



SALT NEWSLETTER

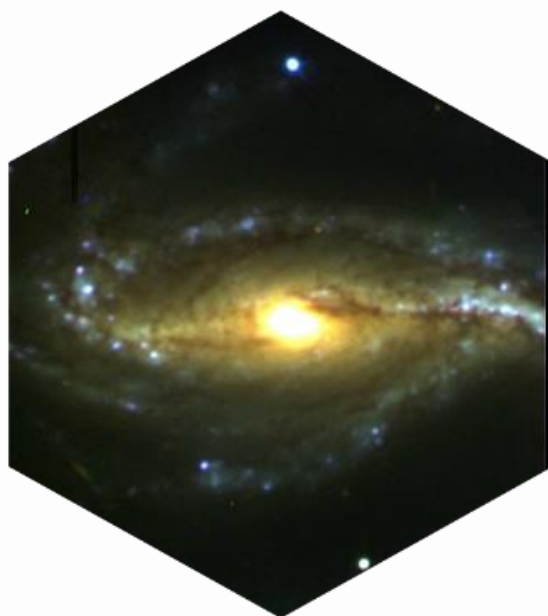
# ISSUE JULY 2017



Southern African Large Telescope,  
Sutherland, South Africa  
Cover photo: Chantal Fourie

## TOPICS

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Contributors to this issue: Encarni Romero Colmenero, Steve Crawford, Rosalind Skelton, Brent Miszalski, Petri Väisänen, Thea Koen (editor).

## LETTER FROM HEAD OF ASTRO OPS



Dear SALT community –

There's a very positive mood around the SALT Operations Team – science results are pouring in from all of you, with the first half year of 2017 averaging nearly a refereed SALT paper per week. We are happy when good data are received, & even happier when they get published ☺

Many of those results were also presented at the fun and successful second SALT Science conference, which was just held in Poland. A special thank you to the Local Organising Committee! Please see a dedicated article on the workshop in this Newsletter.

We are now in the 2<sup>nd</sup> month of the 2017-1 Semester. It has started well, especially May was an absolute whopper of an observing month with 399 observing blocks completed. The previous 2016-2 semester ending in April as a whole in fact broke several records as well, aided by great weather conditions over the semester: we finished 1292 blocks, and the completeness fractions for P1 and P2 time reached 88% and 74%, respectively. Triggered P0 time was essentially all completed. The figure below shows historical data of completeness fractions, suggesting maturing and successful time allocation policies and observing strategies.

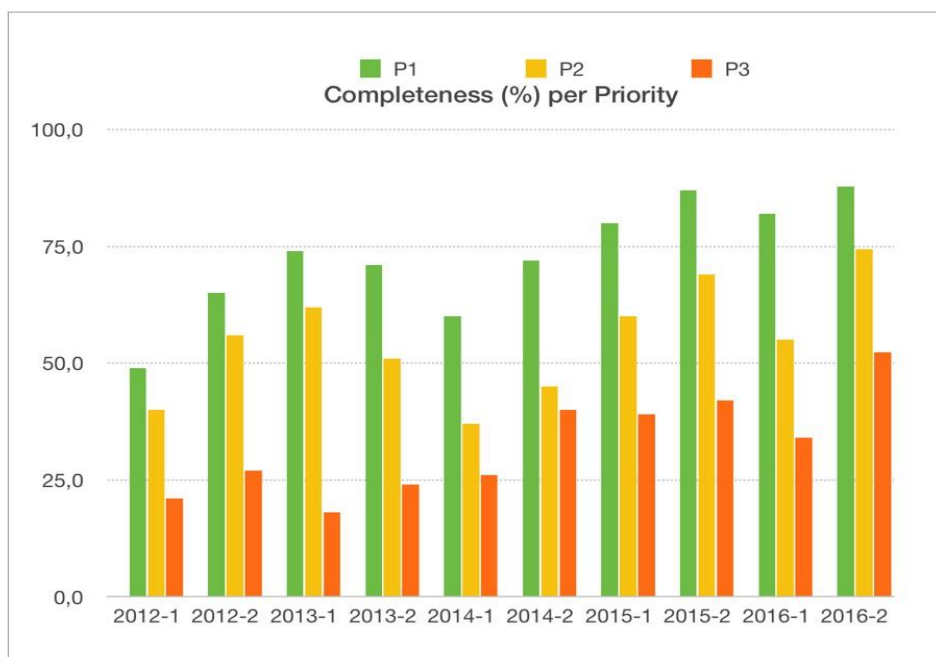


Figure 1. P1 to P3 completeness fractions over the past 5 years



Nevertheless, there was also more technical downtime than hoped for during the past semester with tracker issues and broken coolant pipes in March, which resulted in more than a week of downtime, and took SALTICAM out of action for a couple of months. Since acquisitions for RSS and HRS could be performed with a back-up CCD camera (BCAM), science was not much affected by the SALTICAM absence, luckily. Not all acquisition images taken with BCAM necessarily ended up in the PIs data distribution, however. Anyone missing essential acquisition or slit-view frames, just let us know, the frames are saved.

As always, we very much welcome feedback on data and data quality. Our resources stretch only so far. For example, there has been a dedicated effort by University of Wisconsin colleagues to understand RSS flat-fielding and scattered light properties, to a degree that Astro Ops just has not had time to do. These will be reported hopefully later this year to everyone's benefit. So, please, never hesitate to contact [salthelp@salt.ac.za](mailto:salthelp@salt.ac.za) with any questions or feedback you have, and with lessons learnt from your own SALT data analyses.

Finally, we wish to inform everyone of an extremely important on-going process, a push to define science cases for future 2<sup>nd</sup> generation SALT instrumentation. The goal is to produce 2 to 3 well-motivated and argued cases for possible directions SALT should go scientifically over the next 5-10 years. The science drivers will be discussed by the SALT Board in November this year. The South African astronomical community is already in the process of writing up a handful of such science cases by July, and then examining their instrumentation needs by October. The Partners have been informed of the process in the June Board meeting, and the Poland conference, and *we strongly encourage also any individual scientist to speak up with opinions, ideas, and proposals. Get in touch with your Board or TAC representative, or contact us at Astro Ops, and we will put you in touch with those driving the process.*

*Petri Väisänen*

*Head of SALT Astronomy Operations*



## 2017-2 CALL FOR PROPOSALS

The Call for Proposals for semester 2017-2 (1 November 2017 to 30 April 2018) was issued on Friday 23rd June. The call is open for all four instruments (HRS, RSS, SALTICAM and BVIT) - please refer to the call for proposal document for specific mode availability. Please also note that SALT is currently planning a 4-week shutdown in March 2018 for the installation of the new RSS guide probes (amongst other fixes). RSS will then have TWO more sensitive guide probes, allowing for automatic correction for Rho drift (important for our MOS modes) as well as automatic-focus capabilities.

We have also made several improvements to our pipeline process and verified that the absolute HRS radial velocity accuracy is at least  $< 200$  m/s for LR and  $< 150$  m/s for MR and HR modes using our default weekly calibrations and the automatic pipelines.

**The strict deadline for the Phase 1 submission is the 28th July 2017 at 16:00 UT.**



For more information, the Call for Proposals document can be found on our website: <http://astronomers.salt.ac.za>

## POLAND SALT SCIENCE CONFERENCE REPORT

by Brent Miszalski

Many of us recently gathered together in Kazimierz Dolny, Poland, to attend the workshop 'SALT among the constellations of very large telescopes'. This meeting comes around 2 years after the first conference dedicated to SALT science results that was held in Stellenbosch, South Africa. Kazimierz Dolny is a picturesque and historic small town that overlooks the Vistula river which runs through a large part of Poland and the nearby capital Warsaw. The timing of the conference was excellent with warm European summer days, gentle breezes, and, of course, many fresh SALT science results to discuss.



Photo courtesy of Lisa Crause

More than 50 participants attended the 3 day workshop held in the Folwark Valencia hotel and its lovely garden surrounds. On the first day the focus was on SALT, its latest strengths and capabilities, as well as its relationship amongst many other telescopes. A particular source of pride was the recent successful commissioning of the mirror alignment system at SALT which has simultaneously delivered much improved image quality and greatly increased the available time for science observations.

There was a tangible excitement in the air after the many powerful advantages of SALT were discussed in the context of existing and future facilities. Michael Shara informed us of the critical importance of leveraging discovery spaces in astronomy if fundamentally new discoveries are to be made, by discussing the book 'Cosmic Discovery' by Martin Harwit. A clear consensus emerged that SALT is a highly capable rapid-response large telescope facility that is well-positioned in Sutherland to take advantage of future synergies with other Southern Hemisphere telescopes.

A key strength of SALT is the queue-scheduled operation, inherited from its Hobby-Eberly Telescope (HET) design, that enables a large suite of 'always-on' instruments to respond quickly to targets of opportunity. These targets may be triggered as part of normal user programs, director's discretionary time or in the near future automatically by software monitoring transient notifications from telescopes such as Gaia, MASTER or LSST. As Patrick Woudt

reminded us in his informative conference summary, SALT is well catered to all timescales in astronomy. The shortest timescales of milliseconds to minutes are covered by the numerous fast modes on SCAM and RSS. On longer timescales, SALT excels at amassing large spectroscopic atlases of targets spread across the sky and is ideal for long term monitoring that is very difficult, if not impossible, to do with other telescopes (e.g. supernovae and binary stars with orbits of several months to years). SALT is locally strengthened by an armada of small telescopes and the essentially co-located Meerkat radio telescope, a precursor to the mid-frequency Square Kilometer Array. All of these strengths help clarify and inform the science requirements for possible 2nd generation instrumentation for SALT.

It was pleasing to see the SALT community maturing at this conference. The group of mostly young researchers helped facilitate a supportive and open workshop atmosphere. Everyone wanted to help everyone else squeeze the most they could out of SALT for their science. It was a real pleasure for those members of SALT operations present to see the latest SALT results directly from the users and to put faces to names we see in the queue. Also very encouraging was to see the keen interest expressed in using SALT by those yet to do so.

For many attendees it was their first time visiting Poland. Many understandably struggled with the pronunciation of Polish names, but I would encourage those who have yet to learn some Polish to give it a go! Polish is a mostly phonetic language and once you have covered some basics the names become much easier to say. Hopefully by the time of the next SALT conference all the session chairs will be well practiced in Polish name pronunciation.

As an Australian with a Polish background, it's always a treat for me to visit Poland and sample Polish cuisine. Here are a few Polish specialties that you may have tried or noticed during the conference to finish up this report:







- Ógórkí - Polish pickled cucumbers were available during one of the Lunches.
- Sernik - Polish cheese cake, often with the other yummy cakes provided during the breaks.
- Szarlotka - Polish apple pie/cake. Also during conference breaks and the conference dinner.
- Naleśniki z serem - Polish pancakes filled with cheese. Seen during some breakfasts.
- Lody - Polish for Ice Cream. Perhaps the most numerous type of shop in all of Poland!

Acknowledgements: On behalf of all the participants I would like to again express our deep gratitude to Joanna, Kasia, Cezary, Krystian and Stefania for all their hard work in organising the workshop. A big thank you also to Patrick Woudt for providing a copy of his conference summary and to Lisa Crause for conference photos.

## MARCH 2017 STAND-DOWN: REPORT & PLANS

As you may already be aware, SALT had a much-shorter than planned shut-down in [March 2017](#), lasting only one week. During this period, our technical operations team successfully installed stainless steel cover plates on the surface of the telescope pier, which had been ageing and deteriorating. We had originally intended also to upgrade the tracker's rotation cable wrap, but a design limitation was identified in February, so it was decided to postpone this. Unfortunately, some RSS and SALTICAM pipes were damaged during this period, causing both instruments to warm up. We only had one spare set of pipes, which was allocated to RSS. SALTICAM was replaced by our spare acquisition camera BCAM until the new set of pipes arrived at the beginning of June. We are happy to report that SALTICAM is now also back at the telescope and ready for science!

There will be NO telescope shutdown in August this year, contrary to expectations. The next big shutdown is currently being planned for March 2018, when the new RSS guider and the new tracker rho cable wrap will be installed. The new RSS guider consists of two more sensitive guide probes than our current system, which will allow SALT to correct for rho (field rotation) drift as well as auto-focus. This shutdown is expected to take about 4 weeks. Two additional weeks will be spent tackling the HRS fiber and guider acquisition system - but this fix will only affect HRS (the telescope will remain in operation with RSS and SALTICAM) and is being planned to occur over the new Moon to minimize science impact.



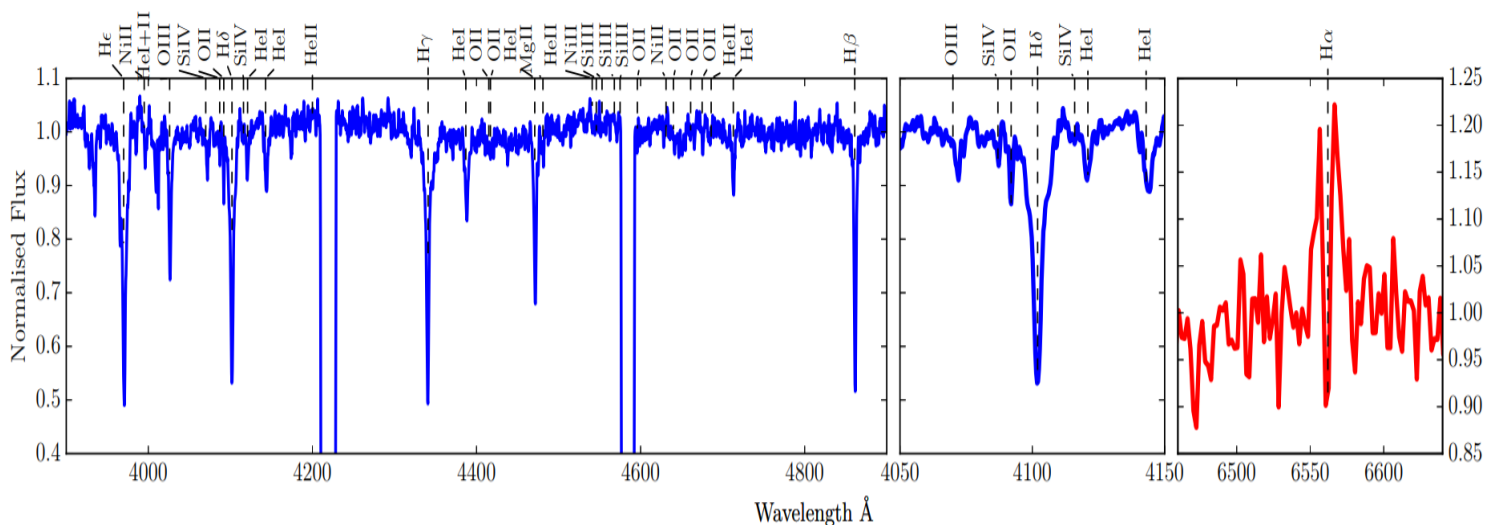
## JOIN THE TEAM!

We are looking for an astronomy-enthusiastic software engineer/astronomer to join our team in Cape Town. This is a 3 year position in which our new team member will be working on operating, maintaining and developing software for the scientific analysis of SALT observations. The advert will be coming out shortly, but in the interim, please feel free to contact [salthelp@sao.ac.za](mailto:salthelp@sao.ac.za) for more details.

## SCIENCE HIGHLIGHT

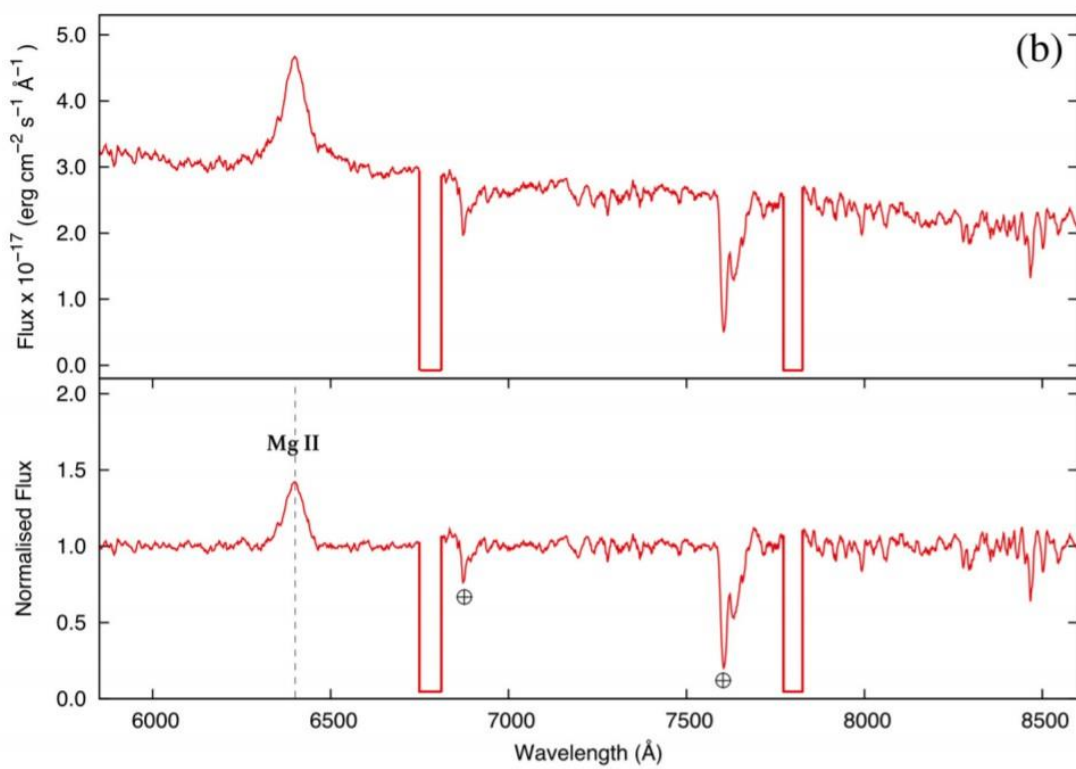
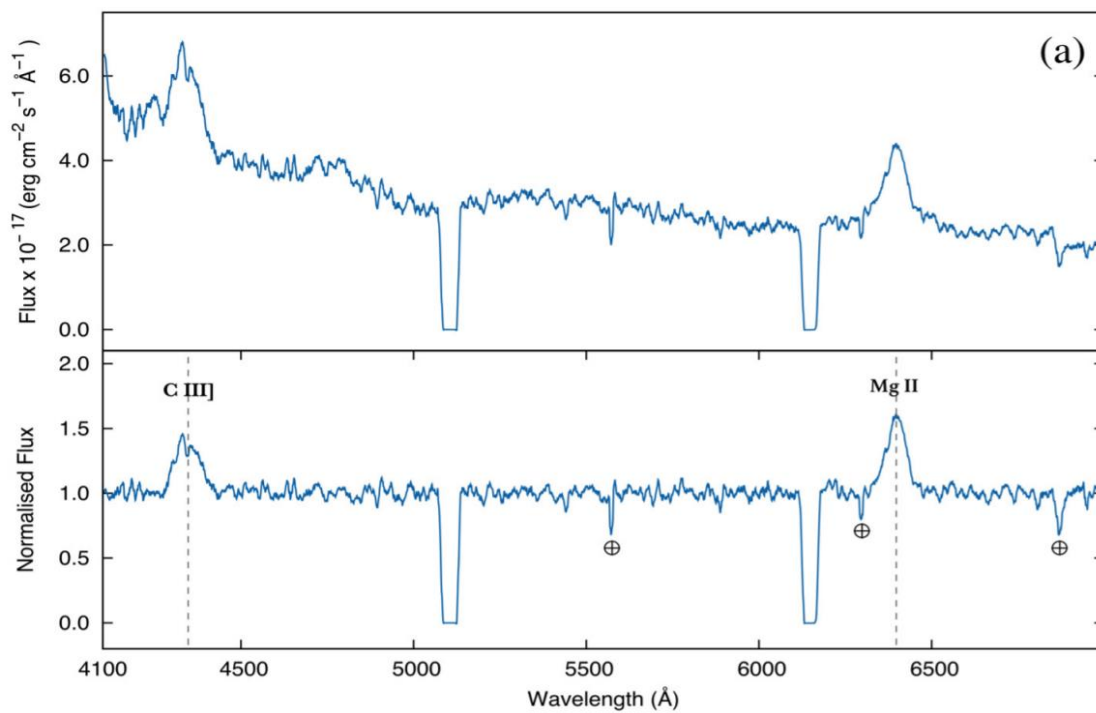
We've had a lot of great science come out in the past quarter, and we highlight four recent publications:

### SXP 7.92: A Recently Rediscovered Be/X-ray Binary in the Small Magellanic Cloud, Viewed Edge On



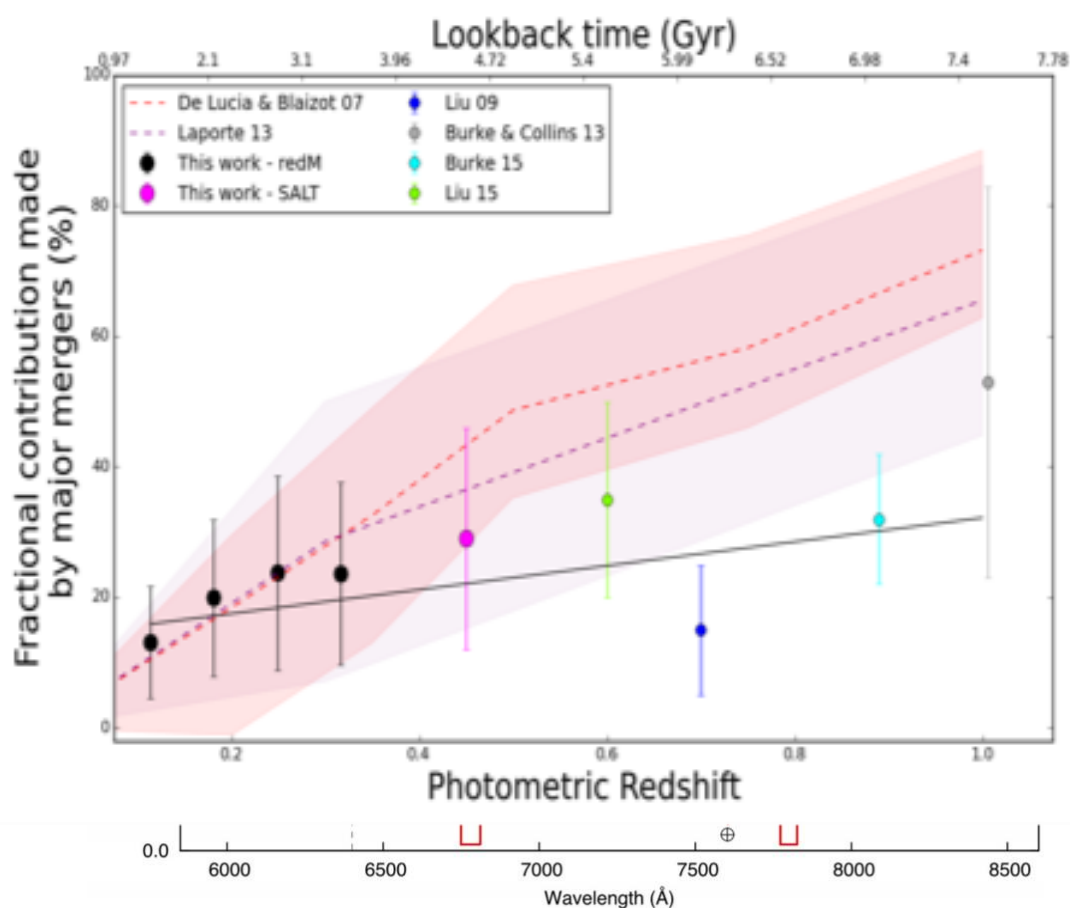
Liz Bartlett and collaborators used SALT as well as other telescopes to study the Be/X-Ray Binary SXP 7.92 that underwent an outburst in 2013. The normalized RSS SALT spectra (presented above) was used to classify the object, and shows a distinct shell like feature in the H $\alpha$  line. Paper Link: <http://adsabs.harvard.edu/doi/10.1093/mnras/stx032>

## Optical spectroscopic classification of a selection of Southern Hemisphere Fermi-LAT unclassified blazars



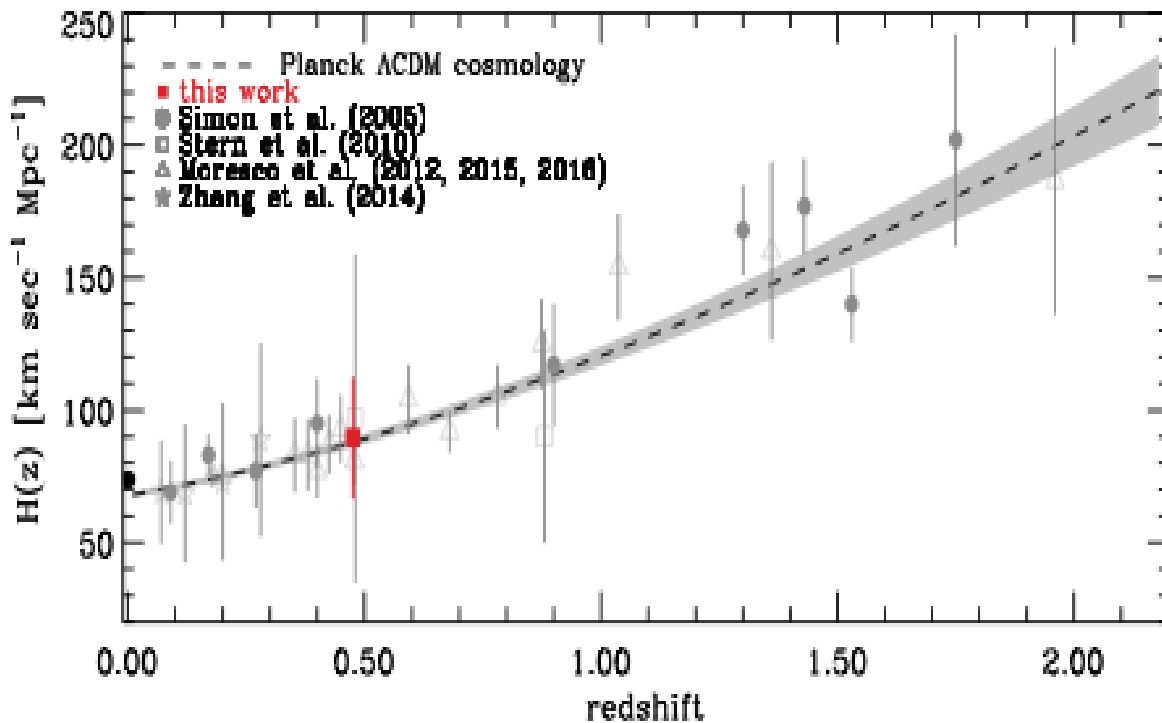
Lizelke Klindt from the University of the Free State used SALT to help classify the spectra of potential blazars detecting by the Large Area Telescope on board the Fermi Gamma Ray Satellite. The above image is the RSS spectra for 3FGL J0200.9-6635, a Flat Spectrum Radio Quasar at  $z=1.28$ . Link: <http://adsabs.harvard.edu/abs/2017MNRAS.467.2537K>

**The close pair fraction of BCGs since  $z = 0.5$ : major mergers dominate recent BCG stellar mass growth**



Daniël Groenewald along with SALT Astronomer Ros Skelton (featured in this newsletter) and collaborators measured the merger rate of Brightest Cluster Galaxies by measuring their pair fraction. She determines that, on average, 24% of the stellar mass of present day BCGs were accreted since  $z \sim 0.32$  and that major mergers can also account for the stellar mass growth seen in the intracluster light. <http://adsabs.harvard.edu/abs/2017MNRAS.467.4101G>

## Age-dating Luminous Red Galaxies observed with the SALT



Ando Ratsimbazafy and collaborators used the cosmic chronometer method to measure the cosmic expansion at  $z \sim 0.47$ . She used high signal to noise RSS spectra to estimate the stellar ages of spectra of luminous red galaxies at two redshifts and then used the differences in the ages ( $z$ ) to provide a direct measurement of  $H(z)$  at  $z \sim 0.47$  (and the comparison with other work is plotted above). Link: <http://adsabs.harvard.edu/abs/2017MNRAS.467.3239R>



Do you have some highlights you'd like to share? Email them to [salthelp@salt.ac.za](mailto:salthelp@salt.ac.za) for the next newsletter!



## MEET THE TEAM: DR ROSALIND SKELTON



Dr Rosalind Skelton, known to all as Ros, has been part of the SALT Astronomy team for just over a year.

### **How did you become an astronomer?**

I grew up in Rustenburg in the North West province of South Africa and spent many happy camping trips in the bushveld with my family, where the beautiful dark skies were endlessly fascinating. My curiosity about the Universe and love of maths and science led me to study Physics at the University of Cape Town. My elective courses in Astronomy were always my favourite (who wouldn't love afternoon tutorials in the Planetarium, with the inspiring Tony Fairall as our guide to the night sky?). I joined the National Astrophysics and Space Science Programme (NASSP) for my Masters, where I started my first research in extragalactic astronomy. I then took a somewhat circuitous route around the world, spending almost 7 years abroad before returning to Cape Town. I did my PhD at the Max Planck Institute for Astronomy in Heidelberg, Germany, and a postdoc at Yale University in the USA before taking up a postdoctoral fellowship at the Observatory and then joining the SALT team last year.

### **What is your research on?**

My research is on galaxy formation and evolution. I am particularly interested in the effects of environment on the quenching of star formation and the growth of galaxies. I am looking at how mergers and close companion galaxies impact galaxy properties in different environments, from the field to rich clusters, and at different times in the Universe's history. I am part of the 3D-HST team, which has used exquisite Hubble Space Telescope data to study changes in galaxy populations from the "cosmic noon" (redshifts of approximately 1 to 2.5), when galaxies formed the bulk of their stars, to today.

### **What is your role on the SALT team?**

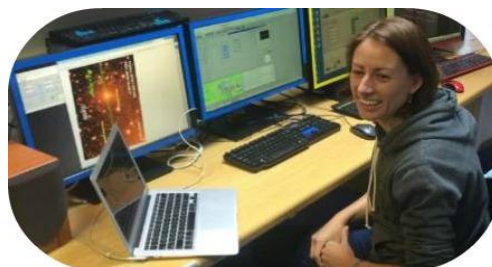
As an extragalactic astronomer, I mainly make use of the long-slit and multi-object spectroscopy (MOS) capabilities of the RSS for my own research. I would like to improve the usability of SALT's MOS tools, from the mask design software to the data reduction pipelines. I am the liaison astronomer for many of the MOS programmes and I manage the mask cutting process, as well as regularly observing on SALT.

### **What have been some of the challenges you've faced?**

Apart from getting through a PhD in Astronomy, dealing with ups and downs in confidence at different stages and the cultural challenges of moving to new countries, I think the hardest thing has probably been the uncertainty along the way, not knowing whether I would get a job in this field that I love, while being able to stay in a place that I love near people I love. I feel very privileged to be part of the SALT team, to regularly spend time in the peaceful Karoo and continue working on the challenges of galaxy evolution in the Mother City.

### **What do you enjoy doing outside of astronomy?**

I love dancing lindy hop, the vintage swing dancing style that developed with the big band jazz of the 1930s and 40s. Since its revival in the 1980s, lindy hop has become a global phenomenon, and our vibrant scene here in Cape Town is growing in leaps and bounds.





## SALT SCIENCE PAPERS

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.

- Bartlett, E.S., Coe, M J., Israel, G.L., et al., 2017/04. SXP 7.92: A Recently Rediscovered Be/X-ray Binary in the Small Magellanic Cloud, Viewed Edge On. *Mon. Not. R. Astr. Soc.*, **466**: 4659.  
<http://adsabs.harvard.edu/doi/10.1093/mnras/stx032>
- Groenewald, D.N., Skelton, R.E., Gilbank, D.G. & Loubser, S.I., 2017/06. The close pair fraction of BCGs since  $z = 0.5$ : major mergers dominate recent BCG stellar mass growth. *Mon. Not. R. Astr. Soc.*, **467**: 4101.  
<https://ui.adsabs.harvard.edu/#abs/2017MNRAS.467.4101G/abstract>
- Kameswara Rao, N., Reddy, A.B.S., Gupta, R., et al., 2017/05. Unveiling Vela: time variability of interstellar lines in the direction of the Vela supernova remnant – II. Na D and Ca ii. *Mon. Not. R. Astr. Soc.*, **467**: 1186.  
<https://ui.adsabs.harvard.edu/#abs/2017MNRAS.467.1186K/abstract>
- Klindt, L., van Soelen, B., Meintjes P.J. & Väisänen, P., 2017/05. Optical spectroscopic classification of a selection of Southern hemisphere Fermi-LAT unclassified blazars. *Mon. Not. R. Astr. Soc.*, **467**: 2537.  
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- Mata Sanchez, D., Charles, P.A., Armas Padilla, M., et al., 2017/06. Swift and SALT observations of the multiple outbursts of MAXI J1957+032. *Mon. Not. R. Astr. Soc.*, **468**: 564.  
<https://ui.adsabs.harvard.edu/#abs/2017MNRAS.468..564M/abstract>
- Munoz, M., Moffat, A.F.J., Hill, G.M., et al., 2017/05. WR 148: identifying the companion of an extreme runaway massive binary\*. *Mon. Not. R. Astr. Soc.*, **467**: 3105.  
<https://ui.adsabs.harvard.edu/#abs/2017MNRAS.467.3105M/abstract>
- Pahari, M., Gandhi, P., Charles, P.A., 2017. Simultaneous optical/X-ray study of GS 1354-64 (=BW Cir) during hard outburst: evidence for optical cyclo-synchrotron emission from the hot accretion flow. *MNRAS*, 469, 193.  
<http://adsabs.harvard.edu/abs/2017MNRAS.469..193P>
- Ratsimbazafy, A.L., Loubser, S.I., Crawford, S.M., et al., 2017/05. Age-dating luminous red galaxies observed with the Southern African Large Telescope. *Mon. Not. R. Astr. Soc.*, **464**: 2066.  
<https://ui.adsabs.harvard.edu/#abs/2017MNRAS.467.3239R/abstract>
- Riedel, Adric R.; Alam, Munazza K.; Rice, Emily L., et al., 2017/05. Young Stars with SALT. *Astr. J.*, **840**: 1-19.  
<http://adsabs.harvard.edu/abs/2017ApJ...840...87R>
- Średzińska, J., Czerny, B., Hryniewicz, K., et al., 2017. SALT long-slit spectroscopy of quasar HE 0435-4312: fast displacement of the Mg II emission line. *A&A*, 601, A32.  
<http://adsabs.harvard.edu/abs/2017A%26A...601A..32S>