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Volume 83 Nos 1-2 February 2024

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MNASSA download site: www.mnassa.org.za

Cover - Two of the Kroomen who worked at the Royal Observatory, Jack Saltwater and Tom Peasoup (James Thomas Brown) around 1890. (Acknowledgment: Michael Fortune).

See page 12.

Astronomical Society of Southern Africa
ASSA
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Vol 83 Nos 1-2 **February 2024**

Obituary: Prof. Roy Booth (1938-28 February 2024)

The South African Radio Astronomy community is saddened by the news of the recent passing of Professor Roy Booth in Sweden after a period of deteriorating health. Roy was a prominent figure in global radio astronomy, and he dedicated his later active years to the development of the discipline in South Africa and the rest of the African continent. Roy's social consciousness compelled him to make a contribution to the development of science in Africa.

Roy obtained his PhD from the University of Manchester under the direction of Professor Rod Davies at Jodrell Bank. After his time at Jodrell Bank he moved to Sweden where he was Director of the Onsala Space Observatory and Professor at Chalmers University of Technology. In 2006 Roy and his wife Shirley moved to South Africa, and Roy joined the Hartebeesthoek Radio Astronomy Observatory as Science Director. He subsequently held the position of Professor of Radio Astronomy at the University of Pretoria before returning to Sweden when he finally retired from active research.

Roy leaves a massive legacy to the global radio astronomy community. His graduate students have themselves become leaders in the field, including Professor Phil Diamond, now Director General of the SKAO. He was a great proponent of international cooperation and collaboration, and was a key figure in the expansion of the network of VLBI stations and the establishment of the ALMA observatory. While in South Africa he led the development of the science case for the MeerKAT radio telescope and he engaged the global radio astronomy community in the project through an open call for large-scale projects that would define the scientific capabilities of the telescope. The unprecedented success of the MeerKAT was celebrated at the MeerKAT@5 conference

in Stellenbosch last week. Roy would have been proud of what has been achieved in South Africa, facilitated by his experience and guidance.
Roy will be missed by radio astronomers around the world as a colleague and as a friend, and also as a ferocious defender of his principles and values. We extend our condolences to Shirley and the rest of their family, and will celebrate his legacy in the years to come in the manner in which he would have approved: reminiscing about his achievements and antics over one of his favourite beverages.

News Note: NASSP@20

On 25 and 26 January NASSP, the National Astronomy and Space Programme held a symposium at UCT to celebrate the 20 years of its existence. Contributions were made by present and past members as well as many graduates who spoke of their subsequent careers in and out of astronomy.

NASSP is a collaboration between the many institutes involved in astronomy and space science in South Africa.

Its Vision is: “To create human capacity in astronomy, big data and space physics, particularly in under-represented communities, and to build a cohort of scientists at the core of an international network of African astronomers, big data scientists, space physicists and citizens, who are bonded by the common experience of schooling, interlinked both professionally and personally and able to make a major contribution to the transformation of society.”

In practice, it provides a pipeline for students to specialize in astronomy and space science related disciplines.

In South Africa a typical career in these fields starts with a 3-year degree in an appropriate technical or scientific discipline. NASSP is orientated around a specialized honours (fourth) year in which astronomical subjects are studied and could possibly involve an extra year in a bridging programme if he or she has insufficient astronomical knowledge. The next step is to study for a MSc degree which comprises six months of coursework followed by research under a supervisor for eighteen months towards a thesis. If academically inclined, the student works towards a PhD degree, also doing research under supervision. Afterwards, if aiming for an academic career, he or she becomes a “Post-doc”, ie takes up a post-doctoral appointment, at a university or a research institute. The chance of obtaining a “permanent” academic position depends on the individual’s research output up to this point.

In a summary lecture Dr Ros Skelton (SAAO) gave many statistics outlining the success of the NASSP programme to date. Of 699 students who have gone through, 464 are honours graduates and 235 have taken Master's degrees. Some 75 are from outside South Africa. There are approximately 100 - 120 students enrolled in the programme each year and, on average in recent years, 67% are black and 34% are female, a major aim having been to encourage racial and sexual balance.

Former programme members are now spread around the world. The kind of analytical and computational expertise acquired has enabled about 40% of students to take up careers in fields outside astronomy, particularly in data science. Significant numbers have gone on to obtain PhDs in South Africa and elsewhere.

News Note: Blue plaque to be unveiled at Toppieshoek

Two priceless heritage sites occur on Toppieshoek, a Tshwane University of Technology (TUT) property on the banks of Hartbeespoort Dam within the UNESCO designated Magaliesberg Biosphere Reserve. One of them is the Broederstroom Early Iron Age

archaeological site, the earliest known Black village in this region, occupied in about AD 350. The other is the former Leiden University Observatory Southern Station which includes two historic telescopes built in the early 1900s and operational at Toppieshoek for 25 years until 1978

These are national heritage treasures that offer unparalleled opportunities for experiential learning and teaching.

For the past year, a collaborative venture between the Magaliesberg Association for Culture and Heritage (MACH) and TUT has been assessing ways of restoring the sites. Vincent Carruthers and Professor Jane Carruthers have worked with astronomers and archaeologists in preparing realistic proposals for TUT on how the sites might be restored, responsibly curated, and put to practical use for the benefit of students and the public. A comprehensive report with detailed proposals has been prepared, an extensive bibliography has been compiled, a book describing the sites and their history has been published, and six outdoor information boards have been erected.

To mark the successful conclusion of this project, the Vice-Chancellor and Principal of TUT, Professor Tinyiko Maluleke will unveil a Blue Plaque at Toppieshoek on 9 March 2024. The celebration will include an exhibition of archaeological artefacts, the launch of the book *The Heritage Treasures of Toppieshoek,* and a talk on the history of the telescopes and the ancient African village.

See Glass, I.S. 2015. *MNASSA* **74**, 127 for further information about this site.

News Note: Book available for free download

The Royal Observatory at the Cape of Good Hope
History and Heritage
I. S. Glass

To encourage interest in the history of the Royal Observatory, Cape of Good Hope (now part of the SAAO), Ian Glass and the centre for Astronomical Heritage have made it available to read online or to download, free of charge.

Please see the following link:
https://cfah.org.za/resources/rocgh-glass/

Recent Southern African Fireball Observations Events # 466-474

Tim Cooper, Director, Comet, Asteroid and Meteor Section, ASSA

This article continues the sequential numbering of reported fireball sightings from southern Africa. By definition, a fireball is any meteor event with brightness equal to or greater than visual magnitude (m_v) –4 . The following events were reported to the author and details are reproduced as given by the observer [any comments by the author are given in brackets]. Where the report originated from the American Meteor Society Fireball page, the corresponding AMS event number is given. All times were converted to UT unless stated, and all coordinates are for epoch J2000.0. Descent angles, if given, are in degrees, with directly upwards = 0°, horizontally left to right = 90°, directly downwards = 180° and horizontally right to left = 270°. Azimuth angles are reckoned from north = 0° through east = 90°.

Event 466 – 2023 October 26 – Hartebeespoort, North West

Captured by Paul Ludick on GMN cameras ZA0004 and ZA0005. From ZA0004, time of appearance was 22h59m24s, duration 4.1 seconds, path from RA/Decl. 00h20m04s, –44.2° to 23h43m34s, –21.9°. Screengrab is shown in Figure 1. The event was also captured on camera ZA0005, but the astrometry was not processed, probably due to proximity of the fireball to the bright Moon, then 95% illuminated and magnitude –12.3.

Examination of both frames shows evidence of three flares, the third being the brightest and terminal flare before fading. The event was sporadic.

Fig 1. Event 466 on 26 October 2023, captured by Paul Ludick on GMN camera ZA0004. The constellation of Grus is below the fireball, Achernar is the brightest star to the left of the trail and Fomalhaut is obscured by the fireball.

Event 467 – 2023 November 10 – Gqeberha, Eastern Cape

Captured by Louw Ferreira on GMN camera ZA000A at 23h38m49s. No astrometry provided but plotting on Atlas Brno Chart 10, start and end coordinates were derived from RA 05h46.8, –71.6° to 02h04.9, –80.6°. Screengrab is shown in Figure 2. The event was sporadic.

Fig 2. Event 467 on 10 November 2023, captured by Louw Ferreira on GMN camera ZA000A. Bright star in the lower right quadrant is Achernar, and Canopus is just below the upper edge of frame above the meteor.

Event 468 – 2023 November 16 – Hartebeespoort, North West

Fig 3. Event 468 on 16 November 2023, captured by Paul Ludick on GMN camera ZA0005. Orion is at top of frame, Taurus is below centre and the Pleiades towards the bottom of the frame. The bright star below right is Capella.

Captured by Paul Ludick on GMN camera ZA0005 at 02h00m17s, duration 3.3 seconds, path from RA/Decl. 05h44.5, +0°15′ to 05h56.6m, +37°00′, path length 38.5°. Screengrab is shown in Figure 3. The event was sporadic.

Event 469 – 2023 December 1 – Hartebeespoort, North West
Captured by Paul Ludick on GMN camera ZA0005 at 23h56m27s, duration 1.0 seconds, path from RA/Decl. 04h11m15.4s –2°50′ to 03h24m39.6, +11°11′, path length 17.6°. Screengrab is shown in Figure 4. The event was probably Puppid-Velid.

Fig 4. Event 469 on 1 December 2023, captured by Paul Ludick on GMN camera ZA0005. Taurus is to the right of the fireball. The bright object towards its lower left is Jupiter, then magnitude –2.8.

Event 470 – 2023 December 12 – Hartebeespoort, North West
Captured by Paul Ludick on GMN camera ZA0004 at 22h45m14s, duration 3.1 seconds, path from RA/Decl. 06h11m3.6s –54°12′ to 21h13m44s -75°48′ path length 46.6°. Screengrab is shown in Figure 5. The path is consistent with the radiant of the Northern chi-Orionids, which are an extension of the Northern Taurid activity into December.

Event 471 – 2023 December 13 – Bloemhof Dam, Free State
Observed by Tiaan Niemand at 23h35, duration 2-3 seconds, bright white fireball about the brightness of Jupiter with terminal flash to m_v about –4 that was visible reflected off the dam water's surface. Path from RA/Decl. 11h51m, –5°20' to 12h57m – 24°27',

path length 24.9°. No persistent train or disintegration, and no sounds heard. From the path given the meteor was possibly a December Leonis Minorid.

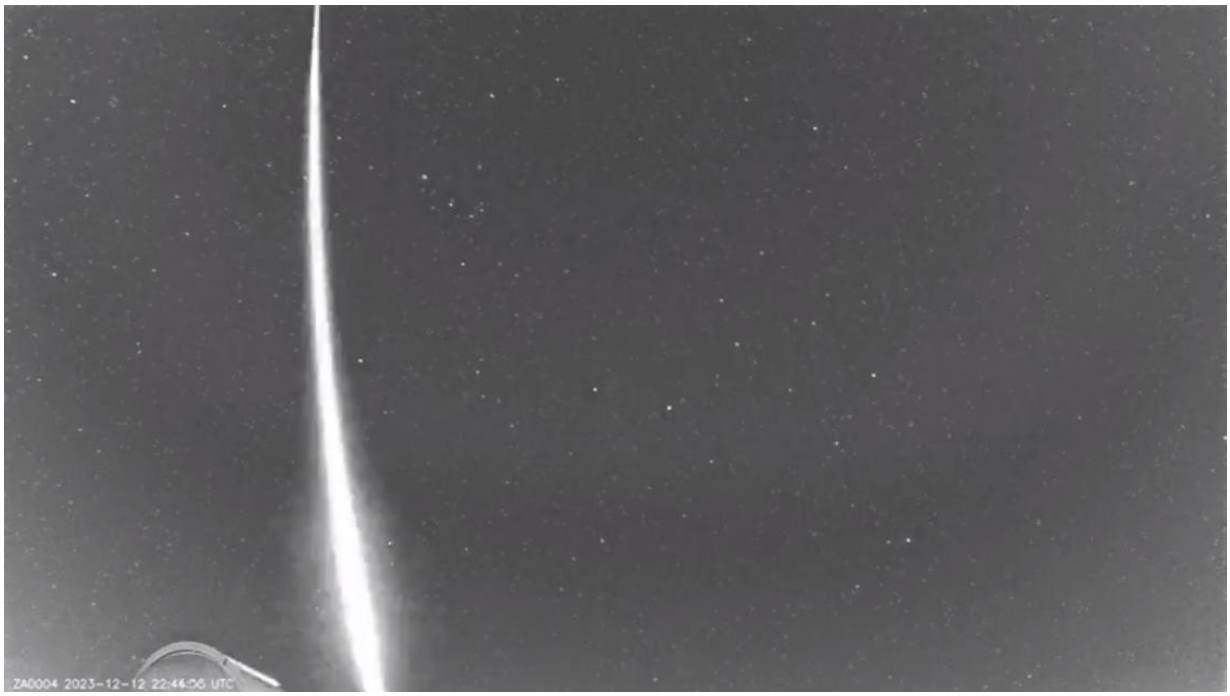


Fig 5. Event 470 on 12 December 2023, captured by Paul Ludick on GMN camera ZA0004. Curvature is due to the camera lens, not the path of the fireball. Achernar is the brightest star just below centre; stars in the constellation Reticulum are upper left and to the immediate right of the fireball.

Event 472 – 2024 January 18 – Still Bay, Western Cape

Observed by Johan Strijdom at about 18h10, during late evening twilight, said 'extremely bright [considering] it was not yet dark, the Langeberge were still visible in the distance, and under these conditions it appeared brighter than Venus [at] its brightest against a dark sky'. Colour was green, fast-moving, duration about 1 second, moving right to left below right of the Moon and Jupiter which were then respectively magnitudes –10.5 and – 2.2. From a sketch provided the path was approximately from az/alt 356°, 8° to 350°, 6°, at which point it was lost behind trees. No sounds heard up to 2 minutes after the passage. The path is consistent with an Anthelion meteor.

Event 473 – 2024 January 20 – near Cathkin Park, KwaZulu-Natal

Observed by Mariana Venter at 13h20, that is during broad daylight while driving on the road between Winterton and Cayley Lodge, Drakensberg. Duration 1-2 seconds, colour was said to be blue-white, path about 60° below right of the Sun from az/alt 348°, 36° to 17°, 32°. The fireball may have been a Helion meteor. AMS Event 499-2024.

Event 474 – 2024 February 11 – George and Bonnievale, Western Cape

Bright fireball captured on two GMN cameras at 02:01:57.4, solar longitude $\lambda_{\odot}$ = 321.49°, by Andre Bruton on camera ZA000C, and by ASTRONOC (Astronomical Observation Centre) camera ZA0002. Screengrabs are shown in Figures 6 and 7, duration 3.17 seconds, the brightness of the fireball saturated both cameras, but peak magnitude estimated as m_v -7 to -8. The fireball began ablation at altitude 131.947 km altitude above latitude/longitude 34.924619° S, 20.796372° E, and ended at 70.253 km above 34.681514° S, 18.820342° E.

Fig 6. Event 474 on 11 February 2024, captured by Andre Bruton at George on GMN camera ZA000C. The fireball passes through Puppis into Canis Major, which is obscured by the bright flash. At left the brightest star is Canopus, and at right is Alphard.

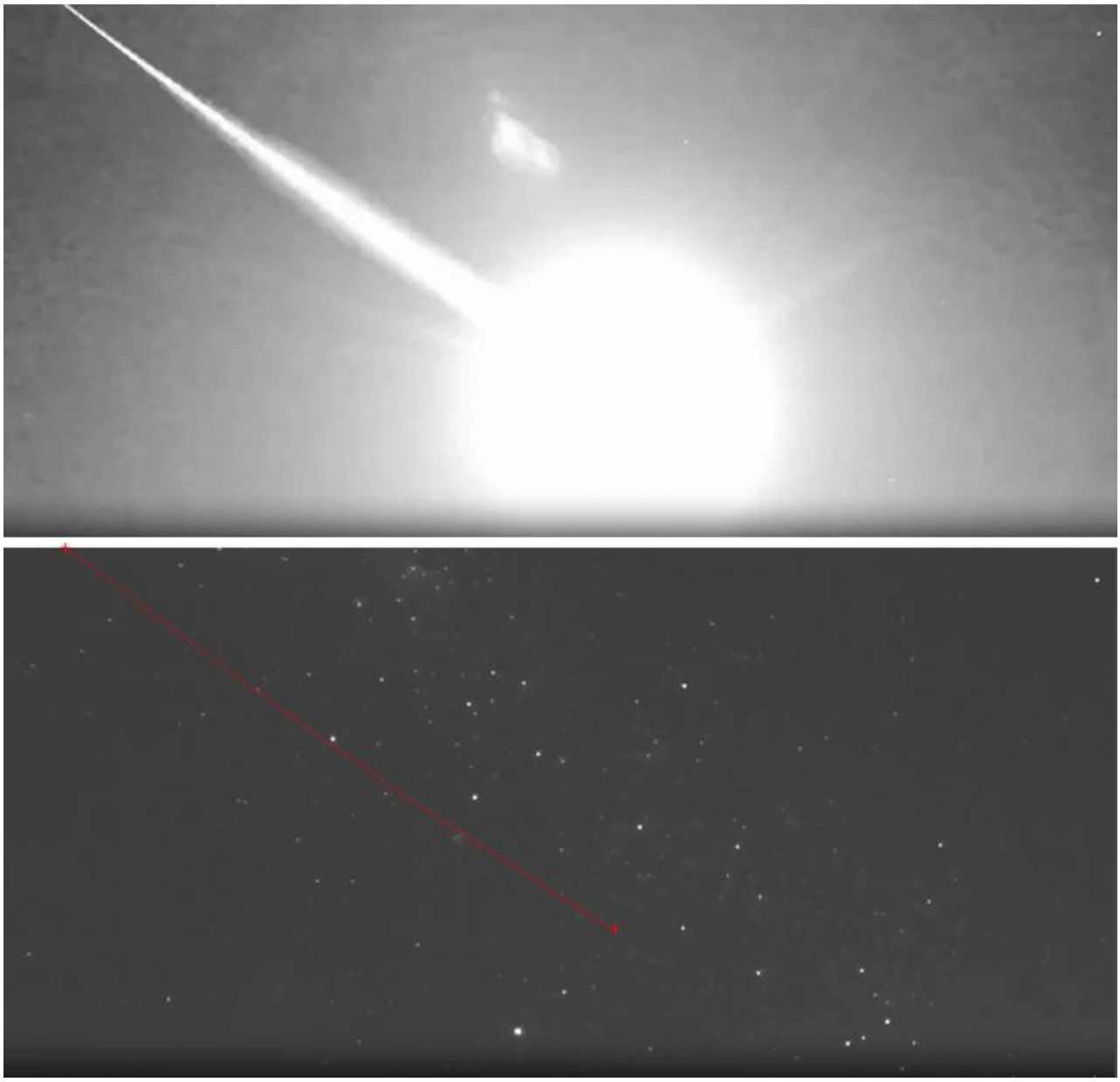


Fig 7a/b. Event 474 on 11 February 2024, captured by Astronomical Observation Centre, Bonnievale on GMN camera ZA0002. Since the light saturated the camera, the author superimposed the path on the stars visible immediately prior to the passage of the meteor. Above left are the Diamond and False Cross, at bottom is the bright star Canopus, and bottom right are stars in the hind of Canis Major.

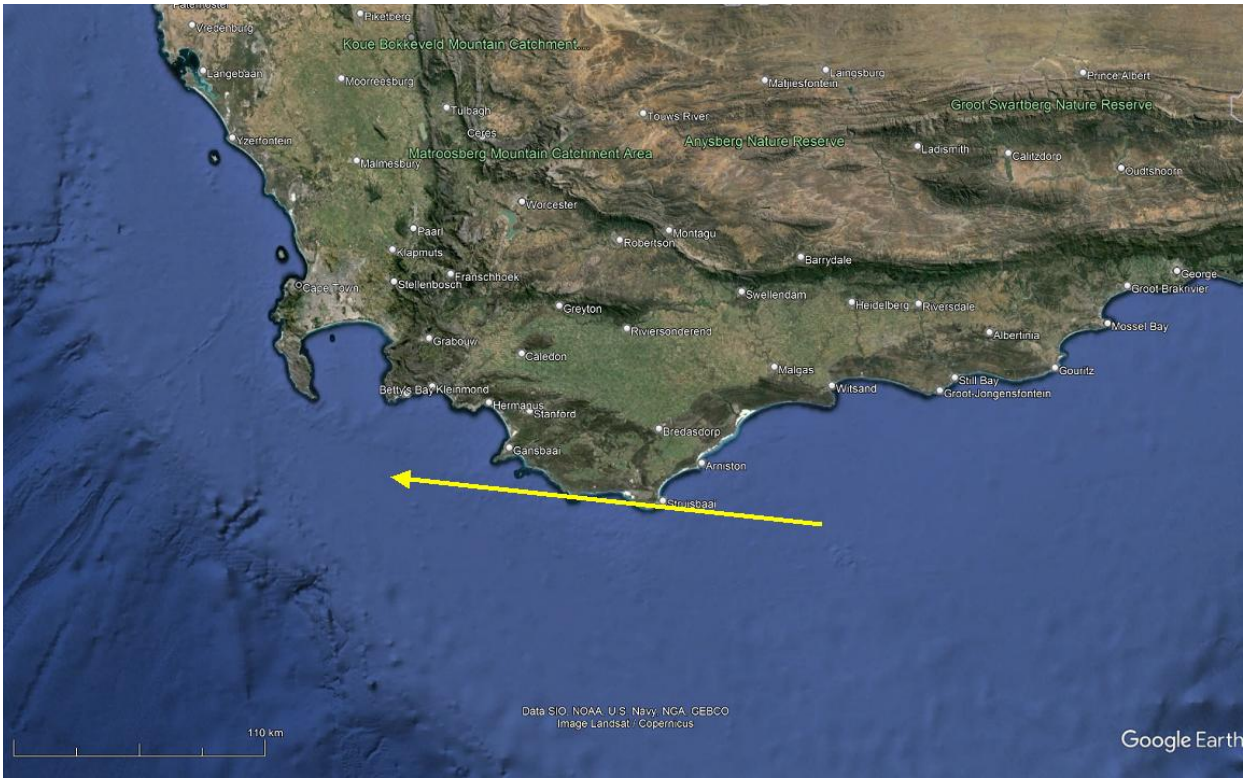


Fig 8. Event 474 on 11 February 2024, path across the Western Cape, descending from altitude 132 km to 70 km in 3.17 seconds.

The path is shown in Figure 8, commencing due south of Witsand, passed overhead at Struisbaai and ended due south of Pringle Bay, where the bright terminal burst would have occurred 65.2° above the horizon. A call was made on social media to check security cameras for any further video footage. Ed Foster checked twenty-four security cameras in the Brackenfell area and reported a flash of short duration was seen on several cameras in areas which were not brightly lit up, all with a consistent time of 02:01:59. From his location the bright flash would have occurred at azimuth 172°, altitude 38° above the horizon. The pre-atmospheric orbit of the meteor was determined by triangulation from the two GMN cameras:

Perihelion distance	q	0.189852 AU
Eccentricity	e	1.006787
Inclination of the orbit	i	158.024041°
Argument of perihelion	ω	52.426970°
Longitude of ascending node (J2000)	Ω	321.492622°

The orbit is retrograde and nominally hyperbolic (e>1.0), though that is probably due to measurement error typical of fast fireballs, and the orbit is indicative of a cometary fragment from the Oort Cloud (Vida 2024). The geocentric radiant (J2000) was determined as R.A. = 270.32925° (18h01m19.0s), Decl. = a –16.90908° (–1°54'32.7"), close to the star 6 Sagittarii, and the meteor entered the atmosphere with geocentric velocity Vg = 61.3 km/sec.

Acknowledgments
Thanks to Paul Ludick, Louw Ferreira and Andre Bruton for forwarding fireballs detected using cameras as part of the Global Meteor Network (https://globalmeteornetwork.org/). Data from the camera at the ASTRONOC Space Object Optical Tracking Station at Bonnievale, also part of the GMN network, was provided courtesy of Nawaz Mahomed and Llewellyn Cupido. Path, orbital elements and radiant details for Event 474 were provided by Denis Vida (private communication, 12 February 2024), and are reproduced with credit to the Global Meteor Network. AMS reports are courtesy of Robert Lunsford (Secretary General of the IMO). Paths were plotted using Gnomonic Atlas Brno 2000.0 by Vladimir Znojil (1988), WGN 16:4, pp 137-140. Figure 8 was prepared from a Google Earth image downloaded 18 February 2024, credit to Google and AfriGIS (Pty) Ltd.

The Kroomen of the Royal Observatory in Cape Town

IS Glass, SAAO

Between the years 1879 and about 1962 the Royal Observatory employed a number of West African people called Kroomen as unskilled workmen. Very little has been written about them and they are hardly remembered today except as very dark black men in sailor uniforms in some of the old staff pictures. Nevertheless the employment of Kroomen, their needs and their problems are mentioned quite often in the Observatory's archives and from this source we can get an insight into the lives that they led.

The Kroomen were not "crew men" but instead were a particular ethnic group that lived along the West coast of Africa in or around present-day Liberia and Côte d'Ivoire. They frequently sought contract employment on ships, mainly as seamen. The Royal Navy at Simonstown seems to have employed of order a hundred of them at times. This practice started around the time of the abolition of slavery in the late 1830s. The Observatory usually had two or three Kroomen assigned to it for a few years at a time and had to pay for them, although their needs were supplied from the Navy.

The Kroomen were not called by their African names but instead by nicknames that the Navy people found easy to pronounce.

According to a group who worked or grew up at the Observatory in the mid-20th century, "their jobs were varied and included newspaper deliveries to the dozen or so staff houses in the grounds, daily collection of mail from the local Post Office, cleaning of the office buildings, maintenance of the gardens and grounds, including the tennis court, the daily raising and lowering of the Union Jack from the flagstaff on top of the main building etc, as well as ferrying staff and us school children in a hand cart through the floodwaters of the Liesbeek River when it regularly overflowed the approach road to the Observatory in the wet winters before it was later canalized".

Looking through the correspondence in the Royal Observatory Archives it is surprising how often the HM Astronomer himself had to write to Royal Naval officials about quite trivial matters and small sums of money, sometimes even about amounts that kroomen owed each other. The HMAs seem to have felt quite benevolent towards them and acted in many ways as their guardian. They often interacted with medical men when Kroomen were sick and had to go to hospital. In general, the surviving correspondence reveals a lot about their employment conditions, their problems and their private lives.

Fig 1. Two of the Kroomen who worked at the Royal Observatory, Jack Saltwater and Tom Peasoup (James Thomas Brown) around 1890. Peasoup served for 15 years and had the rank of 2nd Head Krooman, as his stripes show. From a photograph album that belonged to RT Pett, Third Assistant Astronomer. (Posted on Facebook by Michael Fortune).

After about 1930 the Royal Navy, under pressure from the SA Government, had to stop employing Kroomen and repatriate them to Sierra Leone. However, the

Observatory managed to get some exemptions and the last of the Sierra Leonians, originally employed as a Krooman, retired in 1962

Editor's Note – Last of Magda's Asterisms

Readers of "Asterisms in MNASSA" will have got used Magda Streicher's Asterisms; those stellar clusters that are often very difficult to identify. Sadly these will be the last of her Asterisms; over 100 of theme ! They're the result of hours spent at the eyepiece of a very large amateur telescope, often during those dark and cold nights; cold because there is no cloud cover!

Her work has been recognized internationally and it has been a privilege to have contributed in a small way to her efforts and to have made sure that they are accessible to a wide readership, and will no doubt help in the work of others in the future.

Magda's Remarks

As I share the last of my asterisms, I hope and trust that my contributions have helped to reveal the wonders of the abundance of asterisms that adorn our starry night skies. The beauty of asterisms, and especially those with fewer stars, always tells a story of one kind or another and brings a feeling of joy and delight. The more I have explored, the more my appreciation of it all has increased over the years.

Auke Slotegraaf opened the door for me many years ago to lift the starry deep sky to a higher level of exploration. He became my mentor and sky friend and I dedicated the wonderful world of my asterism search to him, and also share two of his numbered asterisms.

Spend some leisurely, quality time under the starry night skies and strive for new challenges that will bring increasing fulfilment. Magda

Auke's Remarks

The two asterisms, Slotegraaf 11 and Slotegraaf 15, despite bearing my name, were not discovered by me at the eyepiece of my telescope. Rather, I "discovered" them in 2001-2002 whilst carefully searching through star catalogues held at the SAAO Library. I was working on identifying some of Lacaille's "missing" deep-sky objects at the time, and noticed that in the footnotes to individual stellar observations recorded in astrometric catalogues, mention was sometimes made of a nearby stellar grouping that caught the observer's eye. I collected these almost-forgotten comments, from 30 astrometric

catalogues published between 1752 and 1917, and attempted to identify them. About half of the 138 instances, I collected could be found in various lists of star clusters (e.g. Trumper, Collinder). The remainder were "new", and I published this list in 2003 after presenting it at the 5th ASSA Symposium (MNASSA, 2003 April, 62 (3&4), 91-95). The list was taken up in the DSH (Deep Sky Hunters) list, plotted in the Cambridge Photographic Star Atlas, and partially listed in SIMBAD.

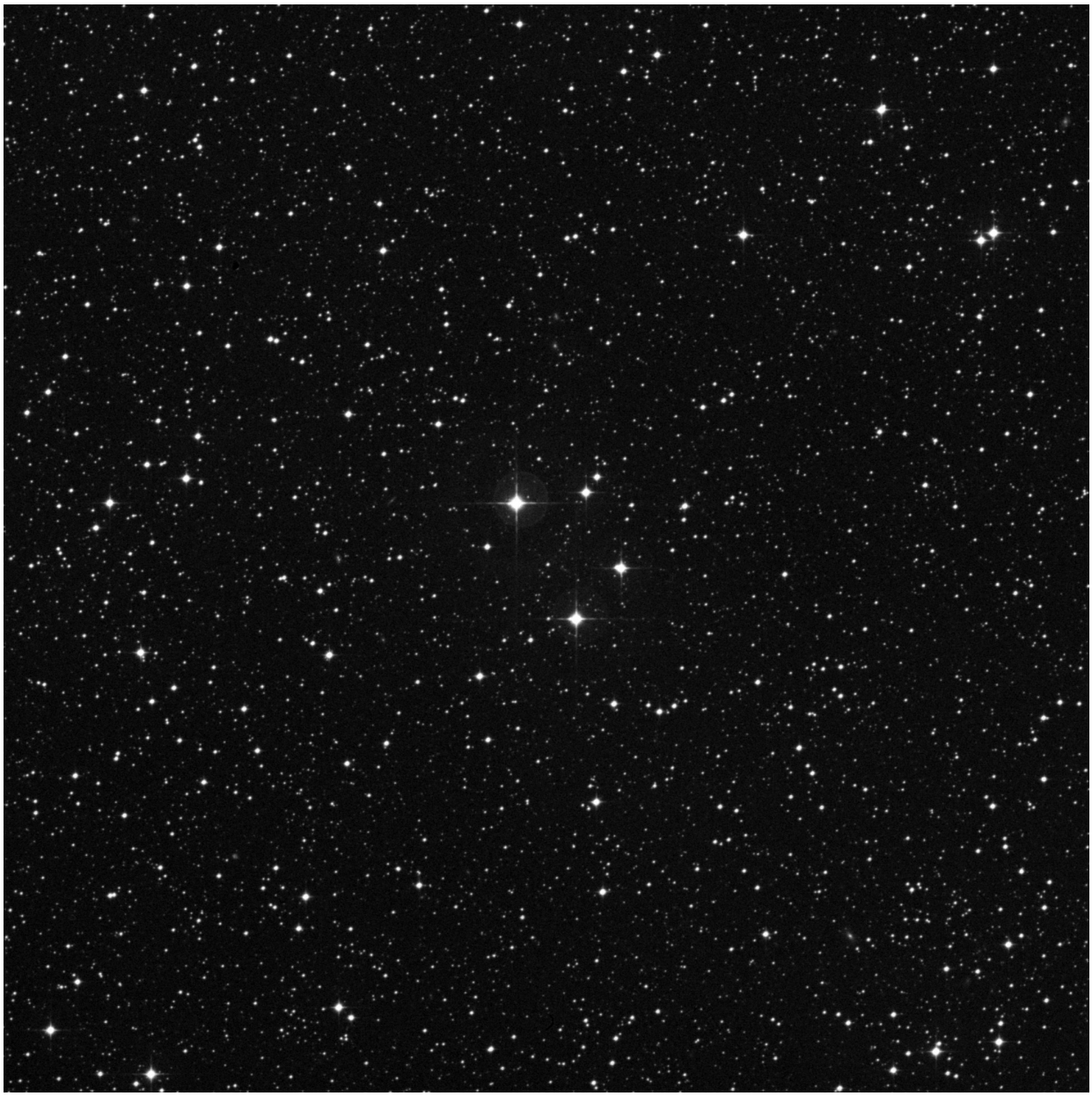
The asterisms now known as Slotegraaf 11 and Slotegraaf 15 were first noted in the 1900s during work to compile the Perth Astrographic Catalogue, carried out under the watchful eye of William Ernest Cooke. Cooke became the Government Astronomer for Western Australia in 1896 and was instrumental in establishing the Perth Observatory. He agreed to take part in the Astrographic Catalogue, an ambitious international project initiated in the late 19th century with the aim of mapping the entire night sky. Over 20 observatories around the globe, each assigned specific zones of the sky, participated in this monumental effort. They used specially designed telescopes called astrographs to capture photographic plates of the stars. The goal was to catalogue every star up to the 11th magnitude. The practical foundation for the project was laid by David Gill (Royal Observatory, Cape of Good Hope) after he was impressed by the visibility of faint stars captured in long-exposure photographs of a comet. In volume 3 of the Perth catalogue, published in 1909, two stars, Perth3-600 and Perth3-603, are described in a footnote as being "south-following of a group [of stars]". The group would become No. 15 on my list. And in volume 4, published in 1910, the star Perth4-592 is noted as being "preceding of a group", Slotegraaf 11. Both objects were discovered based on their visual appearance on a photographic plate, making enough of an impression that they warranted a comment in the form of a footnote, almost forgotten.

SLOTEGRAAF 11 – DSH J0704.7-31
Canis Major

What a lovely V-formation of stars quite outstanding. The first impression that comes to mind is a miniature Taurus constellation. The brightest north-eastern star HD 53698, shines with a magnitude of 7.3 in a slight yellowish colour.

OBJECT	TYPE	RA	DEC	MAG	SIZE
SLOTEGRAAF 11 DSH J0704.73158	Asterism	O7h04m.40	-31°58'.12	8	5'

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

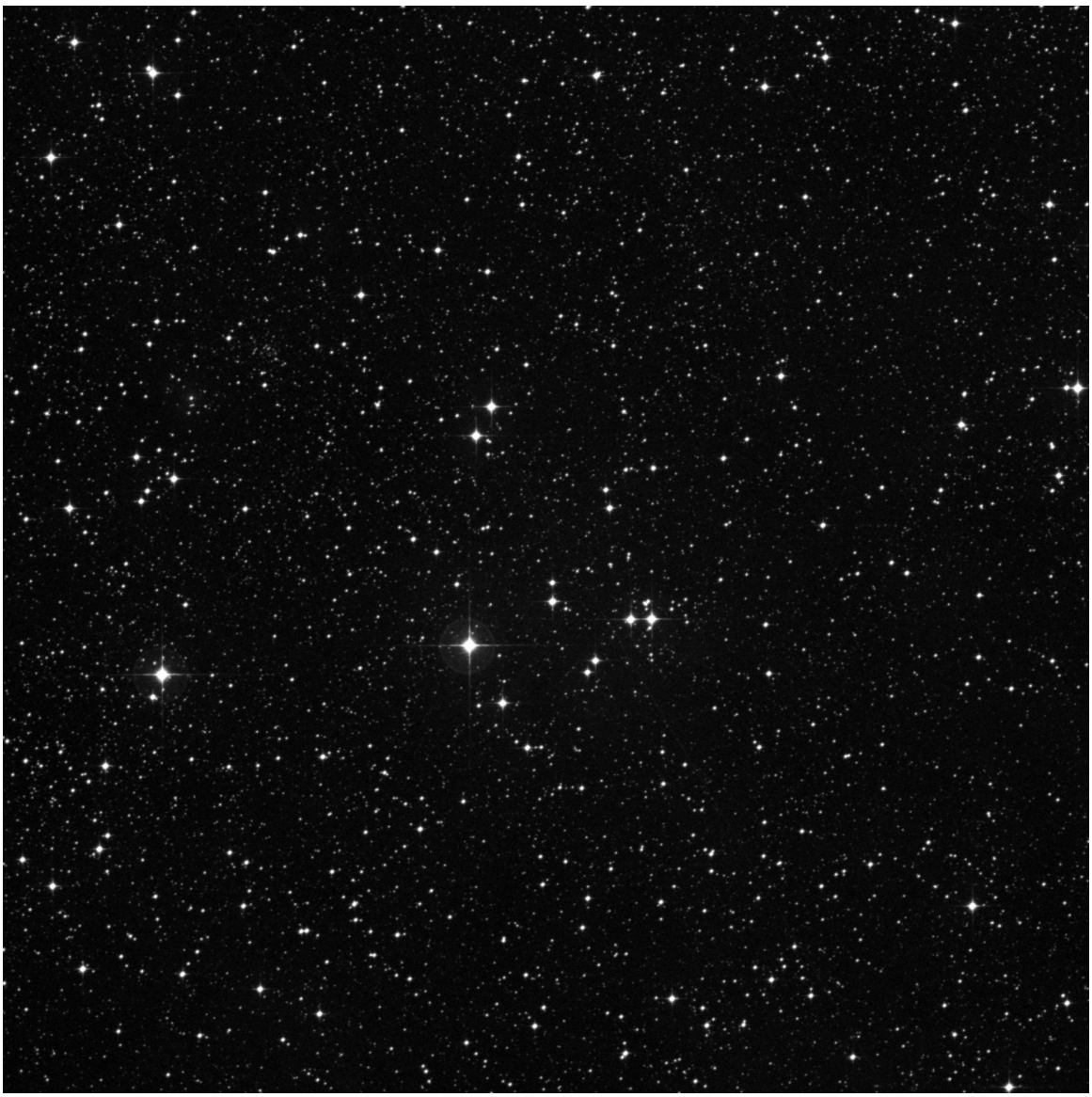


SLOTEGRAAF 15 – DSH J0757.6-34
Puppis

This field of view is special in showing a few look-a-like double stars quite outstanding against the back ground star field. It represented in a way a true impression of a real open cluster.

OBJECT	TYPE	RA	DEC	MAG	SIZE
Slotegraaf 15 DSH J0757.63452	Asterism	O7h57m.37	-34°52'.36		10.5'

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



STREICHER – J2002+1855
Sagitta

In a way this lonely four stars reminds me of the grouping Messier 73 in the constellation Aquarius. However, even small it does stands out against a very busy faint dotted star field. A lovely, crooked arc of magnitude 12 stars can be spotted just to the south-eastern field of view.

OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER DSH J2002+1855	Asterism	20h02m.06	+18°55'.42	10	18'

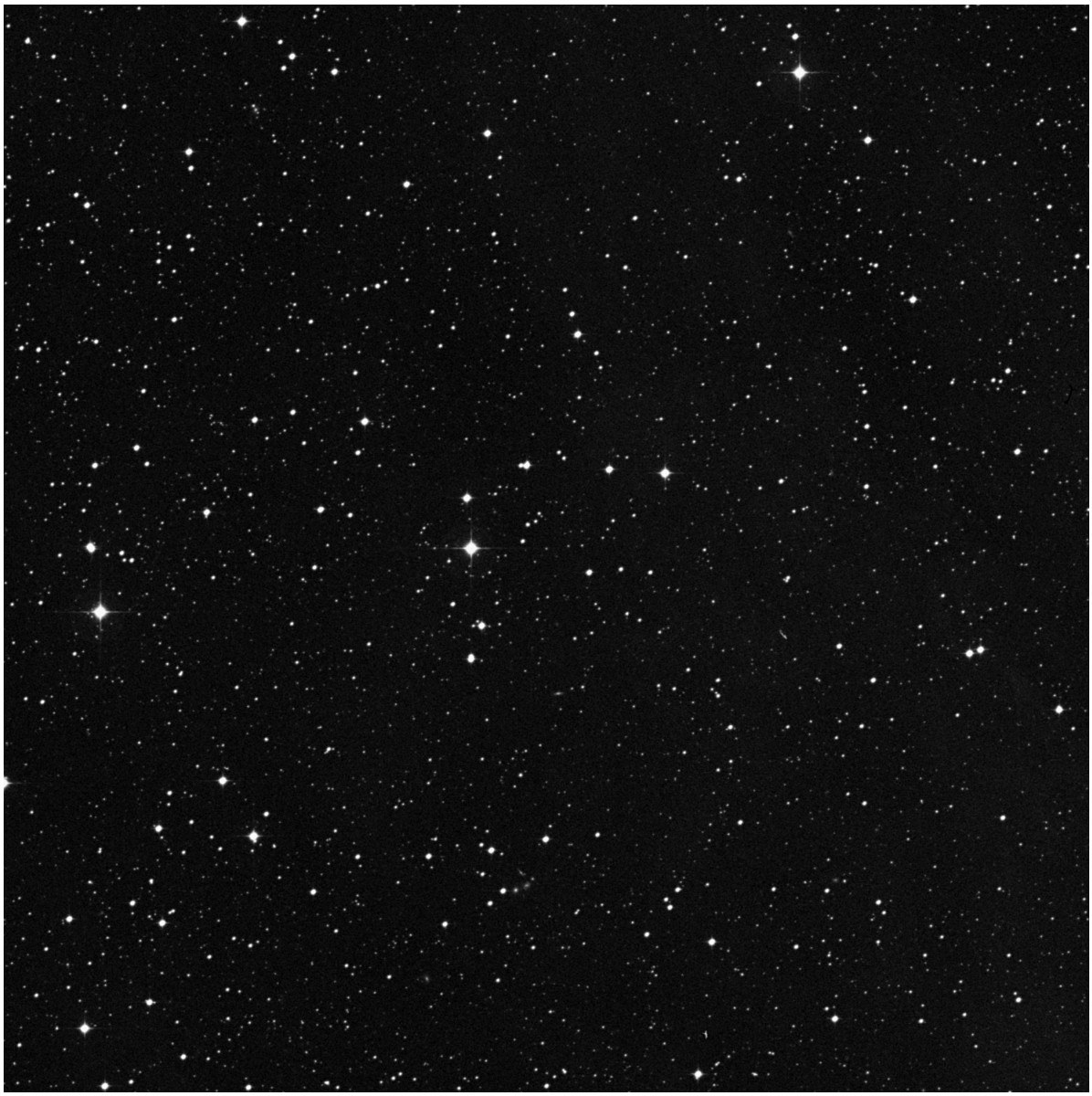
Picture Credit: http://archive.stsci.edu/cgi-bin/dss

STREICHER – J1616-13
Scorpius

Outstanding against the field of view, a few stars give a sort of broken half-moon impression. The brightest star towards east in this curved string is HD 146365, that shines with a magnitude 9 in a super white colour.

OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER DSH J1616-1338		Asterism	16h16m.20	-13°38’.47	10.2	9’

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

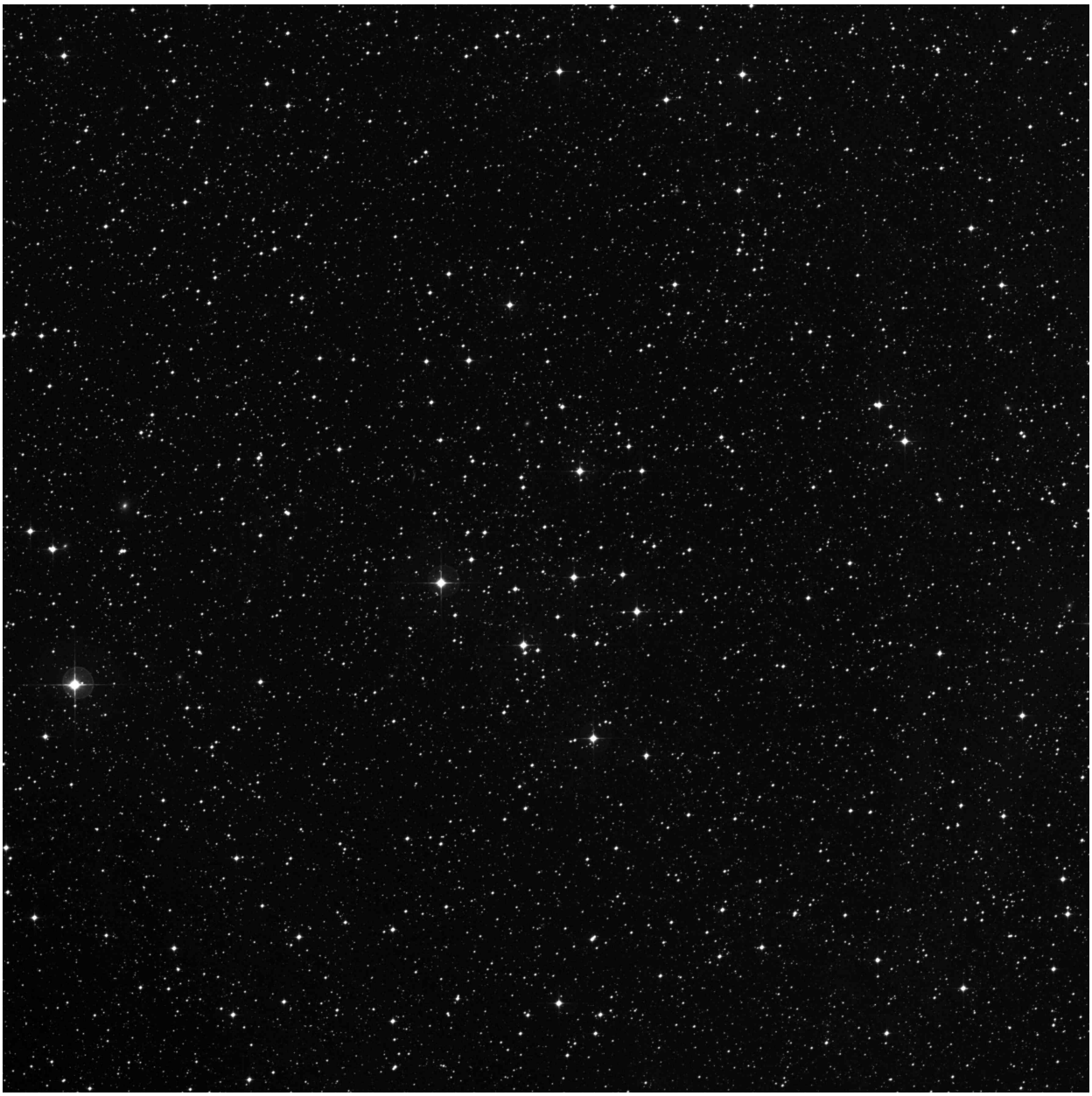


STREICHER – J1915-51
Telescopium

A gradual concentration of star light is obvious in this field of view. The large splash of various magnitude stars is just slightly lifted out against the star field bringing to mind a clustering of sorts mildly sprinkling with fainter stars.

OBJECT	TYPE	RA	DEC	MAG	SIZE
STREICHER DSH J1915-5119	Asterism	19h15m.08	-15°19'.27	9	10'

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



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

These 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

With the passing of CV19, these Colloquia and Seminars are returning slowly 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: Investigating chemical inhomogeneities in the ISM of galaxies from high-z to the Milky Way
Speaker: Tanita Ramburuth-Hurt, student at University of Geneva, Switzerland
Date: 11 January 2024
Venue: SAAO Auditorium – Hybrid
Time: 11h00

Abstract: Gas is a fundamental ingredient of galaxies as it is the fuel for star formation. Studying the metal and dust content of the gas in the ISM can give us insight into galaxy evolution, as well as of outflows and infalling gas in and around galaxies, which are necessary but elusive components of the cosmic baryon cycle. This talk will focus on the study of the properties of the neutral ISM using absorption-line spectroscopy in the Milky Way and galaxies up to z=4.2. Using high-resolution spectroscopy, it is possible to dissect lines of sight and study the chemical enrichment of individual gas components within galaxies. The results from the study of 64 DLAs, demonstrating variations in the chemical enrichment of the ISM traced using dust depletion, and preliminary findings on chemical inhomogeneities of the ISM in the Solar neighbourhood, will be presented.

Title: Flashes of light from the sky to the brain
Speaker: Dr Renée Hlozek, Dunlap Institute and Department of Astronomy & Astrophysics, University of Toronto
Date: 24 January 2024
Venue: SAAO Auditorium – Hybrid
Time: 11h00

Abstract: In the sky: the Legacy Survey of Space and Time (LSST) on the Vera C. Rubin Observatory will generate a data deluge: millions of astronomical transients and variable sources will need to be classified from their light curves. I'll discuss the efforts within the Dark Energy Science Collaboration to get ready for transient classification through efforts like public Photometric LSST Astronomical Time-series Classification Challenge (PLAsTiCC) and the Extended LSST Astronomical Time-series Classification Challenge (ELAsTiCC) was an expert challenge to LSST broker teams themselves to classify alert streams. I'll place this work in the context of pushing from detections to cosmology.

Looking to the brain: I'll present AstroBEATS, a pipeline derived from astronomical image analysis techniques and designed for high-resolution images of the brain. I'll describe how AstroBEATS can be used to study the synaptic firing in the brain and to search for signs of neurodegeneration and describe the processes that generated this interdisciplinary research.

Title: Enabling New Discoveries with Machine Learning
Speaker: Dr. Michelle Lochner from the University of the Western Cape/SARAO
Date: 09 February2024
Venue: UWC Room 1.35
Time: 15h09

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: 21cm Cosmology: tracing neutral hydrogen across cosmic time
Speaker: Dr Marta Spinelli, Observatoire de la Cote d'Azur.
Date: 16 February2024
Venue: UWC Room 1.35
Time: 11h00

Abstract: The redshifted 21cm line of neutral hydrogen (HI), detected by radio telescopes, can probe back to the Cosmic Dawn when the Universe was only hundreds of million years old and up to the late Universe and the large-scale structure. This makes the 21cm one of the most promising observables to map the evolution of the Universe, with the potential of transforming our understanding of cosmology and baryon physics.

In this talk, I will discuss two different subjects in 21cm cosmology: total-power radiometry with individual meter-wave antennas as a potentially effective way to study the Cosmic Dawn and 21cm Intensity Mapping with the SKA Observatory precursor MeerKAT for the study of dark matter and dark energy in the post-reionization era. For both, a key challenge is the subtraction of the bright foregrounds, orders of magnitude stronger than the 21cm signal. It is therefore crucial to understand the systematics in the data and assess our ability to isolate the pristine cosmological signal in realistic scenarios through simulations. I will review the problem for the different experiments and present a brief state-of-the-art overview. I will then conclude by discussing the road map for the era of the SKA Observatory

Title: **LOFAR Surveys: a new window on the Universe**
Speaker: Prof Huub Rottgering, Director of Leiden Observatory
Date: 19 February 2024
Venue: SAAO Auditorium – Hybrid
Time: 11h00

Abstract: The Low-Frequency Array (LOFAR) is a pan-European radio telescope whose massive data taking and processing capabilities make it an unprecedented powerful instrument for carrying out the deepest and widest radio surveys at the lowest radio frequencies accessible from the ground. Over the last years we have addressed important issues related to the analysis and calibration of the radio data so that we can now make thermal noise limited maps at low frequencies. The resulting wide and deep maps enable studies of a wide range of scientific topics ranging from (i) shocks in merging clusters, (ii) radio feedback processes, (iii) star formation in distant galaxies and (iv) the most distant radio AGN, close to the epoch of reionisation. In this talk I will

first discuss our solutions to the main technical challenges. Secondly, scientific highlights will be given related to these 4 topics.

Title: Quantum computing for radio interferometry
Speaker: Dr Emma Tolley
Date: 26 February2024
Venue: UWC Room 1.35 - Hybrid
Time: 11h00

Abstract: The exploitation of high-end, groundbreaking computing technologies has become essential for observational and theoretical astrophysics research. Next generation surveys and scientific instruments such as the Square Kilometer Array will produce exponentially more data than their predecessors, and will need outstanding resources to be post-processed, analysed and stored. Quantum computing (QC) exploits principles of quantum mechanics to perform computational operations. Recent years have witnessed rapid progress of quantum hardware technology, but exploiting QC solutions is a novel direction for astrophysics. We explore applications of quantum computing for radio interferometry and astronomy using recent developments in quantum image processing. We evaluate the suitability of different quantum image representations using a toy quantum computing image reconstruction pipeline, and compare its performance to the classical computing counterpart. For identifying and locating bright radio sources, quantum computing can offer an exponential speedup over classical algorithms, even when accounting for data encoding cost and repeated circuit evaluations.

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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