SALT
Newsletter

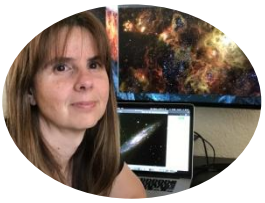
December 2021

Table of Contents

Cover image: Cleaning of the M3 mirror of the Spherical Aberration Corrector – *Credit*: Lisa Crause

Last page image: *Credit*: Bruno Letarte

Letter from the Head of Astro Ops



Dear SALT Community,

I'm writing this from my home office in Cape Town at 2am SAST, when I should be busy observing your targets remotely with SALT but have, yet again, been foiled by bad weather – it's been the worst we've had since 2015, and our completion stats (and your science programmes) are suffering as a result. It could be La Niña, but I'm really hoping it's just a temporary blip… I have to tell you though, it is so weird to be closed due to bad weather when I can see clear skies from my window!

The NIR spectrograph is really nearing completion now, and it is expected to arrive in South Africa in March 2022. The SALT team here and the NIR team at the University of Wisconsin have been regularly checking with each other and ensuring we're all ready for this. They will be busy re-building the instrument in the spectrometer room (which is right under the telescope) for the first few months after its arrival, with on-sky commissioning planned to begin in June 2022. I just can't wait to see it! Moses gives more details below.

We also have other exciting news: we have a shiny new grating, PG0700! We had actually planned to commission the grating in March/April 2022, ready for operations in semester 2022-1, but, in the last week or so, we've made the decision to postpone the next RSS shutdown to at least July/August 2022. This is so that our teams can concentrate on NIR, which makes perfect sense, but this may have implications for PG0700. Read more on the new PG0700 grating and the next RSS shutdown below.

And we're getting an IFU for RSS! Actually, two. Sabyasachi and Matt Bershady have been building them in their SAAO workshop, and we're hoping to commission them early in the new year. The slitmask entrance on RSS (also known as the letterbox) was modified during the October shutdown to accommodate them, so we're nearly ready to go! Sabyasachi tells all below.

And talking about the October SALT shutdown, it was a resounding success! Eben did a fantastic job with planning and everything went well (although he forgot to schedule good weather at the end!). You can read his summary of the main activities below.

To finish off, I have an appeal for all of our SALT users: please help us by updating your Web Manager profile with some extra information. Christian explains this very nicely below, so I'll just say thank you for considering it!

Wishing all of you a very relaxing break, a wonderful Christmas if you celebrate it, and that Santa brings you lots of joy in the form of super-awesome SALT observations!

And don't forget the deadline for SALT proposals: 28 January 2022.

Clear skies and stay safe!
Encarni

SCIENCE HIGHLIGHT

RR Lyrae variables: a new step in the Cosmic Distance Ladder

by Christina Gilligan (Dartmouth Collgege)

One of the biggest sources of tension in astronomy is the precise value of H_0. In general, there are two different methods to measuring H_0: early-time and late-time. Late-time measurements refer to measuring H_0 locally, using the Cosmic Distance Ladder, whose first rung is usually Cepheid variables. Early-time measurements are usually based upon the Cosmic Microwave Background (CMB). The difference between the early-time (around 74 km/s/Mpc) and late-time (around 67.4 km/s/Mpc) H_0 values is 4.4σ. It is now believed that this is not due to instrumentation or measurement errors, instead it seems to be either an error in our assumptions and calibrations of the Cosmic Distance Ladder or an inconsistency with the current version of ΛCDM.

To determine the cause of this tension, the Cosmic Distance Ladder needs to be further scrutinised. RR Lyrae, for example, can be used instead of Cepheid variables as an independent check of the first rung. RR Lyrae are variable stars similar to Cepheid variables and also follow a period-luminosity-metallicity (PLZ) relationship. In the past, using them in the distance ladder was not possible since RR Lyrae are fainter than Cepheids: only five RR Lyrae had parallaxes measured using the HST. With the advent of Gaia, however, there are now hundreds of RR Lyrae with well-measured parallaxes that can be used to recalibrate the Cosmic Distance Ladder.

As part of my PhD thesis (defended in July 2020), we recorded high-resolution spectra of 69 RR Lyrae using SALT with the goal of measuring accurate metallicties. Since only one instrument and telescope was used, our dataset is one of the largest, homogeneous sets of metallicities for RR Lyrae. I was greatly helped in this effort by Brian Chaboyer (Dartmouth College), Juliana Crestani (INAF-Osservatorio Astronomico di Roma), and Giuseppe Bono (INAF-Osservatorio Astronomico di Roma) among many others.

Every RR Lyrae in our sample has positive parallaxes in the Gaia EDR3 catalogue with uncertainties that are less than 10%. In addition, 54 of these stars have at least 20 epochs of simultaneous near infrared (J, H, and K) data from the InfraRed Survey Facility (IRSF, also in Sutherland). These epochs are well-spaced along the entire pulsation period of the star. Near-infrared PLZ relation-ships are preferred over optical for many reasons. The most beneficial aspect is the greatly reduced effect of reddening in the near-infrared bands. With both metallicities and near-infrared lightcurves, the most accurate near-infrared PLZ relationship for RR Lyrae can be attained. The IRSF data reduction and future work is being lead by Massimo Dall'Ora (INAF-Osservatorio Astronomico di Capodimonte). However, the data

reduction of our IRSF lightcurves is ongoing so for the analysis presented here we used W1 and W2 magnitudes from *WISE*.

RR Lyrae nearly always have periods of 0.9 days or less. This means that our HRS exposure times must be short to not cover too large of a pulsation period. Therefore, we were not able to conduct a line-by-line abundance analysis for each of the stars. Instead, we used a synthetic spectral analysis approach. We created a grid of stellar model atmospheres, varying temperature, pressure, microturbulent velocity, and [Fe/H]. We then iteratively compared this grid of models to a star's spectrum until we found a global minimum in χ^2. In the end, 58 RR Lyrae metallicities could be determined using this method, 49 of which did not previously have metallicities determined using high-resolution spectography. This leads to smaller errors in our final stellar parameter determinations.

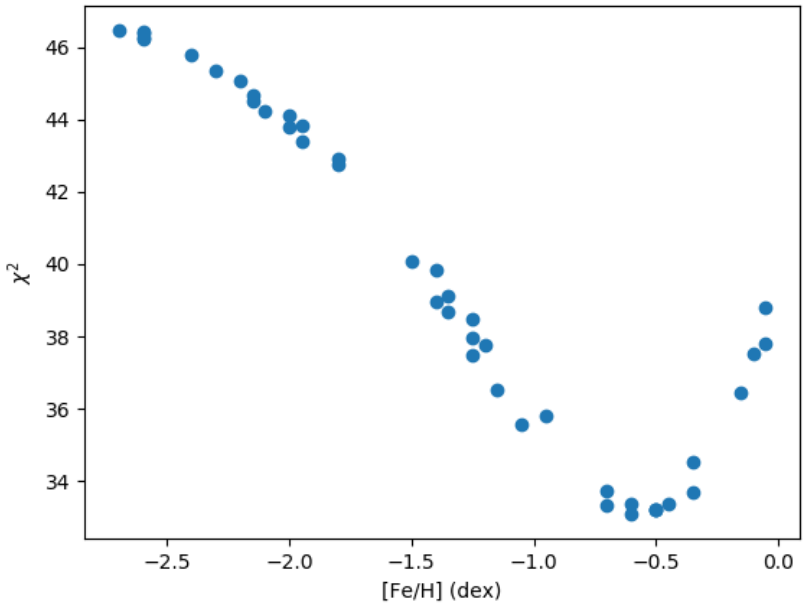


Figure 1: Example χ^2 versus [Fe/H] plot for AA CMi, a RRab type. The χ^2 is extremely apparent, leading to small errors in our final stellar parameter determinations.

By combining our new 49 RR Lyrae metallicities with 109 previously determined metallicities using HRS, we were able to construct new PLZ relationships for the *WISE* W1 and W2 bands. Our PLZ relationships have smaller uncertainties than previous observational determinations of the RR Lyr PLZ relations in the mid-IR. In the future, we will combine these metallicity measurements with our IRSF lightcurves to produce the near-infrared PLZ relationships. In addition, we have nearly 150 other RR Lyrae with more than 20 epochs of IRSF data that do not yet have metallicities from SALT. We hope to include those in our dataset in the future.

Both of these efforts will get us one step closer to solving the Hubble tension. Finally, JWST will be able to get infrared lightcurves also for RR Lyrae in near-by galaxies which will be enormously helpful.

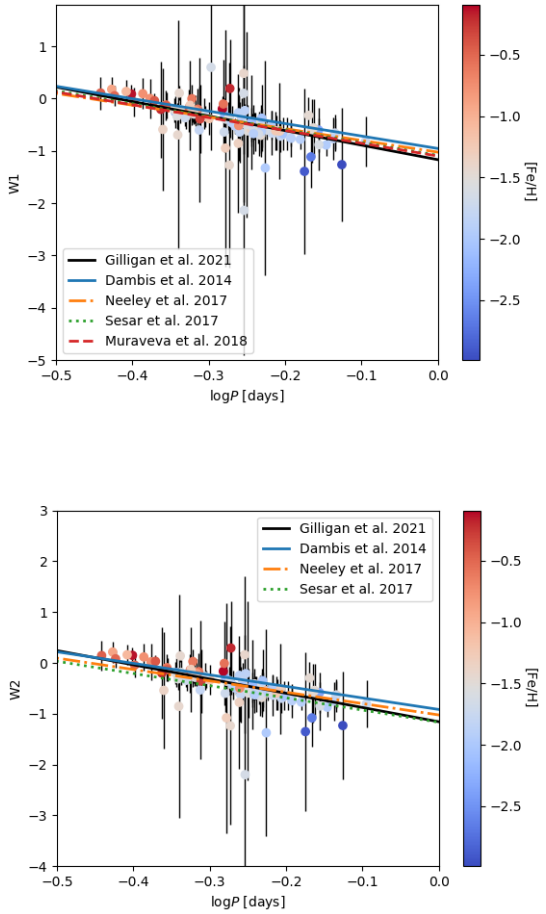


Figure 2: PLZ fits for the full HRS sample compared to the fits from Dambis et al. (2014), Neeley et al. (2017), Sesar et al. (2017), and Muraveva et al. (2018b). The top panel is for W1 versus log P while the bottom panel is for W2 versus log P , where P is the period of pulsation in days. The color bar indicates the metallicity of the RR Lyrae.

The SALT/HRS spectroscopic data of these RR Lyrae are further used in a larger project that investigates metallicities of RR Lyrae in gereral. Currently five publications with the title *On the Use of Field RR Lyrae as Galactic Probes* have been published (Fabrizio et al. 2019, Crestani et al. 2021a and 2021b, Fabrizio et al. 2021 and Braga et al. 2021).

Published as Gilligan et al. (2021), MNRAS Vol 503, pp 4719–4733

Introducing the new SALT Board Chair:

Brian Chaboyer from Dartmouth College

I am pleased to introduce myself as the new chair of the SALT board of directors. I've been a member of the SALT board since 2010, and a member of the board executive committee for the last 10 years. When Dartmouth College became a partner in SALT in 2001, I joined the SALT science working group and was a member of that group until I joined the board. Originally from Canada, I'm now a professor in the Department of Physics and Astronomy at Dartmouth.

My research focuses on stellar astrophysics and Galactic archaeology. I'm interested in improving models for the evolution of stars, and I use stellar models to help us understand the early formation history of our Milky Way galaxy. I helped to create the Dartmouth Stellar Evolution Database, which is widely used to interpret observations of stars. Recently, I have been interested in using RR Lyrae variables as distance indicators, and improving the calibration of the infrared period-luminosity-metallicity (PLZ) relation for RR Lyraes. As part of this effort, Christina Gilligan and myself used HRS on SALT to obtain spectra of 49 local RR Lyrae stars with well determined distances from Gaia parallaxes. These spectra were used to obtain accurate abundances for these stars, and were combined with literature data to calibrate a PLZ relation in the *WISE* W1 (3.4 micron) and W2 (4.6 micron) bands which has a zero-point uncertainty of +/- 2%.

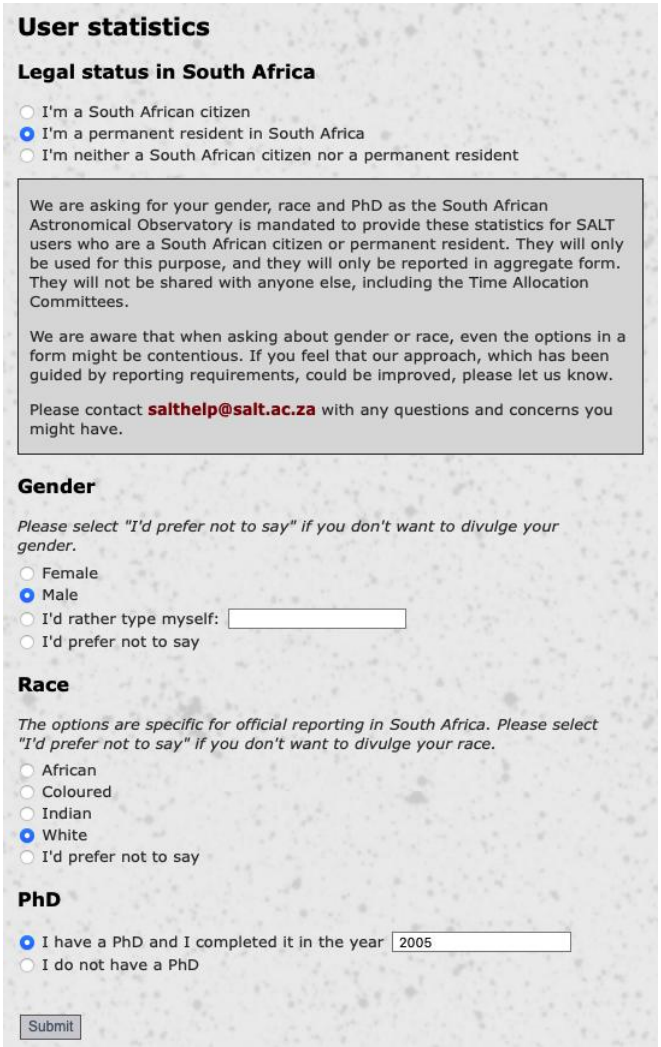
For SALT this is an exciting time, as we look forward to the commissioning of the first major new instrument to be installed on SALT since the first generation instruments were completed over 15 years ago. The near-infrared integral field spectrograph is being built at the University of Wisconsin and will have 212 object fibres and 38 sky fibres covering a field of view of 18 by 29 arcseconds. I am looking forward to working with SAAO and all of the SALT partners in the coming years.

Brian Chaboyer.--

SALT Users, we need your help...

Given South Africa's past of segregation and exclusion, creating and maintaining a vibrant and diverse cohort of scientists must be — and is — one of the key objectives of South African science policy. However, any policy should be guided by empirical data. The National Research Foundation of South Africa (NRF) has therefore asked the South African Astronomical Observatory (SAAO) to provide some statistics regarding the South African citizens and permanent residents using SALT.

SALT Astronomy Operations is therefore asking for your assistance by providing the required information. You can do so by filling in a simple form in the Web Manager, as shown in the image:



User statistics

Legal status in South Africa

- ○ I'm a South African citizen
- ◉ I'm a permanent resident in South Africa
- ○ I'm neither a South African citizen nor a permanent resident

We are asking for your gender, race and PhD as the South African Astronomical Observatory is mandated to provide these statistics for SALT users who are a South African citizen or permanent resident. They will only be used for this purpose, and they will only be reported in aggregate form. They will not be shared with anyone else, including the Time Allocation Committees.

We are aware that when asking about gender or race, even the options in a form might be contentious. If you feel that our approach, which has been guided by reporting requirements, could be improved, please let us know.

Please contact **salthelp@salt.ac.za** with any questions and concerns you might have.

Gender

Please select "I'd prefer not to say" if you don't want to divulge your gender.

- ○ Female
- ◉ Male
- ○ I'd rather type myself: [ ]
- ○ I'd prefer not to say

Race

The options are specific for official reporting in South Africa. Please select "I'd prefer not to say" if you don't want to divulge your race.

- ○ African
- ○ Coloured
- ○ Indian
- ◉ White
- ○ I'd prefer not to say

PhD

- ◉ I have a PhD and I completed it in the year [2005]
- ○ I do not have a PhD

Submit

The following details are required:

- Whether you are a South African citizen or permanent resident. If you are neither of these, you don't have to provide any further information.
- Your gender. You can either choose one of the available options or specify your gender yourself.
- Your race. The available options are specific for official reporting in South Africa.
- Whether you have a PhD. If you have a PhD, you are also asked for the year when it was completed.

Providing the details is simple. Please go directly to

https://www.salt.ac.za/wm/Options/EditUserStatistics

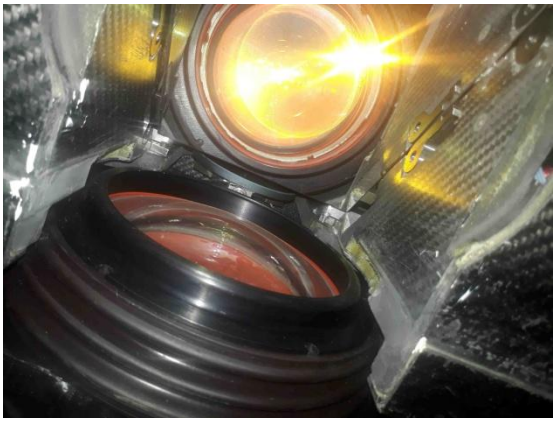
to enter your details. We would appreciate if you could do so at your earliest convenience. If you have not completed the form, you will also be prompted to do so next time you log on to the Web Manager, or when you need to approve a submitted proposal.

The information you provide will only be passed on in aggregate form and it will not be used for any purpose other than as stated above, nor will it be shared with anyone else, including the Time Allocation Committees. Even so, we are aware that user-specific information, and gender or race in particular, can be a highly sensitive issue and that you might be reluctant to share it. In this case, please make use of the option that you prefer not to divulge your gender or race.

We are also aware that when asking about gender or race, even the options in a form might be contentious. If you feel that our approach, which has been guided by the NRF's reporting requirements, could be improved, please let us know. You can reach us with your suggestions or any concerns you might have by sending an email to salthelp@salt.ac.za.

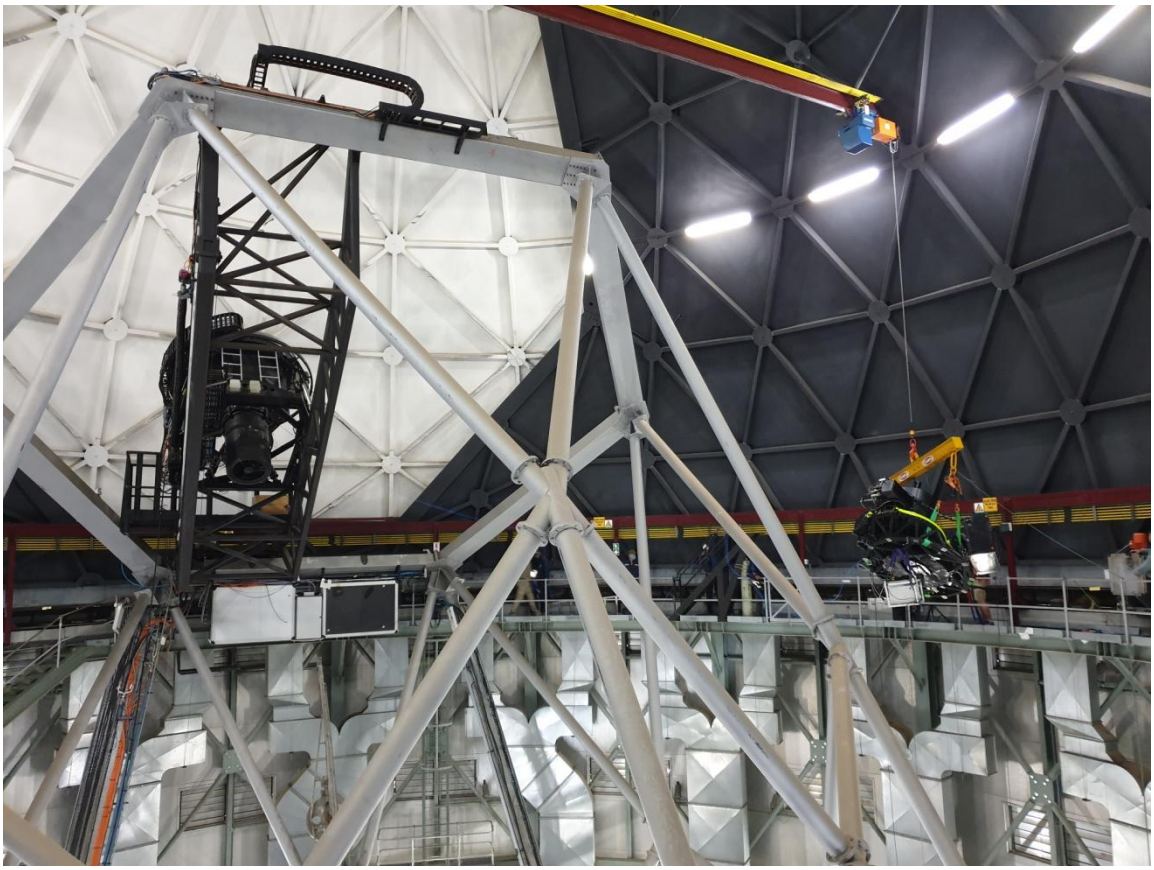
Christian Hettlage.--

Shutdown report: past

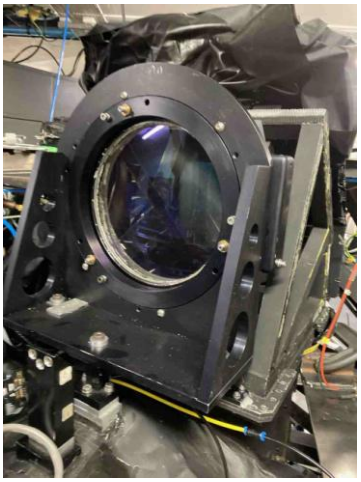


Light path view onto the Salticam fold mirror and Salticam front lens

The long awaited SALT shutdown officially kicked off on 11 October 2021. The Astro ops team had actually started a week earlier to perform pre-shutdown tests, which are essential to confirm that all is well with the instruments and to get a baseline of the telescope and instrument before the shutdown. The full shutdown was planned to finish on 28 October, although the telescope had to be on sky with SALTICAM and HRS from Wednesday 20 October. RSS is actually a 600 kg beast of an instrument, and it's amazing to see how the SALT tech ops team makes it look like a walk in the park to remove the instrument safely to the telescope floor. The video at https://www.youtube.com/watch?v=Ee0T21pSn94 shows this in a time lapse fashion. With the rotating structure also removed, the telescope appears really bare!



Our optical wizards Melanie and Janus, along with Francois Strumpfer, made short work of determining some important dimensions on the tracker. These dimensions are impossible to measure with the instruments and the rotating structure of the tracker in place, and they were urgently needed by the team in Wisconsin finishing our newest instrument, the NIR (see the report on the NIR update). During the shutdown, Dillon used “his bionic arm” (which is really called a romer arm) to make some additional measurements for the upcoming red arm of RSS (MaxE) and also to confirm positions of the main optical elements on RSS. This "bionic" arm of Dillon’s literally measures to the point of splitting hairs in a three dimensional format.



Also on RSS, we ran some tests looking for camera position changes during tracker movements, with interesting results – we are still looking into how to address this. And Thabelo replaced ccd cables – it seemed like there were the same amount of cables that had to be soldered than the amount of stars RSS must observe!

RSS doublet with all the baffling removed

The RSS slitmask mechanism was upgraded to be able to handle thicker slitmasks, which is key in order to accommodate our new glass longslit masks and the new IFU mask that Matt Bershady and Sabyasachi are working on (see their report). We tested the IFU mask after the installation and Sabyasachi was all smiles, with everything working as designed with only minor adjustments. The RSS gratings were inspected and removed, then the instrument was stripped for some more optical tests needed for the upcoming installation of the new doublet and the new triplet. SALT Astronomer and local instrument PI, Lee, also joined for the shutdown and was an active member of Team RSS.

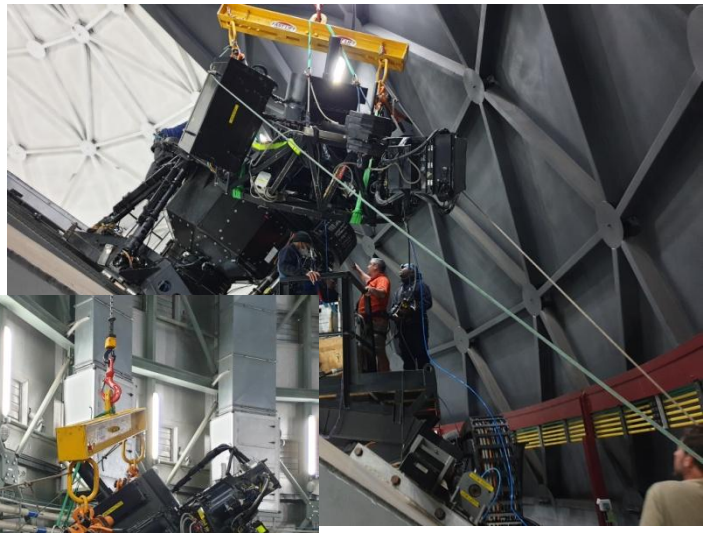
FIF guider situated in the rotating structure

The tracker’s rotating structure had some open heart surgery with mainly the mechanical team, Johan, Nicolaas,

Jonathan and Eben, supported by our in house sparky, Thabelo. The com-plete cooling system was replaced and the tightly packed payload puzzle had to be put back together after-wards. While these tasks were carried out, Etienne pampered his baby, the HRS, and did some baking and vacuum pumping and cryo cooler replacements.

All the scheduled tasks were completed on time and the telescope was back on sky the night of 20 October with HRS and SALTICAM ready for observations. The weather was the only part of the equation that ignored our schedule and kept the telescope closed for most of the following week! RSS was ready for lift on 28 October and SALT was ready for re-commissioning observations that same night.

The shutdown was a success. The SALT Tech Ops team worked together like a well-oiled machine and the few hiccups along the way were quickly and effectively sorted out, and all were done in good time. Projects like these show you the importance of diversity of thinking and problem solving and how we need professional skills from all disciplines to form one effective team that can tackle any challenge with confidence.



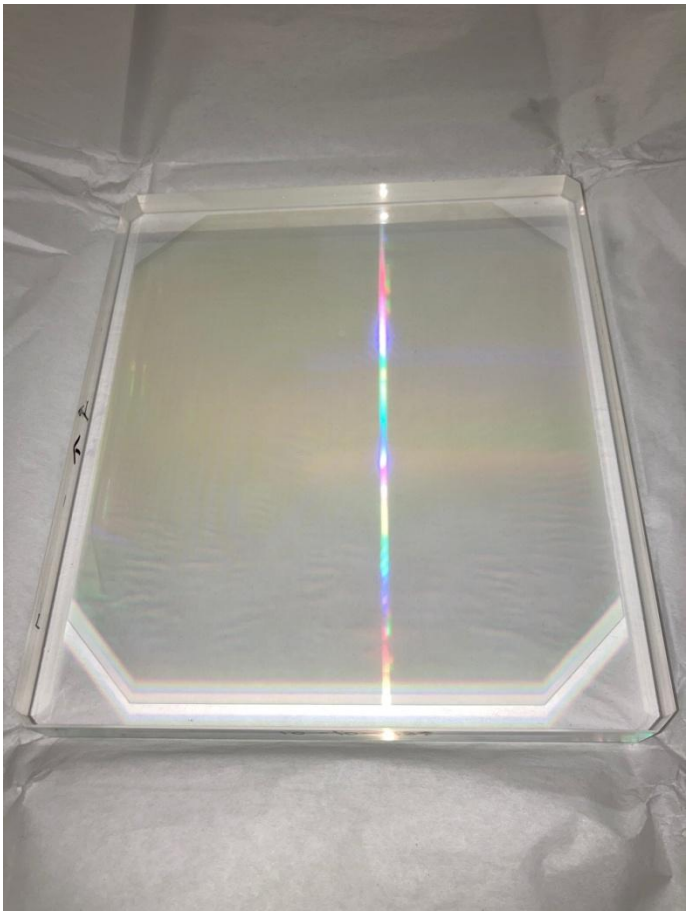
Getting the Payload back onto the structure

Francois and Melanie in the normal payload position doing the optical alignment measurements between the SAC and the Rho stage of the tracker.

Eben Wiid & Encarni Romero-Colmenero.—

Shutdown report: future

The next SALT shutdown to install the new triplet, doublet and PG0700 grating was initially planned for around March 2022. However, due to the imminent arrival of the NIR spectrograph, it was decided to push this shutdown back to July/August 2022. The downtime associated with this is likely to be similar to the shutdown just completed, namely: One week of complete telescope downtime, followed by 2 – 3 weeks with HRS and SALTICAM on-sky whilst RSS is worked on in the engineering room. This will mark a major milestone in the upgrading of RSS, giving us much improved optics, as well as a new grating and shiny new longslits! The roughly one week needed for this shutdown, as well as some extra time to commission NIR, will be reserved from the time available in the 2022-1 semester.



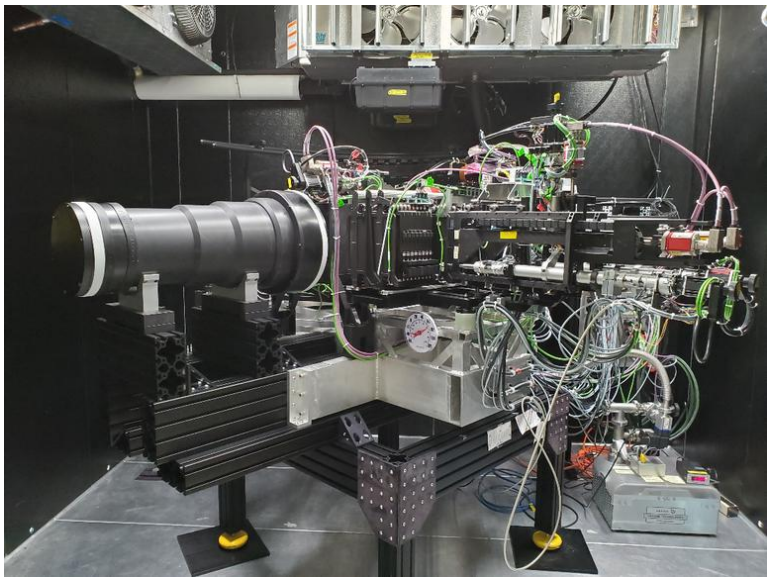
The shiny new PG0700 grating

Lee Townsend.--

NIR update

Instrument

The UW team has made progress on the instrument optical fibre cable work, including deciding on the final mapping of fibres from the eight slit blocks in the four fibre cables to the object IFU. In addition, the various parts of the instrument have been integrated and the camera, dewar and collimator were installed in the instrument enclosure. The articulation and camera focus have been exercised. The team has performed various room temperature tests as well as tests on optical and slit alignment, characterisation of bad pixels/dark current, image quality, and arc lamp wavelength calibration. They instrument enclosure has been prepared for operational temperature (–40 degrees) testing. Currently, the team is working on completing the end-to-end optical alignment at the operational temperature. The deadline for completing all lab testing is 20 December.



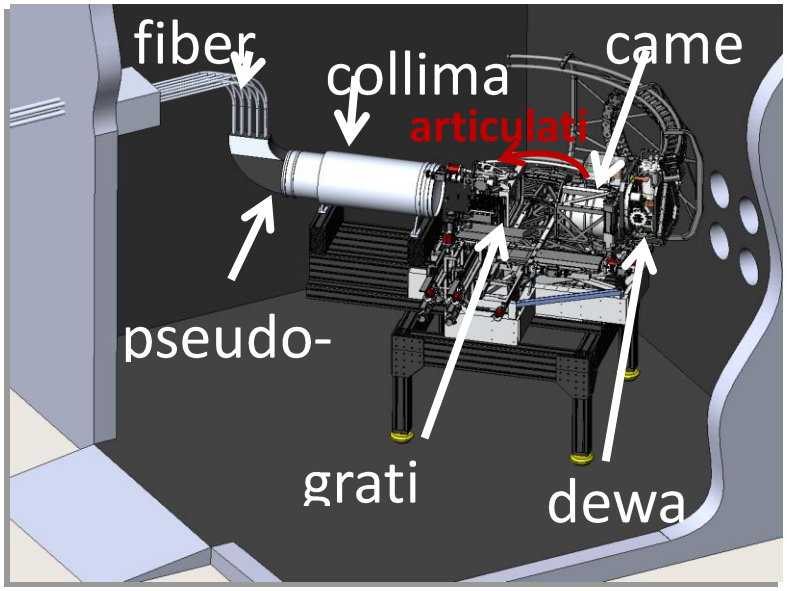


Figure 1: The NIR instrument. Right: A schematic of the NIR instrument with the different components and the direction of articulation.

ADC

The most noteworthy change to the telescope will be the replacement of the ADC. While the present ADC corrects for atmospheric dispersion effects covering a passband of 320 to 900 nm, the new one will extend the red limit to the required 1700 nm. Based on a new optical design, developed by SALT's optical engineers, the entire ADC mechanics and optics have been redesigned by SALT staff.

Manufacturing of the ADC mechanics, integration of mechanics, electronics and optomechanics as well as software changes to the ADC control system will be done locally.

Manufacturing of lenses and lens cells, lens AR coating and optomechanical integration of lenses into cells has been outsourced to an Italian company named Officina Stellare. The machining of the lenses was completed last July (Figure 2). The lenses were then polished at Officina Stellare and completed in October (Figure 3). The last phase for the completion of the lenses is anti-reflection coatings. The manufacturing of lens cells is scheduled for completion by end of December, the lens-cell integration will follow early in January 2022 and it will be shipped by end of January 2022.

Figre 2 Lens after CNC machining

Figure 3 Polishing of lenses

Manufacturing of the mechanics has been outsourced to a manufacturing company in Cape Town due to the large quantity of parts that must be produced. Delivery of mechanics (manufactured and commercially-of-the-shelf (COTS)) is also expected by middle to end of January 2022 with integration of all the parts and subassemblies starting end of January 2022.

Calsys

The calibration system also needs to be changed due to its limited transmission in the NIR passband. Currently the Calsys transmits light only between 320 and 900 nm. The calibration lamps required for NIR wavelength calibration have been identified from the lab tests. In the short term, an additional lamp bay with an infrared liquid light guide will be integrated into the Tracker Non-Rotating Structure. This will allow for light transmission out to 1650 nm. The last 50 nm will be calibrated using sky emission lines. The lamp bay will house three arc lamps and a QTH lamp.

Facilities

The NIR spectrograph will be located in a cooled enclosure in the Spectrometer Room similar to HRS. The major facility changes required will be cooling of the NIR enclosure refrigeration system as well as providing dry compressed air for purging and mechanisms actuators. These requirements have been discussed and plans are being made with SALT's regular service providers for cooling and compressed air systems to ensure that there is appropriate. The assembly of the enclosure and mechanics will be done between the beginning and end of March so that they are ready in time for the arrival of the NIR instrument.

Fibre Instrument Feed

The Fibre Instrument Feed (FIF) will be modified to include a fixture for the NIR IFU object and sky bundles (Figure 4). The distance between the object and sky bundle will be adjustable in the FIF jaw motion. UW has led the design of this new

NIR bundle fixture, and the interface between the fixture and FIF mechanism is being managed jointly by both parties. The final design of the FIF interface is being worked on and a prototype will be built soon. It is foreseen that the new parts will be manufactured at the SAAO mechanical workshop in January 2022.

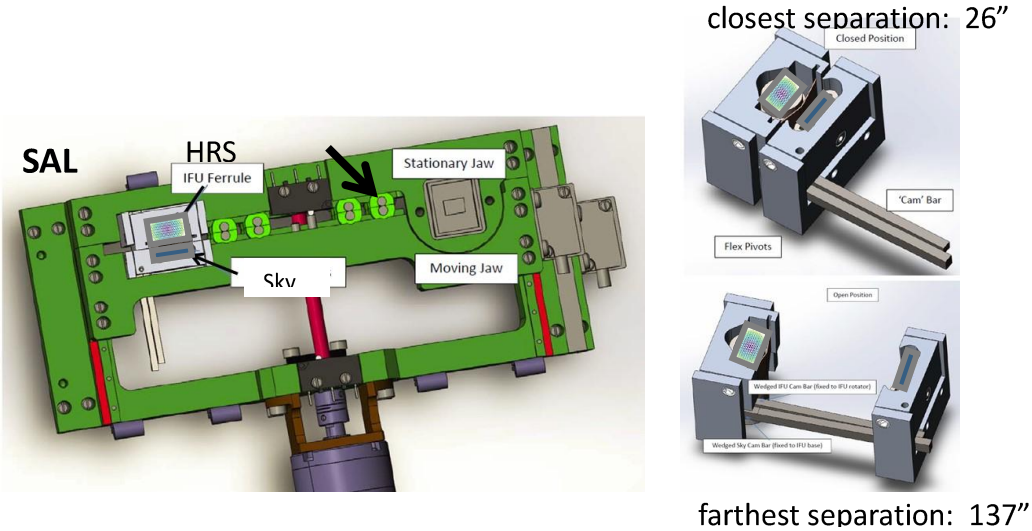


Figure 4: The FIF showing where the NIR fixture will be located, and the jaws. The images on the left show the maximum and minimum bundle separations.

Software

There has been ongoing software development from both UW and SALT Operations to prepare for the instrument. There have been developments in the detector software, instrument software and the SALT operations team has most recently been working on the framework for interactions between the instrument and the telescope control system software. Some of the changes will result in improvements to the way calibrations and dithers are performed at the telescope. The astronomy software team is also currently working on the required changes to the database and PIPT (for the creation of observing blocks) and on creating a data reduction pipeline. Plans for the commissioning and acceptance testing are also being discussed.

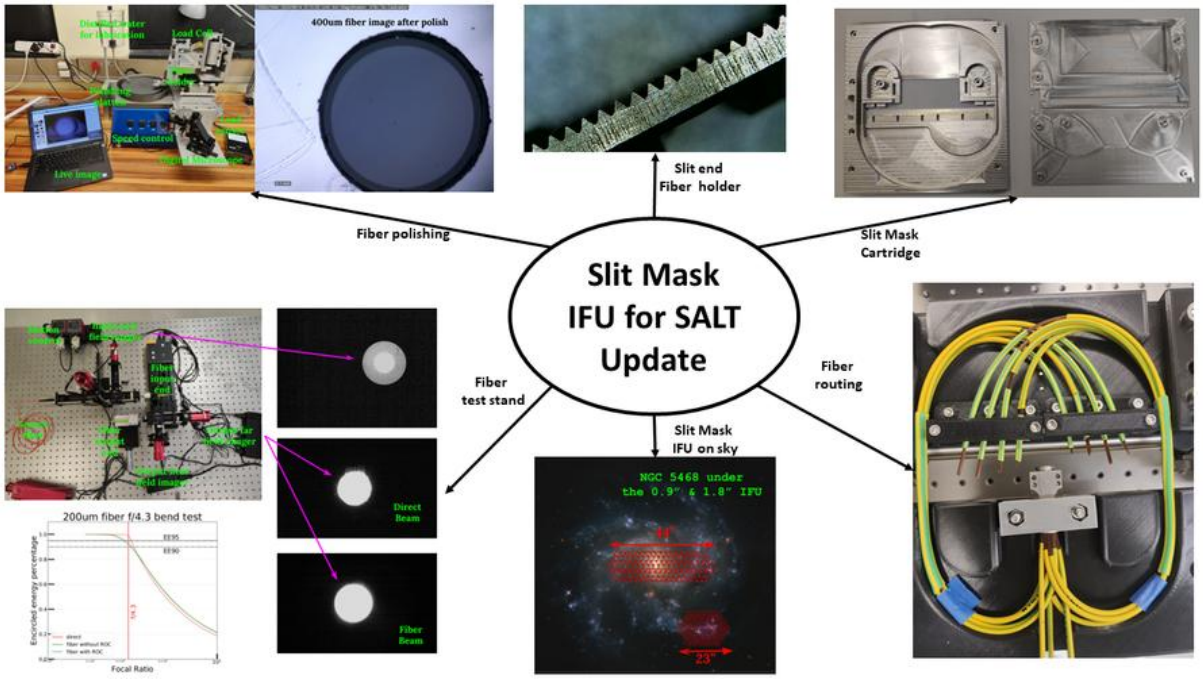
Tentative Timelines

The Instrument will be shipped on January 2022 and is expected to arrive at SALT in March. This will be followed by three commissioning campaigns. The first two will involve the freezer, structure and optical assembly, and end with first light, which is expected towards the end of May 2022. The on-sky and instrument commissioning will then begin in the latter part of June 2022.

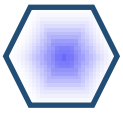
Moses Mogotsi.--

Slitmask IFU for the RSS

Two fibre integral field units are being built in the SAAO fibre-lab for the Robert Stobie Spectrograph's visible arm. Each sits in its own slit-mask cassette and is referred to as a slit-mask IFU (or SMI). These will be insertable in the same fashion as the existing long-slit cassettes at the SALT focal plane. Prismatic fold mirrors direct the focal plane into the fibre IFU and then back into the RSS collimator after the fibres are routed 360 deg within the cassette and formatted into a pseudo-slit. We aim to install the 200 micron (0.9 arcsec sampling, 18 x 23 arcsec field) and the 400 micron (1.8 arcsec sampling, 21 x 44 arcsec field) version in early 2022.



At this time, we have designed and procured the fold prisms, procured fibre for the first two IFUs, and designed and fabricated the first mechanical cassette. The SMI exterior mechanical cassette is tested on RSS cartridge-elevator-letterbox mechanism to ensure mechanical integrity and the longevity of the optical surfaces during the recently completed SALT shut-down. The fibre polishing station has been assembled and single-fibre cables of 200 and 400 microns are polished with satisfactory end finish. Using the SAAO fibre-lab state-of-the-art optical metrology and characterisation system, we found that the polished fibres are introducing marginal focal ratio degradation due to the additional bending inside the cassette. The scheme for interior fibre routing and polishing is being tested through prototype developed using a recently procured 3D printer. Testing of the delicate bonding process of fold-prisms into their mechanical structures is currently being performed



to confirm the choice of glue and its application method. 2D and 1D fibre array holder fabrication awaits tolerance testing to be performed on fixtures which are currently being fabricated. Over the coming semester, we plan to obtain all the fabricated part before polishing and characterising all the fibres including the prism assembly for both the 0.9"and 1.8" SMI simultaneously.

Sabyasachi Chattopadhyay.--

New grating PG0700

The PG0700 grating was designed to primarily support the 3650 to 7300 Å wavelength octave. An asymmetrical VPH design was selected with fringes tilted with respect to the grating surface. This allows one a degree of freedom to shift the Bragg angle away from Littrow. The new grating was designed such that this shift is more than the spectrograph camera's field-of-view and so places the Littrow-ghost off the detector. The PG0700 grating is therefore intended to be used in an off-Littrow configuration with the grating incidence angle nominally 13 degrees less than the diffraction angle. The original supplier of the RSS gratings was selected to manufacture the PG0700. Its external anti-reflection coatings were applied afterwards using a cold-coating process – again by the same vendor that coated the original RSS gratings.

The new PG0700 grating was installed on RSS in place of the PG1300 grating for one night to allow us to confirm the functionality of the grating and to perform some initial characterisation checks in preparation for the upcoming 2022-1 call for proposals. As it stands, SALT Operations plans to make PG0700 available for use during the 2022-1 semester on a shared-risk basis.

The first set of test data were taken on 1 December 2021. This dataset includes an ET5 (grating alignment) test, flats, arcs and on-sky spectrophotometric standard observations. The flats and arcs were taken at the three nominal setups (red, green, blue) and for all available arc lamps and QTH lamp combinations. Comparison data were also taken with the PG0300 and PG0900 gratings.

Figure 1 shows the spectrophotometric standard observation of EG21 using PG0700 (orange) and PG0900 (black). It shows how the new grating has better efficiency over most of the range except towards the red, which can probably be improved with some fine-tuning. Figure 2 shows the grating efficiency derived in the lab for reference, for the 3 nominal setups, and with comparison to PG0900.

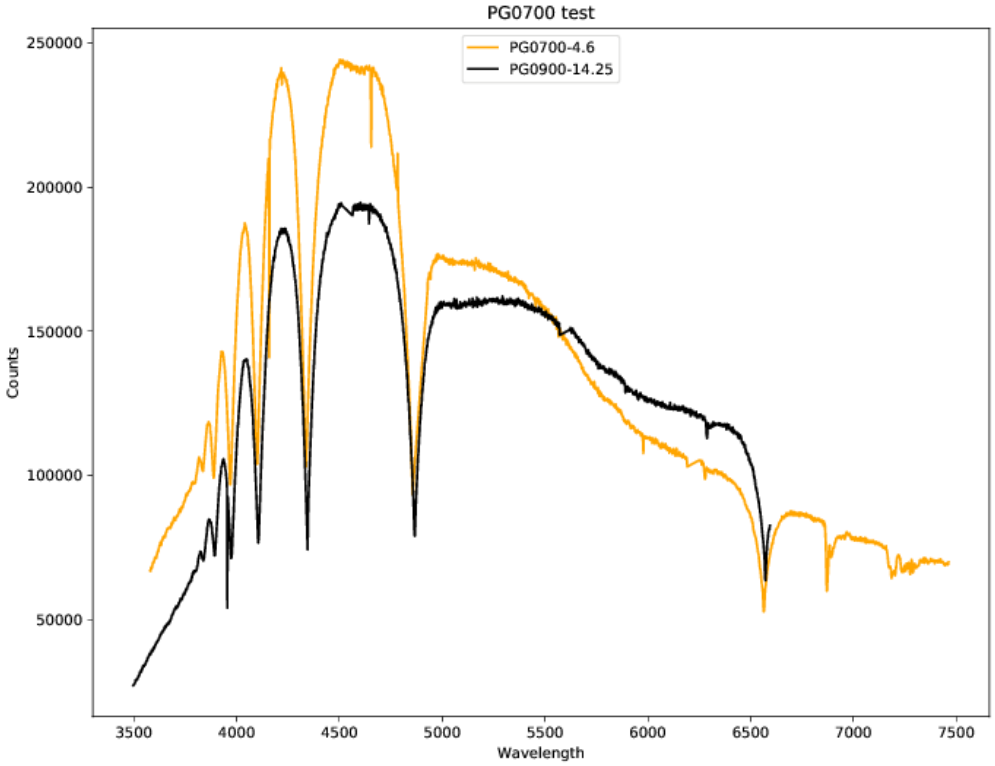


Figure 1: Comparing SPST spectra from PG0700 and PG0900 at grating angles of 4.6 and 13.25 degrees, respectively (note the typo in figure).

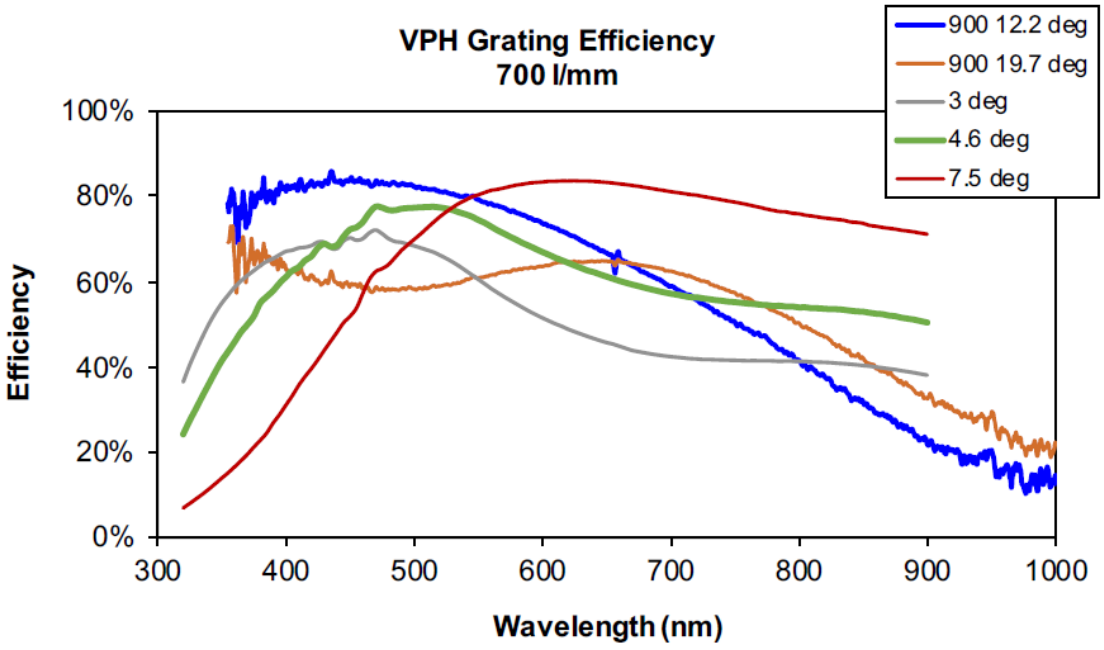


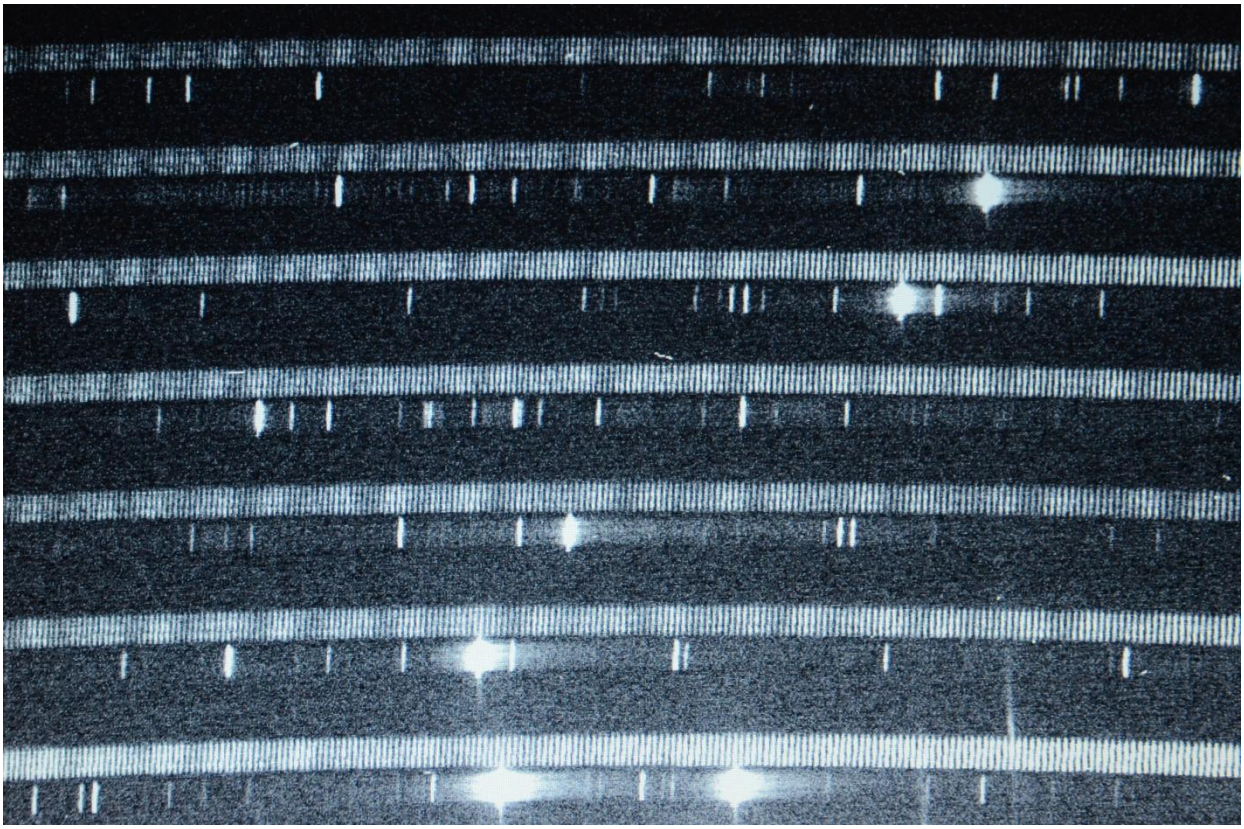
Figure 2: Grating efficiencies as measured in lab tests.

Lee Townsend & Janus Brink.—

Announcing the Call for Proposals

The Call for Proposals for the 2022-1 semester (1 May – 31 Oct 2022) will be published sometime in mid-December. In this call, we will announce the shared-risk availability of the new PG0700 grating. The grating is being briefly installed onto RSS on 1 December 2021 for initial testing and characterisation. We hope to be able to add the new grating to the RSS simulator very soon, so that interested PI's can estimate exposure times needed for their programmes. We hope the grating will be fully commissioned some time in the first half of 2022 and be available for shared-risk use for part of the 2022-1 semester. Stay tuned!

Lee Townsend.—



MEET THE TEAM: Chaka Mofokeng

Hello everyone,

I am Chaka Mofokeng, born in Welkom, located near Bloemfontein in the Free State. I went to Lemotso Primary School, afterwards, I went to Leseding Technical Secondary School. In 2016, I registered for an undergraduate degree in Astronomy and Physics at the University of the Free State.

Soon after, I became interested in machine learning and its applications to astronomy. As such, I did my Honours in Physics at the University of KwaZulu Natal and chose a research project in machine learning and astronomy.

And for my Masters (hoping to submit soon!), registered at the University of the Western Cape, my research project focused on applying a machine learning algorithm to classify radio sources from multi-wavelength image data. We further turned this algorithm into a fully-fledged source characterisation algorithm to detect, classify and cross-identify radio sources with their infrared counterparts.

I enjoy playing football (being on the field and playing FIFA) and pool. And sometimes I go for a hike or a run around the beach.

I am very excited to be working as a software developer at SAAO, and I enjoy being part of the team and learning from them. I am looking forward to making more positive contributions to the team and the organisation at large.

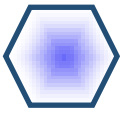
Cheers, Chaka

SALT SCIENCE PAPERS

August 2021 – November 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.

- Manick, R., Miszalski, B., Kamath, D., et al. 12/2021: The binary central star of the bipolar pre-planetary nebula IRAS 08005-2356 (V510 Pup), MNRAS 508, 2226 -- https://ui.adsabs.harvard.edu/abs/2021MNRAS.508.2226M
- Kennea, J. A., Coe, M. J., Evans, P. A., et al. 11/2021: Swift J011511.0-725611: discovery of a rare Be star/white dwarf binary system in the SMC, MNRAS 508, 781 -- https://ui.adsabs.harvard.edu/abs/2021MNRAS.508..781K
- Di Teodoro, E. M., Posti, L., Ogle, P. M., Fall, S. M., & Jarrett, T. 11/2021: Rotation curves and scaling relations of extremely massive spiral galaxies, MNRAS 507, 5820 -- https://ui.adsabs.harvard.edu/abs/2021MNRAS.507.5820D
- Ilin, E., Poppenhaeger, K., Schmidt, S. J., et al. 10/2021: Giant white-light flares on fully convective stars occur at high latitudes, MNRAS 507, 1723 -- https://ui.adsabs.harvard.edu/abs/2021MNRAS.507.1723I
- Pustilnik, S. A., Egorova, E. S., Kniazev, A. Y., et al. 10/2021: XMP gas-rich dwarfs in nearby voids: results of BTA spectroscopy, MNRAS 507, 944 -- https://ui.adsabs.harvard.edu/abs/2021MNRAS.507..944P
- Jencson, J. E., Andrews, J. E., Bond, H. E., et al. 10/2021: AT 2019qyl in NGC 300: Internal Collisions in the Early Outflow from a Very Fast Nova in a Symbiotic Binary, ApJ 920, 127 -- https://ui.adsabs.harvard.edu/abs/2021ApJ...920..127J
- Fesen, R. A., Drechsler, M., Weil, K. E., et al. 10/2021: Far-UV and Optical Emissions from Three Very Large Supernova Remnants Located at Unusually High Galactic Latitudes, ApJ 920, 90 -- https://ui.adsabs.harvard.edu/abs/2021ApJ...920...90F
- Fabrizio, M., Braga, V. F., Crestani, J., et al. 10/2021: On the Use of Field RR Lyrae As Galactic Probes: IV. New Insights Into and Around the Oosterhoff Dichotomy, ApJ 919, 118 -- https://ui.adsabs.harvard.edu/abs/2021ApJ...919..118F
- Braga, V. F., Crestani, J., Fabrizio, M., et al. 10/2021: On the Use of Field RR Lyrae as Galactic Probes. V. Optical and Radial Velocity Curve Templates, ApJ 919, 85 -- https://ui.adsabs.harvard.edu/abs/2021ApJ...919...85B



- Wood, M. L., Mann, A. W., & Kraus, A. L. 10/2021: Characterizing Undetected Stellar Companions with Combined Data Sets, AJ 162, 128 -- https://ui.adsabs.harvard.edu/abs/2021AJ....162..128W
- Buckley, D. A. H., Bagnulo, S., Britto, R. J., et al. 09/2021: Spectropolarimetry and photometry of the early afterglow of the gamma-ray burst GRB 191221B, MNRAS 506, 4621 -- https://ui.adsabs.harvard.edu/abs/2021MNRAS.506.4621B
- Holdsworth, D. L., Cunha, M. S., Kurtz, D. W., et al. 09/2021: TESS cycle 1 observations of roAp stars with 2-min cadence data, MNRAS 506, 1073 -- https://ui.adsabs.harvard.edu/abs/2021MNRAS.506.1073H
- Dorsch, M., Jeffery, C. S., Irrgang, A., Woolf, V., & Heber, U. 09/2021: EC 22536−5304: a lead-rich and metal-poor long-period binary, A&A 653, A120 -- https://ui.adsabs.harvard.edu/abs/2021A&A...653A.120D
- Gupta, N., Srianand, R., Shukla, G., et al. 08/2021: Evolution of Cold Gas at 2 < z < 5: A Blind Search for H I and OH Absorption Lines toward Mid-infrared Color-selected Radio-loud AGN, ApJS 255, 28 -- https://ui.adsabs.harvard.edu/abs/2021ApJS..255...28G