SALT
Newsletter

April 2025

Table of Contents

Editor: Anja C. Schröder

Cover image: SALT control room. -- *Credit*: SAAO

Letter from the Acting Head of Astro-Ops

Dear SALT Community,

As we move through the first quarter of 2025, I'd like to share a few updates from the SALT team.

We're very pleased to officially welcome Antoine Mahoro, who joined the SALT Astronomy Operations team in January 2025. While Antoine is new in terms of his appointment, he's no stranger to SALT — having actively observed on the telescope during his time as a postdoc. Antoine brings valuable experience and will be leading the continued development of the Slitmask SMI mode on RSS. We're delighted to have him on board and look forward to his contributions. Please see the "Meet the Team" article in this newsletter, where Antoine introduces himself.

At the same time, we bid farewell to Chaka Mofokeng, one of our SALT software developers, who has moved on to new opportunities. We thank Chaka for his many contributions to various SALT projects and wish him all the best in this next chapter of his career.

We're pleased to announce the release of the long-awaited polarimetry calibration update in the Gamma release, which includes updates to polSALT, the official SALT polarimetric data reduction pipeline. For more details, please refer to the dedicated article in this newsletter.

Finally, as many of you know, the telescope-wide shutdown is currently underway and scheduled to be wrapped up in May. Teams across SALT are hard at work on various upgrades and maintenance tasks, with a particular focus on the primary mirror. We're grateful for everyone's efforts during this critical period to ensure the telescope is well-prepared for the next phase of operations.

Until next time,
Danièl

Polarimetry Calibration Release

Over the past few years, we, Kenneth Nordsieck and Danièl Groenewald, have worked on refining the calibrations for the RSS spectropolarimetric science observations. We are excited to announce the Gamma release of the polSALT software[1], which includes new calibrations for RSS spectropolarimetry, starting with the PG0900 grating. This new release also includes the capability of reducing spectropolarimetry observations taken with the PG0700 grating. The new calibrations mark a significant improvement in the accuracy and precision of polarimetric observations with SALT.

Issues identified in the previous calibration

Over the past few years, we identified two key calibration deficiencies:

- Position angle (PA) ripple: High signal-to-noise data revealed a "ripple" in the position angle's wavelength dependence, caused by variations in the waveplate illumination over a SALT track.
- Polarisation degree variation: Recent comparisons with VLT/FORS2 standard stars showed a small PA–dependent effect in the wavelength dependence of the degree of polarisation.

Calibration enhancements for the PG0900 grating in the Gamma release

The new release addresses these issues with the following improvements:

- Track dependence calibration: A new model accounts for changes in the RSS pupil illumination over the SALT track, significantly reducing the PA ripple (see Fig 1).

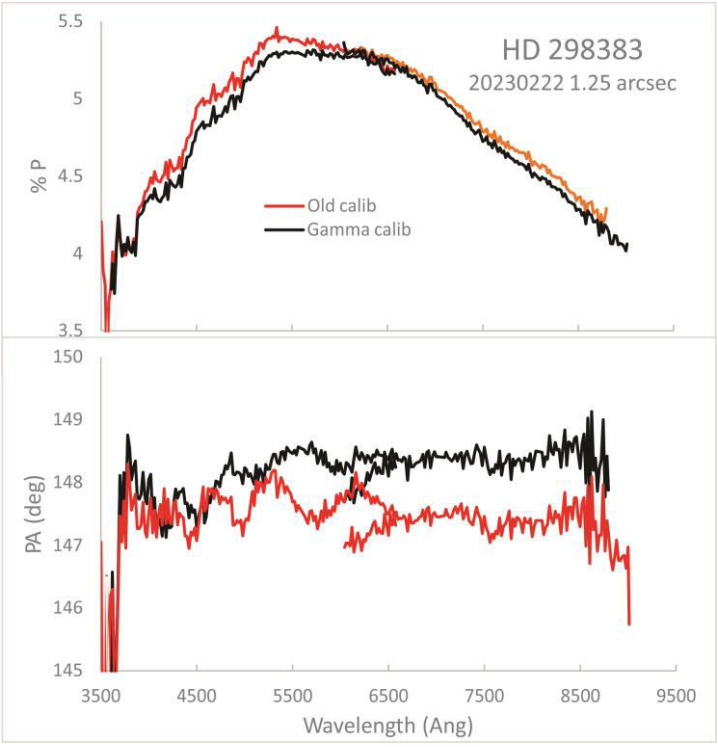

Figure 1: Comparison of the old (red) and new (black) calibration for HD298383, using a narrow slit.

[1] https://github.com/saltastro/polsalt

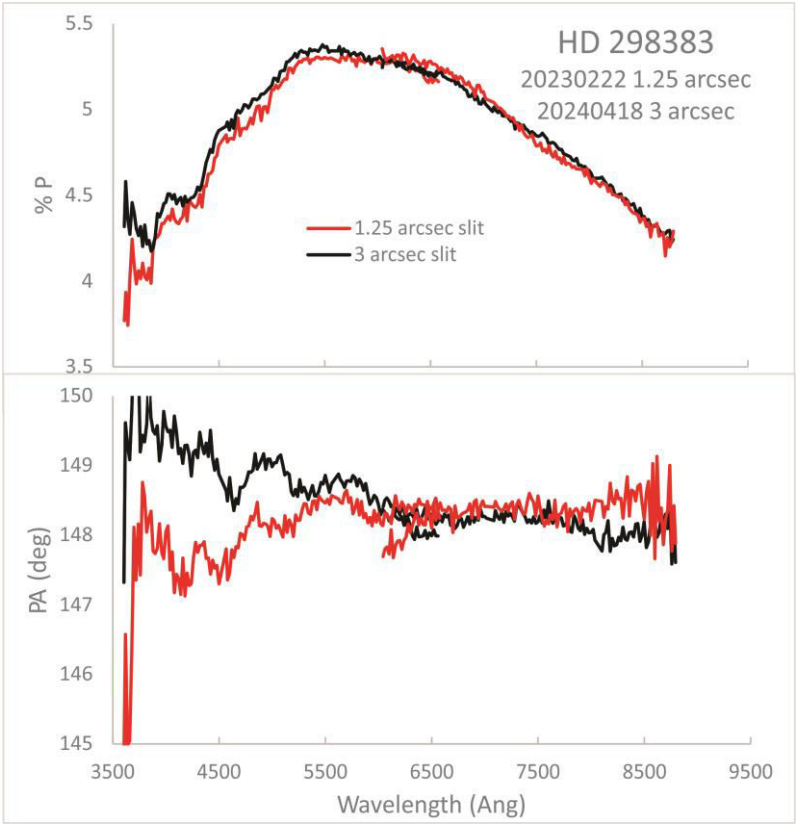

Figure 2: Comparison of the new calibration for a narrow (red) and a wide (black) slit observation of HD298383.

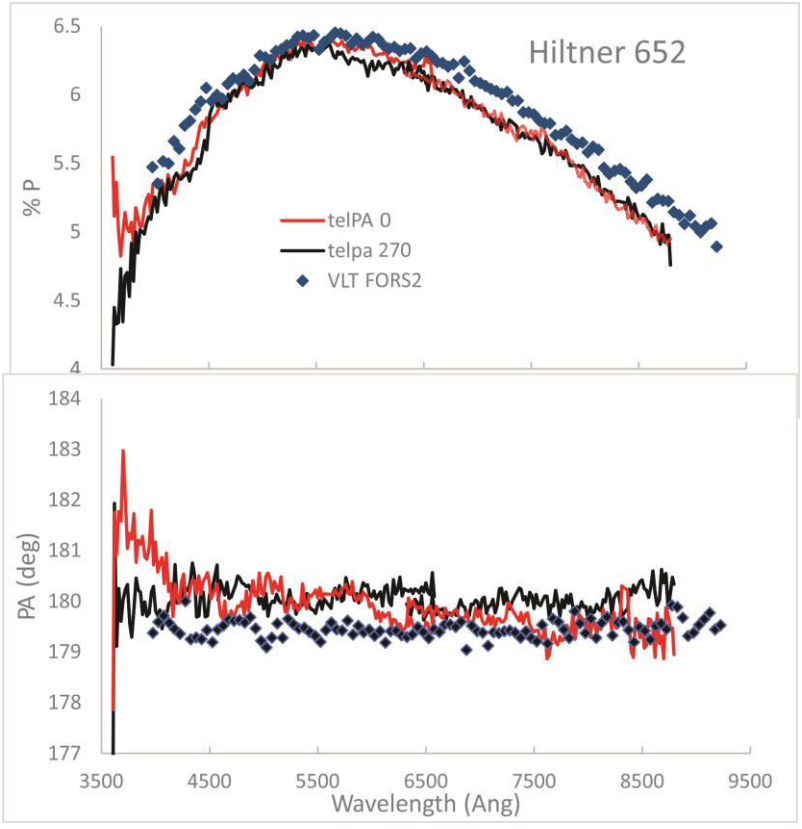

Figure 3: Comparison of the new calibration for standard Hiltner 652 with telPA set to be 0 (red) and optimal (black), 90 degrees from the polarisation PA. The VLT/FORS2 mean result for Hiltner 652 is also shown (blue diamonds).

- Wide slit optimisation: Using a wide slit (3" longslit, see Fig. 2) and setting the telescope position angle (telPA) to 90° from the polarisation PA yields the most accurate results (see Fig 3).
- Improved accuracy: Comparisons with VLT/FORS2 standards show a reduction in PA ripple and a close alignment of polarisation degree, enhancing overall calibration precision (see Fig 3).

For more details, including performance comparisons with the previous calibrations, please refer to the updated documentation on the polSALT GitHub wiki page:
https://github.com/saltastro/polsalt/wiki/Linear-Polarization-Reduction:-Gamma-version

Our work is now focused on developing the future Delta version of the software, which will address slit and PA effects. Ken and I are grateful for the SALT polarimetry community's patience, and we look forward to hearing your feedback as you work with the improved calibration.

Danièl Groenewald & Kenneth Nordsieck.--

Dartmouth student visit

Dartmouth College partnered with SAAO and the UCT astronomy department to continue their off-campus astronomy programme. A group of 16 undergraduates, two PhD students and three faculty members spent 10 weeks in South Africa, from early January to mid-March. During their time in South Africa, students learned about observational astronomy and were introduced to research methods and current astronomical research in South Africa. Classes were held in the mornings at both SAAO and UCT during the first five weeks of the programme. Students really enjoyed their tours of the SAAO Cape Town facilities, along with attending morning tea. Several UCT and SAAO astronomers gave invited talks to the students, describing their research. During their visit, the students also participated in outreach programmes to local schools, working with the SAAO public outreach group. A highlight of the programme was a two-week observing run using the SAAO telescopes in Sutherland (1.9m, 1.0m and Lesedi). Each student was able to spend a week in Sutherland, taking observations of CVs, RR Lyrae stars and exoplanet transits. The students had a chance to tour SALT during the day and observed SALT nighttime observations. The last few weeks were spent in Cape Town, where the students analysed the data they obtained at Sutherland, as well as SALT RSS spectra of low-mass galaxies.

Brian Chaboyer & Ryan Hickox.--

SALT at the AfAS Annual Conference 2025

The African Astronomical Society (AfAS) held its annual conference from 24 – 28 March 2025 at Emperor's Palace in Johannesburg, South Africa. The event brought together astronomers from across the continent and beyond to share their latest research and initiatives.

Several SAAO staff members and students attended, delivering talks and presenting posters on their ongoing work. Representing SALT, Danièl Groenewald gave an update on SALT's Astronomical Operations and hosted a 90-minute workshop focused on the SALT proposal tools.

As part of the workshop, a list of SALT proposal tools — including the PIPT and instrument simulators — was circulated in advance, along with four observational scenarios. Participants were asked to use these tools to prepare a Phase 1 proposal, consider appropriate target selections, and determine exposure times to achieve a given signal-to-noise ratio (SNR) or, vice versa, given certain observing conditions.

At the start of the session, participants were asked whether they had previously written any kind of proposal — not limited to telescope time. Only two attendees had done so, which made it a perfect opportunity to introduce the fundamentals of proposal writing. The workshop covered best practices, common pitfalls, and practical tips for crafting effective proposals — skills that are broadly applicable across scientific disciplines.

Although time was limited, Danièl worked through one of the scenarios live, demonstrating how to determine exposure times or achievable SNR values based on the observing conditions. The session was interactive, with participants asking questions about various aspects of the proposal process, including time allocation procedures and the different types of proposals supported by SALT.

Danièl talks about how to write a proposal.

The workshop was well received and provided a valuable introduction to SALT's proposal preparation process, especially to potential African PIs. It also helped build confidence among potential users by demystifying the tools and workflow involved.

Danièl Groenewald.--

A Night to Remember:

Making a Dream Come True at SAAO and SALT

Since 1988, the “Reach For A Dream Foundation” has brought hope, joy, and healing to countless children by helping them use their dreams to fight life-threatening illnesses. The foundation fulfils dreams that provide a temporary escape from challenging medical treatments and inspire children to believe that tomorrow is worth fighting for. More details can be found here: https://reachforadream.org.za/who-we-are.

On a truly special evening in Observatory, we had the privilege of welcoming Brendon Rossouw and his mother, Melanie, for a tour that was as inspiring as it was emotional. This visit, arranged through Reach for a Dream, was not just about astronomy — it was about hope, passion, and the power of dreams.

Brendon, a young man from humble beginnings, has an incredible love for astronomy. His excitement upon arriving at SAAO with the promise of operating SALT was palpable, and throughout the tour, his thirst for knowledge was evident. Seeing his enthusiasm as he explored the wonders of the Universe was a reminder of why we do what we do.

The evening was filled with unforgettable moments:

A Special Surprise: Brendon received a high-performance laptop from Reach for a Dream — a crucial tool that will support his aspirations in astronomy.

A Personal Touch: Dinner featured his much-anticipated “Oh My Seoul” pizza from Col’Cacchio, a meal he had been looking forward to for some time.

Hands-On Astronomy: Under the guidance of our “on-call” astronomer, Christian, and our Operator, Shamin, Brendon had the rare opportunity to remotely operate SALT. To commemorate this milestone, he was presented with a Certificate of Appreciation — a moment that left him in awe.

Brandon (4th from the left) and his mother (3rd from left) with the SAAO/SALT team.

A Gift to Remember: Brendon was also given a Galileoscope, a gift that captivated him so much that we had to gently nudge him to put it away for safekeeping!

Stargazing Magic: The night sky did not disappoint. Observing Jupiter and the Orion Nebula left both Brendon and Melanie in wonder, their reactions reminding us of the sheer beauty and impact of astronomy.

The evening concluded with an overjoyed Brendon and an emotional Melanie, who expressed her deep gratitude to SAAO and SALT. She shared that this experience was something she and Brendon would cherish forever and asked us to extend her heartfelt thanks to everyone who helped make this dream come true.

Pran Govender.--

MEET THE TEAM:
Antoine Mahoro

SALT Astronomer

I was born and raised in Rwanda. I remember meeting Dr. Pheneas Nkundabakura back in 2010. He had just returned to Rwanda from the University of the Free State, and I met him at the Kigali Institute of Education (KIE), where I was pursuing my undergraduate degree, majoring in Physics with Education.

Before meeting Dr. Nkundabakura, I knew nothing about astronomy and astrophysics. However, after attending a one-week introductory astronomy lecture given by Dr. Nkundabakura, which also covered astrophysics software, my curiosity immediately peaked!

I started exploring ways to work in astronomy, and in my final undergraduate year, I collaborated with Dr. Nkundabakura to complete my first astrophysics project entitled: "Modelling Synchrotron Emission from Active Galactic Nuclei". This project significantly broadened my understanding of astronomy.

In 2013, I met Prof. Väisänen and Dr Mirjana during a week-long astronomical data reduction workshop held in Rwanda, further motivating me to pursue astrophysics. In 2015, I enrolled for my Master's degree at Mbarara University of Science and Technology (MUST). Later, in 2018, I started my PhD in astrophysics at the University of Cape Town (UCT). After earning my PhD, I undertook a one-year postdoctoral fellowship at the South African Astronomical Observatory (SAAO).

My research specialisation is in optical observational astronomy, focusing on galaxy formation and evolution, as well as the properties of normal and active galaxies.

I am now thrilled and excited to join SAAO as a SALT astronomer, and I look forward to collaborating with everyone in Cape Town and Sutherland.

— Antoine

SALT SCIENCE PAPERS

December 2024 – March 2025

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.

- Siwak, M., Kóspál, Á., Ábrahám, P., et al. 03/2025: Gaia20bdk – New FU Ori-type star in the Sh 2-301 star-forming region, A&A 695, A130 -- https://ui.adsabs.harvard.edu/abs/2025A&A...695A.130S
- Valerin, G., Pastorello, A., Mason, E., et al. 03/2025: A study in scarlet: II. Spectroscopic properties of a sample of intermediate-luminosity red transients, A&A 695, A43 -- https://ui.adsabs.harvard.edu/abs/2025A&A...695A..43V
- Rodriguez, A. C., El-Badry, K., Hakala, P., et al. 02/2025: A Link Between White Dwarf Pulsars and Polars: Multiwavelength Observations of the 9.36-minute Period Variable Gaia22ayj, PASP 137, 024202 -- https://ui.adsabs.harvard.edu/abs/2025PASP..137b4202R
- Pennock, C. M., van Loon, J. T., Cioni, M.-R. L., et al. 02/2025: The VMC Survey - LI. Classifying extragalactic sources using a probabilistic random forest supervised machine learning algorithm, MNRAS 537, 1028 -- https://ui.adsabs.harvard.edu/abs/2025MNRAS.537.1028P
- Sobrino Figaredo, C., Chelouche, D., Haas, M., et al. 02/2025: Broad-line Region Characterization in Dozens of Active Galactic Nuclei Using Small-aperture Telescopes, ApJS 276, 48 -- https://ui.adsabs.harvard.edu/abs/2025ApJS..276...48S
- Patnaude, D., Weil, K. E., Fesen, R. A., Milisavljevic, D., & Kraft, R. P. 02/2025: Late-time Optical and X-Ray Emission Evolution of the Oxygen-rich SN 1996cr, ApJ 980, 82 -- https://ui.adsabs.harvard.edu/abs/2025ApJ...980...82P
- Dastidar, R., Misra, K., Valenti, S., et al. 02/2025: SN 2018is: A low-luminosity Type IIP supernova with narrow hydrogen emission lines at early phases, A&A 694, A260 -- https://ui.adsabs.harvard.edu/abs/2025A&A...694A.260D
- Guerrero, M. A., Santamaría, E., Liberato, G., et al. 02/2025: Confirmation of the planetary nebula nature of HaTr 5: Not a remnant of Nova Sco 1437, A&A 694, A105 -- https://ui.adsabs.harvard.edu/abs/2025A&A...694A.105G
- Matchett, N., & van Soelen, B. 01/2025: New insight into the orbital parameters of the gamma-ray binary HESS J0632 + 057, MNRAS 536, 166 -- https://ui.adsabs.harvard.edu/abs/2025MNRAS.536..166M
- Cabrera, T., Palmese, A., Hu, L., et al. 12/2024: Searching for electromagnetic emission in an AGN from the gravitational wave binary black hole merger candidate S230922g, PhRvD 110, 123029 -- https://ui.adsabs.harvard.edu/abs/2024PhRvD.110l3029C
- Mróz, P., Król, K., Szegedi, H., et al. 12/2024: Millinovae: A New Class of Transient Supersoft X-Ray Sources without a Classical Nova Eruption, ApJL 977, L37 -- https://ui.adsabs.harvard.edu/abs/2024ApJ...977L..37M
- Gutiérrez, C. P., Mattila, S., Lundqvist, P., et al. 12/2024: CSS 161010: A Luminous Fast Blue Optical Transient with Broad Blueshifted Hydrogen Lines, ApJ 977, 162 -- https://ui.adsabs.harvard.edu/abs/2024ApJ...977..162G
- Sun, L., Jiang, N., Dou, L., et al. 12/2024: Recurring tidal disruption events a decade apart in IRAS F01004-2237, A&A 692, A262 -- https://ui.adsabs.harvard.edu/abs/2024A&A...692A.262S

- Sneppen, A., Damgaard, R., Watson, D., et al. 12/2024: Helium features are inconsistent with the spectral evolution of the kilonova AT2017gfo, A&A 692, A134 -- https://ui.adsabs.harvard.edu/abs/2024A&A...692A.134S