO Stripe 82 Survey (CNSS). V. AGNs That Transitioned to Radio-loud State, ApJ 914, 22 https://ui.adsabs.harvard.edu/abs/2021ApJ...914...22W/abstract
- Crestani, J., Braga, V. F., Fabrizio, M., et al. 06/2021: On the Use of Field RR Lyrae as Galactic Probes. III. The α-element Abundances, ApJ 914, 10 https://ui.adsabs.harvard.edu/#abs/2021ApJ...914...10C/abstract
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- Gvaramadze, V. V., Kniazev, A. Y., Gallagher, J. S., et al. 05/2021: SALT observations of the supernova remnant MCSNR J0127-7332 and its associated Be X-ray binary SXP 1062 in the SMC, MNRAS 503, 3856
https://ui.adsabs.harvard.edu/abs/2021MNRAS.503.3856G/abstract

- Zajaček, M., Czerny, B., Martinez-Aldama, M. L., et al. 05/2021: Time Delay of Mg II Emission Response for the Luminous Quasar HE 0435-4312: toward Application of the High-accretor Radius-Luminosity Relation in Cosmology, ApJ 912, 10
https://ui.adsabs.harvard.edu/#abs/2021ApJ...912...10Z/abstract

- Kankare, E., Efstathiou, A., Kotak, R., et al. 05/2021: Core-collapse supernova subtypes in luminous infrared galaxies, A&A 649, A134
https://ui.adsabs.harvard.edu/abs/2021A%26A...649A.134K/abstract

- Muhie, T. D., Dambis, A. K., Berdnikov, L. N., Kniazev, A. Y., & Grebel, E. K. 04/2021: Kinematics and multiband period-luminosity-metallicity relation of RR Lyrae stars via statistical parallax, MNRAS 502, 4074
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https://ui.adsabs.harvard.edu/#abs/2021MNRAS.501.1951C/abstract

- Barna, B., Szalai, T., Jha, S. W., et al. 02/2021: SN 2019muj - a well-observed Type Iax supernova that bridges the luminosity gap of the class, MNRAS 501, 1078
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- Arcodia, R., Merloni, A., Nandra, K., et al. 2021: X-ray quasi-periodic eruptions from two previously quiescent galaxies, Nature 592, 704
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Credits: Chantal Fourie