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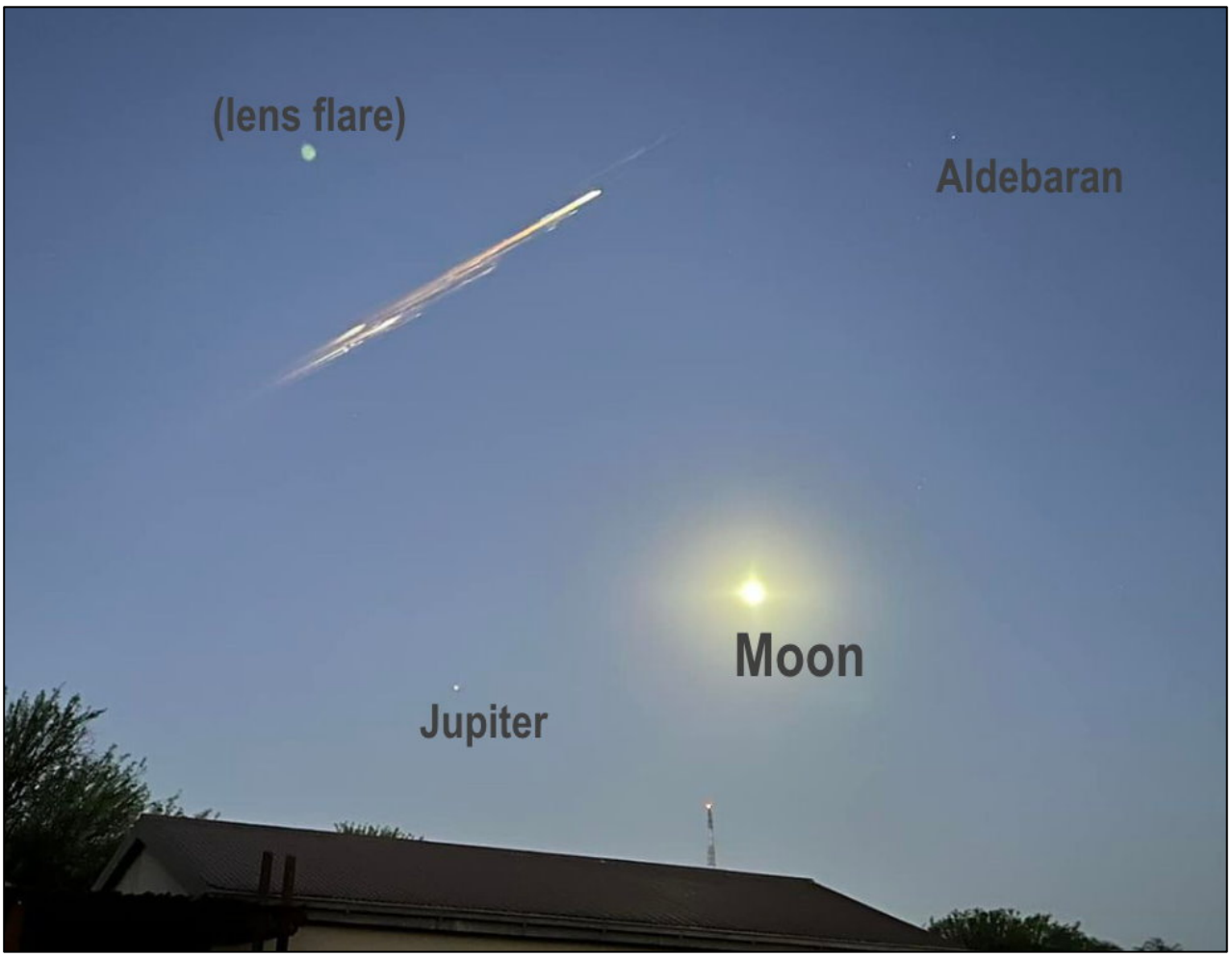

In this issue:

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Cover - Martin Bacsak's picture taken from Nossob, Namibia, clearly showing the final break-up of the booster of the Long March CZ-3B rocket (Norad code: 57625, International code: 2023-120B), launched on 12 August from Xichang Space Center, China (see article on page 179).

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Vol 82 Nos 11-12 December 2023

Obituary: Peter Richard Warren (1943-2023)

Peter Warren, a South African astronomer active in the 1960s and 1970s, was born on 22 October 1943 in Pietermaritzburg, Natal, and died on 9 November 2023 in Howick, Natal.

He obtained his BSc at the University of Natal, Durban and an MSc in astronomy at UCT. Following that, he was supported by the Smuts Trust and the Council for Scientific Research (SA) to study for his PhD in Astrophysics at Cambridge University under D.W. Peat. In 1971 he joined SAAO but was seconded to the Radcliffe Observatory in Pretoria at first, only later moving to the Cape. At the latter he was soon made head of the photometry department. He built up a solid publication record as an astronomer. However, he quit the SAAO following the retirement of Sir Richard Woolley as Director and moved to Port Elizabeth where he used his computer skills to work at first as a systems analyst, simultaneously studying to acquire IT qualifications.

He soon afterwards began a new career in academic computer science, becoming a professor at UPE. Later he held appointments at Vista University, the University of Natal, and the University of the United Arab Emirates, from which he eventually retired, settling in Howick, Natal.

He had married Leslie Parker while at Cambridge and they had two children, Carina and Juliet (m. Dymond). He had the misfortune to lose both his wife and daughter Carina prematurely, the first dying of cancer and the second in a fall from a game-viewing vehicle. In retirement he became a keen cyclist and lover of South African flora and, in his later years, came to enjoy the companionship of Barbara Clulow, whom I thank for information (ISG).

News Note: ROTSE visit to Namibia

Dr D Buckley and W Koorts (SAAO, ASSA)

David Buckley, Willie Koorts, and Pat van Heerden (UFS & Boyden Observatory) recently paid a short visit to the HESS site near the Gamsberg in Namibia (see figure).

The purpose was to make a detailed inspection of the decommissioned ROTSE (Robotic Optical Transient Search Experiment) telescope. This wide-field (2.6 degree diameter) 0.45m aperture telescope operated until 2013, conducting fast optical follow-up observations of GRBs (gamma ray bursts). The science committee of AfAS (African Astronomical Society) decided in late 2022 to explore the prospects of resurrecting the telescope, with the idea that it could eventually become part of the SAAO's Intelligent Observatory network and the first telescope available to the African community under the AIOS (African Integrated Observation System) project.

This first reconnaissance visit allowed us to inspect every detail of the telescope, its mount, and control system. Although the camera and focusing unit were removed upon decommissioning, there are plans to replace them with an Andor sCMOS camera from SAAO in the future. Even though much of the 2000's technology at the heart of ROTSE is now obsolete (e.g., the mount runs on a Window NT computer), it was clear that bringing it back into operation should not prove too difficult. Eventually, we plan to modernize it to a Linux-based system. We took the opportunity to clean the very dusty optics, whose over-coated silver mirrors were surprisingly in not too bad a condition.

We were magnificently supported in our visit by on-site HESS staff and particularly Clyde Foster, a South African planetary astronomer who now resides on the farm adjacent to HESS and ROTSE

A return visit, with the camera, is planned for Mar-Apr next year, when we plan to conduct on-sky tests.

Long March CZ-3B rocket booster re-entry

Willie Koorts (ASSA)

In the early hours of the morning of 30 October 2023, a bright object was seen falling into the atmosphere, leaving a short "tail" behind it and breaking apart towards the end of its trajectory. Most of the observations were from Namibia, although it was seen as far south as Vredendal in the Western Cape. Initial reports suggested that it was a meteor, but it eventually turned out to be the decay of the booster of the Long March CZ-3B rocket (Norad code: 57625, International code: 2023-120B), launched on 12 August from Xichang Space Center, China (see Figure 1).

Fig 1: A map showing the locations mentioned in the text with the red track indicating the final orbit and X marking roughly where the rocket body finally disintegrated.

The first report I received was from Jan van Niekerk from Vredendal who described it as a bright "shooting star". Jan first spotted it in the north-west, travelling from west to east at about the height of the moon (which was at 12 degrees above the horison) - see Figure 2. He saw it disappear over the horison at about 05:30.

NamibiaCam have two live webcams on YouTube, at the Namib Desert Lodge and Kambaku Safari Lodge respectively (see Fig. 1 for their locations). The former was particularly well placed and captured the event throughout it's full field of view. An extract of the event resulted in a separate YouTube video, complete with the click-bait title of *Mysterious UFO flying above Namib desert waterhole.* (See Figures 3, 4 & 5)

Fig 2: A screenshot from the Vredendal area showing the streaking object close to the horison at the height of the moon (right).

Fig 3: Screenshot from the Namib Desert Lodge webcam giving a clear view of the rocket booster re-entry at the top of the screen.

Fig 4: By stacking the frames of the Namib Desert Lodge video, shows the trajectory of the decaying rocket.

Fig 5: Frames stacked of the Kambaku Safari Lodge video with the rocket streak marked.

The *Namibian Sun* was quick with the following FaceBook post which included a short video (see Figure 6): "This morning between 05:15 and 05:30, farmers between 125 km and 140 km south-east of Aranos heard something like a loud thunder storm. Along with this, they also saw some smoke in the air. Weather expert and farmer, George van der Merwe, who took this video, said they presume it was a meteorite that entered the atmosphere...". In Figure 1 it is clear that these observers must have been very close to where the booster finally disintegrated, explaining why sound could be heard and smoke was seen.

Fig 6: A screenshot from a video posted by the Namibian Sun on FaceBook.

Kgalagadi Sightings is a Facebook page on photography and videography. Martin Bacsak posted the picture in Figure 7, with the following caption: "At 05:10 this morning something that I have never seen before. Meteorite shower!!! Lasted for about 45 seconds. What a treat to start the day. Nossob, 30 October 2023."

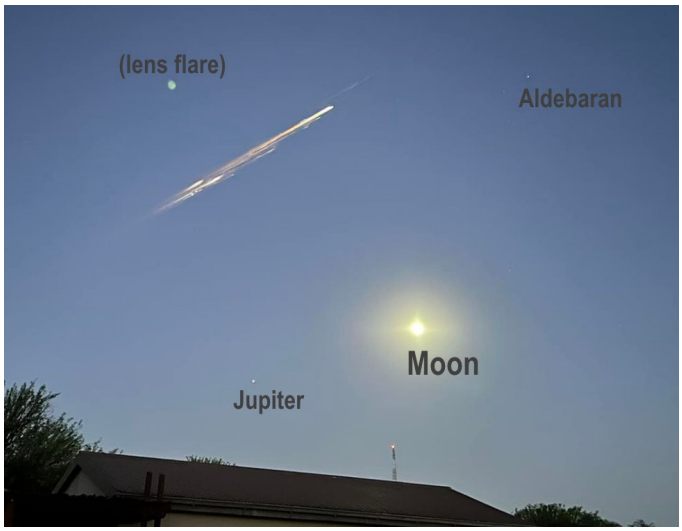


Fig 7: Martin Bacsak's picture taken from Nossob, clearly showing the final break-up.

As with all possible meteor sightings, Tim Cooper was originally contacted. By the relative slow movement shown in the videos, the possibility of a meteor was quickly ruled out. The behaviour was more typical of a satellite decay. After doing some checking, Tim identified it as the Long March CZ-3B rocket booster.

This was confirmed by the prediction in Figure 8, showing that the intention was for it to decay over the Atlantic Ocean, well off the coast of Namibia.

Fig 8: The yellow line shows the intended re-entry window of the rocket booster in the Atlantic Ocean.

By entering its last known orbital elements into the satellite prediction software WXtrack, Johan le Roux simulated its final orbits (see Figure 9). At this point the satellite was in a highly elliptical orbit, dipping down to below 150 km above the Atlantic Ocean at perigee, which caused a lot of drag, quickly slowing it down. It still survived its penultimate orbit, and overshot perigee on the last orbit, making it reach Namibian soil where it entered earth's atmosphere and burned up.

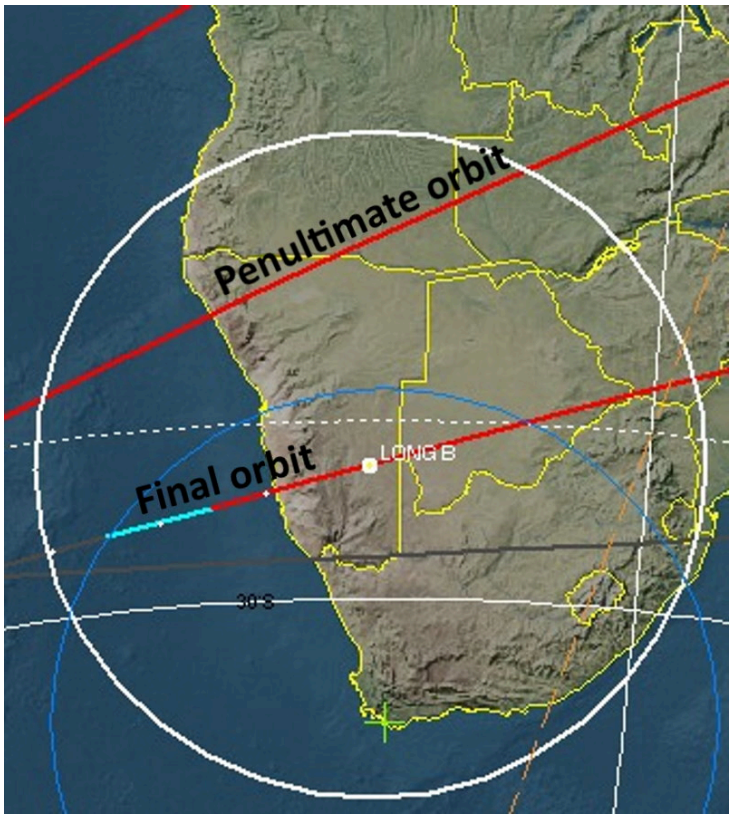


Fig 9: Screenshot of a WXtrack prediction of Norad 57625, showing its final orbits.

An Endangered National Heritage Site - The Cape Observatory

IS Glass (SAAO)

Abstract

The SAAO Cape Town campus was declared a National Heritage Site in December 2018, just short of its 200th anniversary, but is now in a run-down condition. As the former Royal Observatory, it is the oldest scientific institution in South Africa and probably in all Africa. It has a fascinating and well-documented history and surely deserves better. For many years maintenance has been neglected and many of the old telescopes and buildings are in a poor state. They are beginning to show signs of serious decay. Some examples are given.

Introduction

Many observatories around the world with comparable histories and heritages to that of the Cape have been considering application for World Heritage Status (see https://whc.unesco.org/en/astronomy/). In fact, the Observatories of the Kazan Federal University, plausibly of less significance than ours, have this year been added to the UNESCO World Heritage List.
(see https://whc.unesco.org/en/documents/200411).

South Africa has only 10 sites on the World Heritage List and none at all of scientific importance. I believe that the Cape Observatory is a prime candidate for inscription but it needs serious refurbishment and long-term maintenance. In the following, some of the conservation issues that should be faced are highlighted, mainly those concerning the chief surviving instruments.

Apart from anything else, the National Research Foundation, the current proprietor of the site, have an obligation under Section 9 of the National Heritage Resources Act No 25 of 1999 to maintain it properly.

The Astrographic telescope (Grubb 1890)

Recent History: The Astrographic telescope and guider were removed from the mount in 1995 and their lenses were placed in the small darkroom on the observing floor. The original Astrographic and guider telescopes are on the floor at the side of the dome. In

their place on the mount is a 16-inch Parkes Newtonian that was used in the 1990s by a graduate student for infrared studies but has not been touched for over a decade.

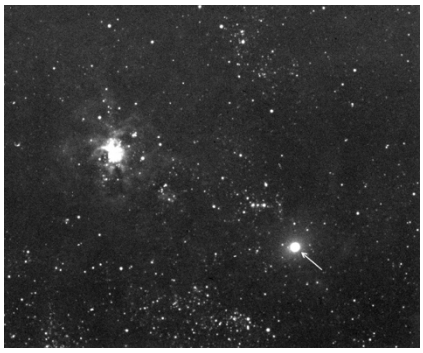
Fig 1 (a,b): The Astrographic dome is currently used as a junk room, containing many boxes of unused equipment. These are gathering dust and dirt.

Fig 2: The telescope in its original form. Originally constructed for photographing the Cape Zone (between declinations -40° and -52°) of the international Carte du Ciel project, it has had an interesting and varied history.

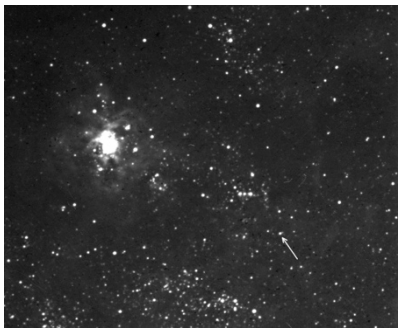
For some details of this telescope and its achievements, please see:
http://www.saao.ac.za/~isg/poster_astrographic.pdf

Historically, among other things, the Astrographic was used for the Cape contribution to the pioneering international project “Carte du Ciel”, regarded as the inspiration for the formation of the International Astronomical Union, and was used during the first detection of oxygen in stars by Frank McClean (see Gill, 1900).

The last use of the complete telescope was probably to photograph the field of SN1987A to compare with one taken with the same instrument pre-outburst. These photographs were widely circulated.



Figs 3 and 4: Plates of the 30 Dor Region showing SN 1987A when brightest and Right: the same region showing the precursor of the supernova, Sk −69° 202. Both were taken with the Astrographic (thanks to the late Mr J. Churms).



The Lyot telescope (1957)

Fig 5: The Lyot is used as storage for telescopes used in outreach and today also contains many boxes of unused material

This is, or rather was, an automatic telescope that photographed the Sun through a Hα filter every 2 minutes. It was installed in conjunction with the International Geophysical Year in 1957 and continued to monitor solar activity until *ca* 1980. It was constructed by Société d'Études et de Construction d'Appareillages Scientifiques et Industriels, Bordeaux, France.

It is no longer functional. However, in terms of historical interest, it is probably less valuable than the other instruments on site.

Fig 6: The Lyot Coronagraph In better days. This telescope followed the Sun automatically from dawn to sunset. The Hα filter was thermostatically controlled.

<u>The McClean or Victoria Telescope (Grubb, ca 1896)</u>

Fig 7: This 24-inch telescope was the largest refractor in the Southern Hemisphere when constructed. It was mainly used for spectroscopy until 1926 and afterwards for stellar parallaxes until ca 1980. It remains usable.

The building was designed by the famous architect Herbert Baker.

Its rising floor needs to be maintained periodically and such occasional attention as it has received in recent years is thanks to the efforts of Wim Filmalter, a retired engineer who is a member of the Astronomical Society of Southern Africa. He has made some recommendations on improving the performance of the hydraulic system whose seals currently tend to develop leakage problems.

This telescope is frequently used on open nights and the rising floor is something that people are usually surprised by and remember for many years afterwards.

The telescope itself and its building are also showing signs of age and neglect.

Figs 8, 9: (left and centre) Original cast iron drain pipes becoming detached from wall. Mould growing on wall and weeks rooting in wall.

Fig 10: (right) path to dome broken up by recent truck traffic.

The building also contains the Astronomical Museum of the SAAO, maintained on a voluntary basis. All items have been photographed and inventoried.

Among other problems is the messing by starlings that enter by small gaps in the shuttering.

The security of the building is a constant concern.

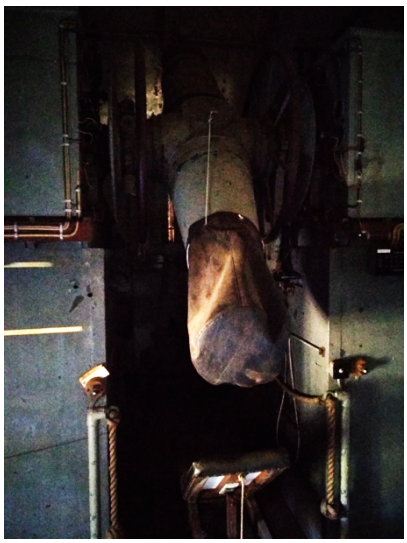
Fig 11: The grills over the basement windows are loose and will not deter any determined intruder.

More information about the telescope and its history can be found at:
http://www.saao.ac.za/~isg/poster_mcclean.pdf

The Reversible Transit Circle (RTC, Troughton & Simms, ca 1905)

This instrument was one of the most refined transit circles ever built and embodies many design features that were copied in later instruments elsewhere in the world, resulting from the experience of Sir David Gill. It was of importance to the networks of positional standard stars in the “Fundamental Katalogs” of the 20th Century, only superseded by the Hipparcos and Gaia astrometric satellites of the European Space Agency





Figs 12, 13 & 14: The interior of the RTC structure in the recent and more distant past.

For further details, please see:
http://www.saao.ac.za/~isg/poster_gill_RTC2.pdf

The Gill circle building appears to have been stripped of auxiliary items such as clocks, thermometer and barometer, though other accessories remain. The instrument itself is not in very bad condition though probably unusable.

The building is of steel and is rusting away, particularly since **the ventilators on top are broken and admit** rain to the space between the inner and outer shell of the building. The door is jammed shut (2023) but is perhaps openable with a crowbar.

WP Koorts and I replaced the rotting wooden access steps around 2020. At this time we removed literally bucketfuls of dirt and dust.

Electricity seems no longer to be available in the building although it was functional in 2020. The dome no longer opens, having been damaged through carelessness a few years ago. [The motor starter failed during closing and a tractor was used to push the building closed. This was in ignorance of the manual override. The dome is currently jammed shut].

I believe the building could be preserved with minimal expense – the first item being to prevent the ingress of rain

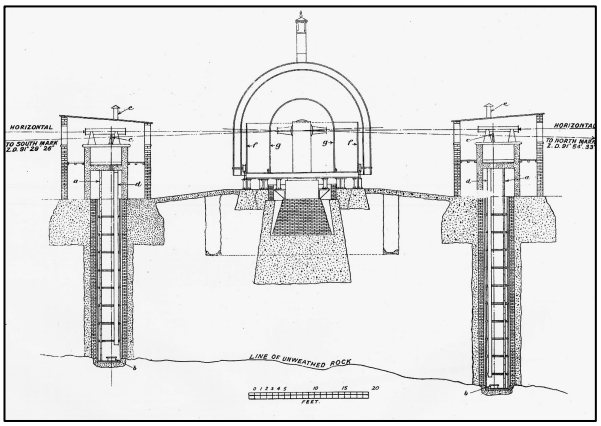


Fig 15: The building is mostly made of sheet steel and consists of two layers. Thanks to the missing ventilator top on the West side, rain is getting in between the two layers. The remains of the missing ventilator are inside the building.

Fig 16 a, b & c: The damaged ventilators that let water in between the layers of the roof.

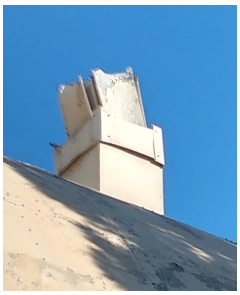


Fig 17: Typical examples of rust on the outside of the building.

The outer buildings of the installation – the collimator houses and mark houses – are insecure and filthy, unprotected from weather, and their deep shafts (see Fig. 15) are easily accessible by children and extremely dangerous. Their keys are probably lost.

The 18-inch telescope (various 1848-1955)

This telescope, dating from 1855, was alost exclusively used by the late Dr AWJ Cousins and is intimately associated with the history of stellar photometry. Here the *UBVRI* Cousins system was defined.

Figs 18 & 19: The interior of the building, showing the result of bird invasion and leaks.

Fig 20: The building has been invaded by starlings and the floor is covered by straw and bird droppings.

Though an attempt was made to seal it off, this was not successful. No cleaning has been performed for at least 2 years. There is a **water leak** and this also causes wetness in the archives overflow storeroom below, some of whose shelves can no longer be used. Just outside this part of the dome is a narrow downpipe whose purpose is not clear and it may be part of the problem. A large downpipe to the NW is in danger of falling off.

Some of the original photometric equipment used with the 18-inch telescope is still in the dome.

Fig 21: In better days. The 7-inch 1848 Merz telescope is used as a guide telescope for the 18-inch reflector, seen just after it was restored.

This building originally housed the Repsold Heliometer, dating from 1890. This was an instrument mainly used for the determination of stellar parallaxes (and consequently star distances) before the advent of photographic astrometry. The telescope mount was adapted from the Repsold one.

For the history of these telescopes and the dome, see:
http://www.saao.ac.za/~isg/poster_18in.pdf

The 6-inch telescope (Grubb 1882)

This telescope was operable in recent times and may still be so.

See http://www.saao.ac.za/~isg/six-inch.jpg for details.

Figs 22 & 23: It has not been cleaned recently. The woodwork of the sliding-roof building, which dates from 1935, is rotting away and has not been painted in recent years.

Photoheliograph (Dallmeyer 1875)

Fig 24: This telescope is currently on a Troughton & Simms mount.

The telescope was one of several constructed by the Dallmeyer Company of London according to the precepts of the solar pioneer Warren de la Rue. It was housed at first in a wooden building that has since been demolished. It was upgraded *ca* 1910. Two plates of the Sun were taken daily and sent to the Royal Greenwich Observatory to be used in compiling the Sunspot Index.
It is in a wooden dome of ca 1849 that runs on cannon balls.

The telescope is in working condition for solar spot viewing though not kept clean. The woodwork of the dome is in need of repair in various places. The paint is peeling. The telescope itself was cleaned and overhauled in 2009.

Fig 25: One of the cannon ball "bearings" of the dome.

See http://www.saao.ac.za/~isg/Photoheliograph_lowres.pdf

Some Suggestions for rehabilitation

With the new SAAO Cape Town Visitors' Centre approaching completion, hopefully before the General Assembly of the International Astronomical Union in August 2024, now is a good time to take remedial action and restore the dignity of this special place.

While it hardly makes sense to allow unsupervised crowds access to the Observatory buildings and grounds, a lot could be done to make the Observatory a presentable National Heritage Site, interesting and pleasant to visit by those who are seriously interested. Certain places like the Museum, McClean dome and Library have long been open to the public during guided tours and the Saturday night experience, but fairly strict supervision has had to be exercised.

- Broken up pavements could be repaired, especially the old brick gutters that must have looked attractive before a century or more of general neglect, natural decay, damage by trucks, excavations for cables, weed encrustation etc.
- McClean: The rising floor is such an amazing feature that it would be well worthwhile to upgrade its hydraulics. Mr Filmalter has suggested how this could be done.
- Astrographic: The building should be cleaned up and the original telescopes replaced on the mount. The screws and fittings are probably all still there.
- 18-inch: Re-seal the dome, fix roof leak (s), re-tile floor and set up as a display of photometry.
- RTC: Repair vents, treat rust, consider making housing opening mechanism operable. Set up a display of astrometry.
- Lyot: Clean up.
- 6-inch: replace/repair roof
- 1849 dome/Photo heliograph: Repair woodwork.
- All: clean regularly. Paint as necessary.

Reference

Gill, Sir D., 1900. *Proc. Roy. Soc.* **65**, 413.

Colloquia

Colloquia and Seminars (now Webinars) form an important part of a research facility, often as a sort of pre-publication discussion or a discussion of an individual's current research, and as such it is virtually impossible to "publish" this material. However by recording the topics discussed in the form below does indicate to those, who are unable to attend, what current trends are and who has visited to do research: it keeps everyone 'in the loop' so to speak.

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Colloquia and Seminars have returned to their normal face-to-face format, but a spin-off from the pandemic is that Colloquia and Seminars are often Hybrid sessions. It has also meant that now there are Webinars on interesting topics from around the globe! The editor however still focusses very much on sessions held locally, by South African astronomers or visitors to South Africa

Title: The radio Universe at large scales
Speaker: Dr. Francesca Loi from INAF, Italy
Date: 03 Nov 2023
Venue: UWC Room 1.35
Time: 15h00

Abstract: Radio observations allow us to constrain the physics of galaxies, galaxy groups and clusters, to understand how galaxies evolve in different environments, and to study the injection mechanisms of magnetic fields and the re-acceleration of particles at large scales. In this talk I will show recent results on these topics obtained with the deep high-resolution images released by the current radio telescopes. Such images are also showing new unexpected features associated with radio sources that are challenging our historical view of the radio Universe.

Title: Enabling New Discoveries with Machine Learning
Speaker: Dr Michelle Lochner from UWC
Date: 09 Nov 2023
Venue: SAAO Auditorium – Hybrid
Time: 11h00

Abstract: The next generation of telescopes such as the SKA and the Vera C. Rubin Observatory will produce enormous data sets, far too large for traditional analysis techniques. Machine learning has proven invaluable in handling massive data volumes and automating many tasks traditionally done by human scientists. In this talk, I will explore the use of machine learning for automating the discovery and follow-up of interesting astronomical phenomena. I will share an exciting recent MeerKAT discovery made with machine learning and discuss how the human-machine interface will play a critical role in maximising scientific discovery with automated tools.

Title: An Elemental Journey
Speaker: Prof Nico Orce form UWC
Date: 10 Nov 2023
Venue: SAAO Auditorium – Hybrid
Time: 11h00

Abstract: 'How were the elements from iron to uranium made?" remains one of the greatest unanswered questions in physics. The abundance pattern of the heavy stable elements from barium to lead in the oldest metal-poor stars (Population II) —produced by rapid neutron captures or r-process during the cooling of the high temperature and high neutron density ejecta emitted after the merging of two neutron stars— follows the scaled abundance pattern in our Sun (Population I). Given that our Sun formed billions of years after these metal-poor stars —from gas that was enriched by many stellar generations— this astonishing concurrence suggests a universal origin of heavy elements beyond iron. As stated by Kajino and collaborators, "Whether this may be only an artifact of nuclear properties or it may point to a single cosmic site remains an open question" [10.1016/j.ppnp.2019.02.008].

We have just published a plausible explanation in the Monthly Notices of the Royal Astronomical Society [J. N. Orce et al., Enhanced symmetry energy may bear universality of r-process abundances at

https://doi.org/10.1093/mnras/stad2539]

from nuclear physics measurements of Giant Dipole Resonances (GDR) —an out of phase collective motion of neutrons against protons— built on excited states. In this work, the authors uncover an additional decrease of the binding energy as the nuclear symmetry energy —a necessary but a destabilizing effect of the binding energy of the nuclear system related to the increasing neutron to proton ratio as consecutive neutron captures forge the production of elements— increases at the high temperatures occurring during these colossal stellar explosions, which potentially closes in the

reaction network in stellar nucleosynthesis and yields the universal formation of heavy elements. “It is like driving from Cape Town to Joburg. You could go through the N2 or other more exotic paths, but it is energetically favoured to stick to the N1.

Title: FiberPol-6D: Spectro-polarimetric Integral Field mode using fibres for SpUpNIC on SAAO 1.9 m Telescope
Speaker: Dr. Kenda Knowles from Rhodes University/SARAO
Date: 16 Nov 2023
Venue: SAAO Auditorium – Hybrid
Time: 11h00

Abstract: Galaxy clusters are the largest known gravitationally bound structures, and lie at the intersection of cosmology and astrophysics. In the radio, sensitive cluster observations can be used for a wide range of science, from galaxy evolution to cluster diffuse emission and magnetic fields. The MeerKAT Exploration of Relics, Giant Halos, and Extragalactic Radio Sources (MERGHERS) survey is targeting a homogeneously selected sample of SZ-detected galaxy clusters with the aim of probing the cosmic and mass evolution of diffuse cluster radio emission. Almost all statistical cluster samples studied for diffuse radio emission are restricted to low-redshift, high-mass clusters due to historical telescope sensitivity limitations. MERGHERS is designed in statistically complete tiers, to build up to a large statistically significant cluster sample across wide redshift and mass ranges, as yet unprobed at mid-MHz and GHz ranges. I will introduce the MERGHERS survey and present the results of the first tier of the project, which focuses on mid-to-high redshift clusters ($0.4 < z < 0.6$) from the Atacama Cosmology Telescope DR5 cluster catalogue

Title: FiberPol-6D: Spectropolarimetric Integral Field mode using fibres for SpUpNIC on SAAO 1.9 m Telescope
Speaker: Dr Siddharth Maharana from SAAO
Date: 17 Nov 2023
Venue: SAAO Auditorium – Hybrid
Time: 11h00

Abstract: Most optical spectropolarimeters built to date operate as long-slit or point-source instruments; they are inefficient for observations of extended objects such as galaxies and nebulas. 2D Spectro-polarimetry isa major challenge in astronomical polarimetry, along with its promise of rich scientific dividends.

At South African Astronomical Observatory’s (SAAO) Fibre Lab, we are developing a spectropolarimetry capable Integral Field front-end called Fibre Pol(-6D) for the existing SpUpNIC spectrograph on the SAAO’s 1.9 m telescope. Fibre Pol generates 6D

observational data for a 10-by-20 arc-seconds field: x-y spatial dimensions, wavelength, and the three linear Stokes parameters I, q and u. FibrePol aims to achieve a polarimetric accuracy of 0.1% per spectral resolution bin. Further, it can also function as a non-polarimetric Integral Field of size 20-by-20 arc-seconds.

FibrePol is a low cost technology demonstrator, and can be modified for use on any existing spectrograph, especially on bigger telescopes like the 10 m South African Large Telescope (SALT) and the upcoming 30 m class telescopes.

In this talk, we will present the scientific and technical goals, and overall design of Fibre Pol. As of November 2023, the instrument design has been completed. It is scheduled for lab assembly, characterization and subsequent on-sky commissioning in 2024.

If time permits, I will also present the ongoing activities for the assembly and development of the WALOP instrument and its present status.

WALOPis a joint IUCAA-SAAO project; it will be the first survey capacity optical polarimeter in astronomy and will be used for carrying out the PASIPHAE sky survey.

Title: New measurements of the galaxy mass-spin relation
Speaker: Prof. Ed Elson from the UWC
Date: 17 Nov 2023
Venue: UWC Room 1.35
Time: 11h00

Abstract: The galaxy mass spin relation is a sensitive probe of the processes by which galaxies acquire mass in a Lambda-CDM universe. It allows measurements of the baryonic components of galaxies to be linked to their dark matter properties. In recent years several measurements of the mass-spin relation have shown it to be well-described by an unbroken power-law over several decades of stellar mass. While there is a general consensus that stellar specific angular momentum is proportional to stellar mass to a power close to 2/3, additional measurements of the relation based on larger sample and accurate measurements of galaxy properties are needed to better refine the relation. In this presentation, I will present the results of a study that has yielded what are arguably the best measurements of the mass-spin relation to date - they are based on large samples and have very low intrinsic scatter. Strong evidence was found for a galaxy's concentration of stellar mass (as quantified by its I-band effective surface brightness) serving as an important secondary driver of its angular momentum content.

Title: Obscured SF and obscured AGN: tracing the co-evolution up to high-z
Speaker: : Luigi Barchiesi (UCT)
Date: 20 Nov 2023
Venue: SARAO MeerKAT Boardroom, BRP – Hybrid
Time: 13h00

Abstract: The evolution of the star-formation rate density and of the Black Hole accretion rate density presents huge similarities. They both peak at z~1-2 and they both suffer from large uncertainties at high-z, where dust makes it challenging to completely sample their populations. I will present the work I did during my PhD, regarding how to find, characterize and study the elusive population of obscured AGN. I will show how we will be able to exploit the synergies between next-gen IR and X-ray observatories to detect almost the entire population of CT-AGN. I will discuss the use of UV-emission line to find obscured AGN and my analysis of a sample of them at z~1-3. Finally, I will also mention the benefit of the use of MeerKAT data to detect and analyse obscured AGN and obscured SF galaxies.

Title: Probing the cosmic reionisation with the Hydrogen Epoch of Reionization Array
Speaker: Ntsikelelo Charles (Rhodes & NWU)
Date: 23 Nov 2023
Venue: SARAO MeerKAT Boardroom, BRP – Hybrid
Time: 12h00

Abstract: The Epoch of Reionisation (EoR) is one of the least-known areas in cosmology from an observational point of view. The EoR is the period marked by the reionisation of the Inter-Galactic Medium (IGM) by radiation coming from the formation of the first stars and galaxies. Currently, several cosmological models are still predicting different reionisation scenarios and more sensitive data is required to discriminate between them. Precision antenna calibration is a requirement in 21 cm cosmological radio surveys. However, poorly understood diffuse galactic emission complicates the calibration process. Also, effects such as mutual coupling can further complicate the calibration process by introducing non-smooth calibration errors. In my talk, I will present an overview of 21 cm cosmology, primarily focusing on the Hydrogen Epoch of Reionization Array. I will discuss progress made in the field and a subset of the many challenges faced. I will also showcase my current research involving the use of closure phase quantities and fringe rate filters to improve the calibration of 21 cm observations.

Title: Evidence for kinetic feedback within radio-selected galaxies up to z=5
Speaker: Dr Sthabile Kolwa
Date: 24 Nov 2023
Venue: : UWC Room 1.35 – Hybrid
Time: 11h00

Abstract: Radio-loud Active Galactic Nuclei (AGN) host galaxies are known to produce jets sufficiently powerful to disrupt and even expel gas from their host galaxies. With optical integral field unit (IFU) MUSE observations, we observe rest-UV line emission from gas which is chemically enriched through previous star-forming epochs and also photoionized by the AGN. In cases where the jet axes are aligned with the extended ionised gas morphologies, we find a clear feedback association between the high energy output of the jets and the ionised gas. Additional evidence for such AGN feedback is seen in the very complex Ly-alpha halo morphologies prevalent around radio galaxies at redshifts z=2 to z=5. With ALMA, we trace the cold gas component of the interstellar medium (ISM) in the radio galaxies via neutral carbon emission. These [CI](1-0) line detections trace faint cold gas in emission from which we infer cold molecular gas fractions of <20%. Based on our results, we conclude that gas depletion through star formation and molecular gas outflows driven by the jets may have led to a diminished gas supply in the ISM of our observed radio galaxies. Overall, our MUSE and ALMA studies add significantly to the body of work in galaxy studies that illustrate the impact of AGN-driven jets on star formation. In the second part of the talk, I will discuss recent results based on MeerKAT & uGMRT (superMIGHTEE) observations which highlight the usefulness of deep radio continuum surveys in studying the physical processes underlying radio emission within star-forming galaxies and radio AGN up to z=5.

Title: Clues on evolving AGN and galaxies from radio-continuum surveys: paving the way to the SKA
Speaker: Dr Ivan Delvecchio (INAF)
Date: 07 December 2023
Venue: 5-42, Natural Sciences 1, Hatfield Campus – Hybrid
Time: 13h00

Abstract: The buildup of galaxies is likely intertwined with the growth of their supermassive black holes, but the origin of such connection remains elusive. Addressing this stems from our ability to disentangle and gauge the emission arising from star-forming and active galactic nuclei (AGN) processes. Radio-continuum

observations provide a unique, dust-free window to both phenomena up to high redshift.

In this talk, I will present empirical findings obtained so far from radio-continuum surveys of SKA pathfinders and precursors. These were broadly aimed at (i) calibrating radio-continuum as a star formation rate tracer to take a census of the star formation history in the Universe; (ii) assessing the incidence, evolution and impact of radio AGN across the galaxy population. Finally, I will discuss how the unparalleled combination of survey speed, angular resolution and sensitivity of the SKA will revolutionize our understanding of galaxy and supermassive black hole assembly over time.

Title: RFI excision for future interferometers using AI vs fully Bayesian methods
Speaker: Prof. Bruce Bassett from the University of Cape Town
Date: 12 December 2023
Venue: Hybrid
Time: 11h00
Abstract: Radio Frequency Interference (RFI) is a key challenge for radio telescopes like MeerKAT and SKA. We discuss approaches to deal with RFI based on machine learning and AI and contrast their strengths and weaknesses compared with rigorous Bayesian methods which draw on experience from the CMB.

Title: Rise of the Machines 2: Trends and the future of AI and AI agents
Speaker: Prof. Bruce Bassett from the University of Cape Town
Date: 13 December 2023
Venue: Hybrid
Time: 11h00

Abstract: We reflect on what we have learned in AI over the past decade and look forward to the coming decade, with a particular emphasis on AI as a discovery and exploration tool for fundamental science and whether AI will be able to do high-quality research with little or no human interaction.

Streicher Asterisms

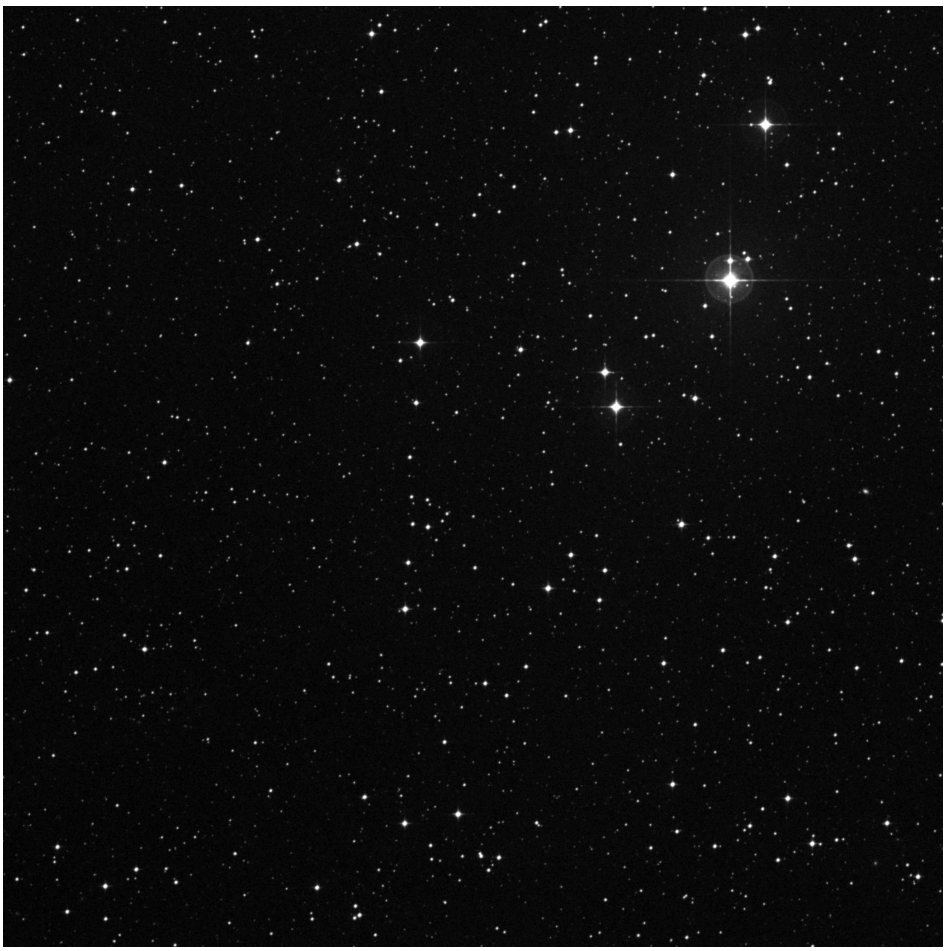
Magda Streicher

STREICHER – J2124-85
Octans

What keeps me going back to this area is the long nearly straight line of similar magnitude stars towards the eastern field of view. A tiny clump of stars attach itself flanking on the western edge along the line of stars. Brighter stars share the north-western field of view.

OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER DSH J2124-85	Asterism	21h24m.26	-85°45'.50	10	23'

Picture Credit: http://archive.stsci.edu/cgi-bin/dss

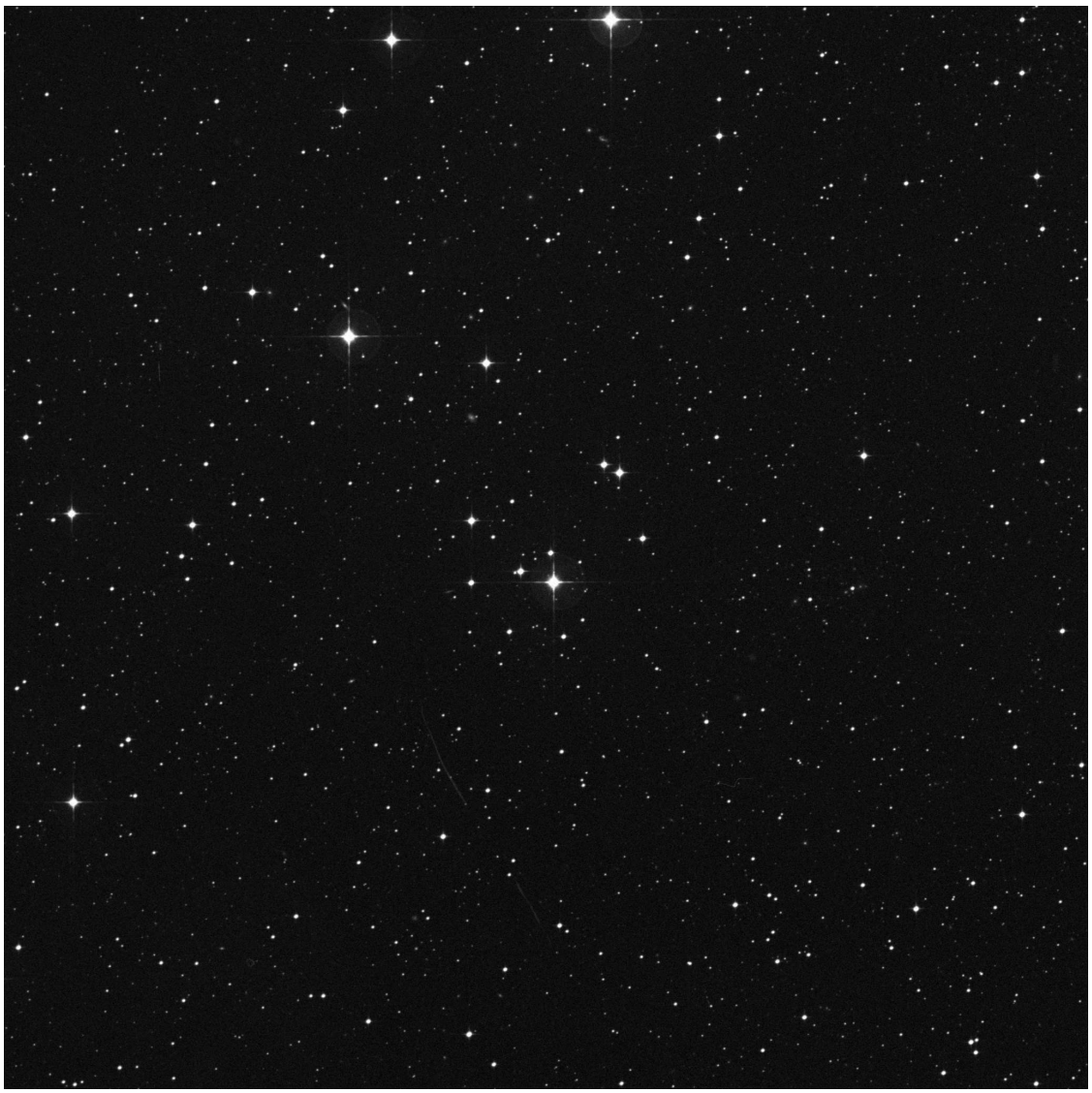


STREICHER – J2036-59
Pavo

This nifty little grouping dominated the star field, embraces a brighter star to add flair to the group connection. The asterism is situated only half a degree north of the double star phi Pavonis.

OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER DSH J2036-59	Asterism	20h36m.40	-59°54’.28	8.5	15’

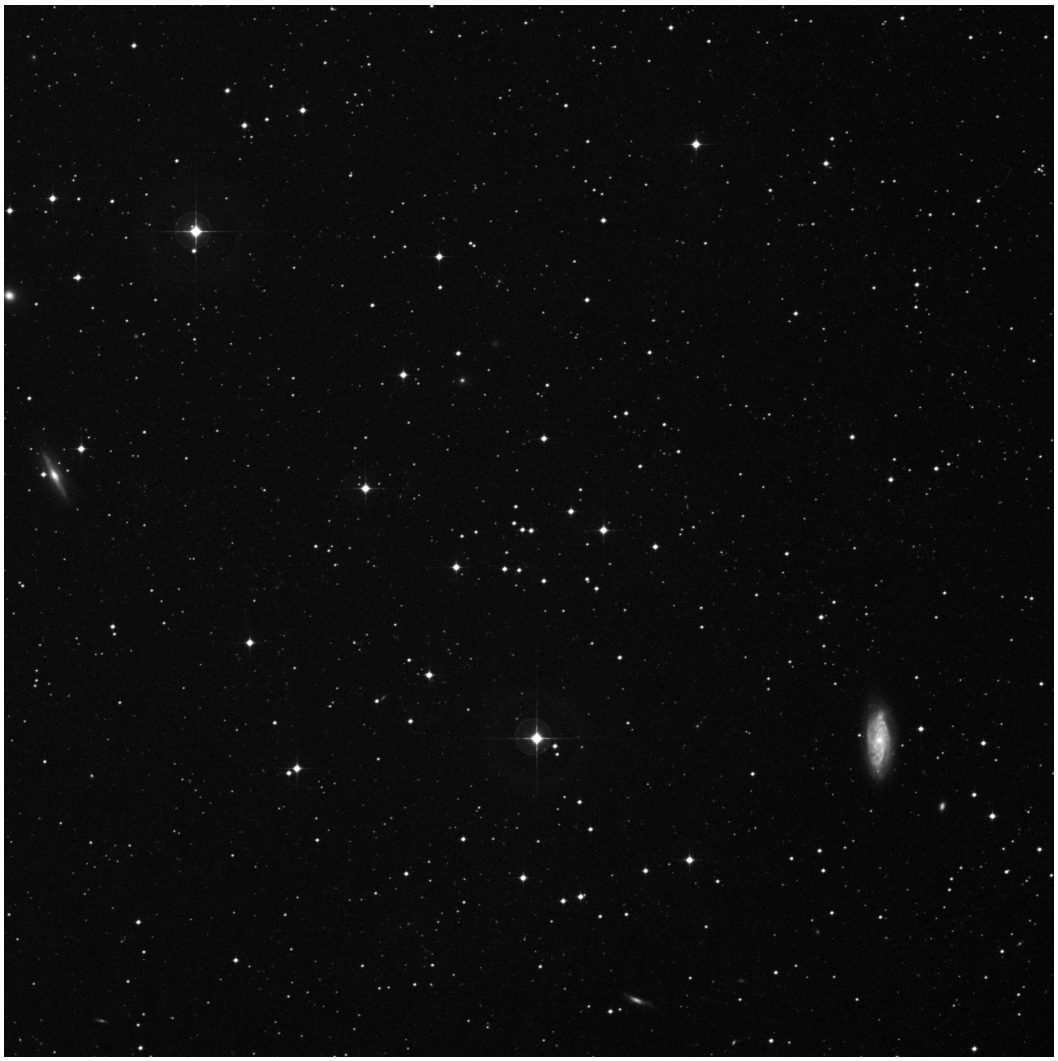
Picture Credit: http://archive.stsci.edu/cgi-bin/dss



STREICHER – J2237-25
Piscis Austrinus

A close loose grouping of stars a near neighbour of the prominent spiral galaxy NGC 7314, and its companion NGC 7313, which is situated just 20’ towards the south-west. The very faint edge-on galaxy PGC 69398 can be glimpse towards the eastern edge in this Deep Sky Survey photograph below.

OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER DSH J2237-25	Asterism	22h37m.01	-25°53’.21	10	8’



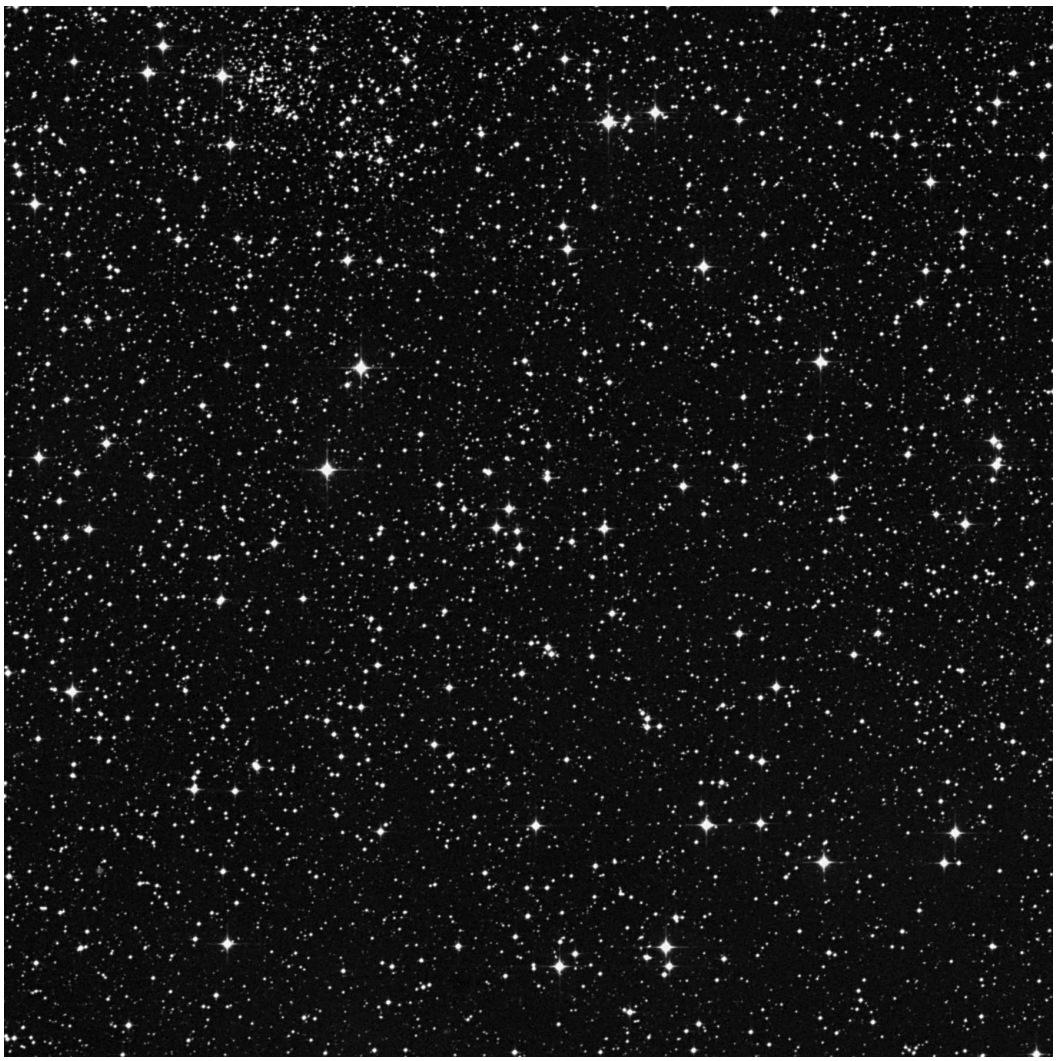
Picture Credit: http:/ /archive.stsci.edu/cgi-bin/dss

STREICHER – J0728-15
Puppis

Barely 20’ south of the nicely lifted out clusters Czernik 29 and Haffner 10, which can be seen at the top of the photograph below, a few stars form a tight crammed patch imbedded in this very busy star field. When spotted it turn out to be easily seen.

OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER DSH J0728-15	Asterism	07h28m.05	-15°34’.48	11	9’

Picture Credit: http://archive.stsci.edu/cgi-bin/dss



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The **Astronomical Society of Southern Africa** (ASSA) was formed in 1922 by the amalgamation of the Cape Astronomical Association (founded 1912) and the Johannesburg Astronomical Association (founded 1918). It is a body consisting of both amateur and professional astronomers.

Publications: The Society publishes its electronic journal, the *Monthly Notes of the Astronomical Society of Southern Africa (MNASSA)* bi-monthly, the annual *Sky Guide Southern Africa*.

Membership: Membership of the Society is open to all. Potential members should consult the Society's web page : https://assa.saao.ac.za for details. Joining is possible via one of the local Centres or as a Country Member.

Local Centres: Local Centres of the Society exist at Bloemfontein, Cape Town, Durban, Hermanus, Johannesburg, Pretoria and the Garden Route Centre; membership of any of these Centres automatically confers membership of the Society.

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