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Cover picture: The late Chris Forder, well-known amateur telescope maker, seen in his dome at the Cederberg Observatory with his self-built Cassegrain telescope. See his Obituary inside.

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News Note: Michele Dougherty Appointed Astronomer Royal

Professor Michele Dougherty of Imperial College London has been appointed Astronomer Royal to succeed Prof Martin Rees.

Left: Prof Michele Dougherty (photo: Imperial College, London)

Michele was born in South Africa in 1962. She first became interested in astronomy when her father built a 10-inch telescope. She went to school at Gordon Road High School and Mitchell Girls High School in Durban. Though science was not taught, she excelled at mathematics and was admitted to study at the University of Natal. There she obtained her PhD in 1989 in the Mathematics and Applied Mathematics Department under Prof Jim McKenzie, with a thesis entitled "Waves in Anisotropic and Dispersive Media".

After a fellowship in Germany, she went over to Imperial College, London in 1991 and ultimately became a Professor of Space Physics there.

She has worked on a number of planetary programmes, especially involving Jupiter and its moons using the Ulysses and Cassini missions. Her work led to the discovery of an atmosphere containing water and hydrocarbons around Enceladus.

She has received a number of high awards and accolades, including FRS (in 2012) and the Gold Medal of the Royal Astronomical Society for Geophysics in 2017. She is an influential figure in the UK space community and chaired the Science Programme Advisory Committee of the UK Space Agency between 2014 and 2016.

Michele is the first woman to become Astronomer Royal and the 16th person to hold this title since Flamsteed in 1675. Though originally it signified the director of the Royal Observatory at Greenwich, today it is an honorific position but one that carries a lot of prestige and influence.

Incidentally, Sir Richard Woolley, also born in South Africa, was the 11th holder of the title from 1956 to 1971. He was the first director of SAAO in 1971-1976.

News Note: South Africa Unveils Two Flagship Astronomy Facilities: SAAO Remote Operations Centre and Visitors' Centre

On 9 July 2025, the South African Department of Science, Technology and Innovation (DSTI), in partnership with the National Research Foundation (NRF), celebrated the official opening of two landmark infrastructure developments at the South African Astronomical Observatory (SAAO) in Cape Town: the *Remote Operations Centre* and the *Visitors' Centre*. These launches form part of the DSTI's 2025/26 Budget Vote outreach programme and reflect South Africa's commitment to strengthening its role as a global leader in astronomy while bringing science closer to the public.

The *NRF-SAAO Remote Operations Centre* is a state-of-the-art command hub that enables astronomers to control and monitor telescopes and instrumentation located at remote observatories—particularly the flagship site in Sutherland—from Cape Town. This operational advancement drastically reduces logistical costs, improves research efficiency, and enhances data acquisition and analysis capabilities. It also positions South Africa to remain globally competitive in optical astronomy, further supporting its strategic role in international scientific collaborations such as the Square Kilometre Array (SKA).

In parallel, the opening of the *NRF-SAAO Visitors' Centre* marks a major milestone in public science engagement and astro-tourism. Funded in part by the Department of Tourism, the centre is designed as a welcoming and educational space for learners, tourists, and members of the general public. Through exhibitions, immersive displays, and expert-led tours, it aims to foster public understanding of astronomy and ignite interest in science careers. The initiative aligns with the National Astro-Tourism

Strategy and Implementation Plan approved by Cabinet earlier in 2025, demonstrating the government's commitment to leveraging science infrastructure for tourism and educational development.

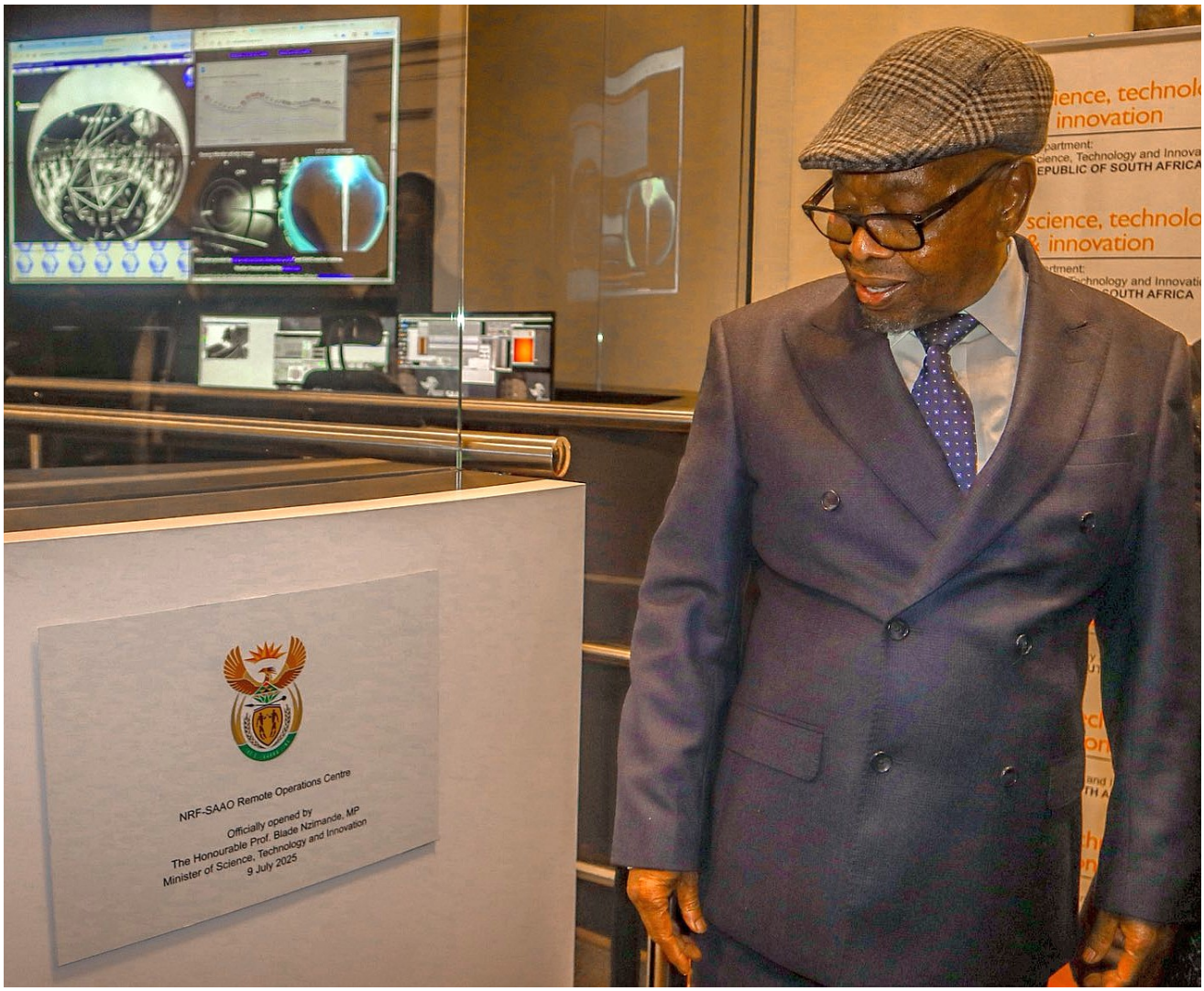


Fig 1: Minister Dr Blade Nzimande at the opening of the Remote Operations Centre.

The ribbon-cutting ceremony was officiated by the Minister of Science, Technology and Innovation, Prof. Blade Nzimande, alongside Deputy Minister Dr. Nomalungelo Gina and Minister of Tourism Ms. Patricia de Lille. They were joined by NRF CEO Dr. Fulufhelo Nelwamondo, as well as representatives from Parliament, government departments, the research sector, and civil society. A significant feature of the event was the participation of over 100 learners, primarily from under-resourced schools, who engaged in interactive demonstrations and received guided tours of the newly launched facilities.

In his keynote address, Minister Nzimande lauded the NRF and SAAO for their vision and commitment to science advancement and inclusion. “The launch of the Remote

Operations Centre and Visitors' Centre is a clear manifestation of the government's long-standing investment in astronomy infrastructure. These investments are not only vital for scientific progress but also for transforming education, enhancing public engagement, and creating high-skill employment opportunities," he said. He emphasized that astronomy has been a strategic national priority, enabling South Africa to take on a leading role in global scientific ventures.

NRF CEO Dr. Fulufhelo Nelwamondo highlighted the broader societal impact of the two facilities. "The NRF's duty is to ensure that our national research infrastructure delivers maximum benefit to society. These facilities bridge the gap between high-end science and public participation, contributing to education, tourism, and skills development," he said. Dr. Nelwamondo expressed particular encouragement at the presence of so many young learners: "Their curiosity is South Africa's future competitive edge."

Fig 2: Ministers Patricia de Lille, Blade Nzimande and Nomalungelo Gina at the opening of the SAAO Visitors' Centre.

Dr. Rosalind Skelton, Managing Director of the NRF-SAAO, provided a comprehensive overview of the observatory's evolution, its scientific contributions, and the transformative role astronomy can play in sustainable development and community

empowerment. Messages of support were also delivered by Ms. Tsakani Shiviti, Chair of the Parliamentary Portfolio Committee on Science, Technology and Innovation, and Dr. Shamilla Chettiar of the Department of Tourism, who reinforced the cross-sectoral value of astro-tourism.

Together, the Remote Operations Centre and Visitors' Centre represent a bold step forward in South Africa's science, technology, and innovation agenda. They reinforce the country's global scientific standing while making astronomy more accessible, inclusive, and inspiring for the next generation. (NRF Press release)

Obituary: A legend has passed – Remembering Chris Forder

Lia Labuschagne

"*We got music going - we try to keep it to calm music, so that we are not too excited. If you get too excited, then things start going wrong and you start doing stupid things. You must just keep calm the whole time while you are imaging. After all, the stars will wait - if you don't get them tonight, you can get them tomorrow night. Time is nothing to them, time is everything to us*."
- Chris Forder.

The late ASSA member Chris Forder will be remembered as a highly skilled amateur telescope maker, but also among others as honorary member of Cape Centre, committee member, financial guru (he had served for more than 30 years as regional accounting manager at the OK Bazaars before his retirement), a member of the Cederberg Observatory, astro-photographer, devoted sky gazer - and esteemed presence at sky parties and outreach events.

Although injuries lately kept me away from star parties and meetings, Chris had been a favourite sky-gazing buddy with wise and informed words on many subjects. Among others he regularly attended the Southern Sky Parties organised by Ed and Lynnette Foster (originally at Night Sky Caravan Park, and later at Leeuwenboschfontein). In the late night hours, with only a few of us left around our telescopes, the Chris who appreciated and understood the night sky was the best possible companion. **Ed Foster** remembers: "Chris was an amazing and very willing source of telescopic and astronomical advice. He never made a telescope for me, but he did some finishing work om my 14-inch mirror, which our son Jaco ground under the guidance of Bill Hollenbach way back in the 1990s. Over and above his vast telescope and astronomy knowledge,

Chris had a very sharp wit, a delightfully wicked sense of humour and a more than adequate musical knowledge."

Over coffee against the night cold we shared our appreciation of music and humour. Chris loved old-fashioned British radio comedy, and shared puns and Star Trek-inspired jokes. As a practical music man, he listed being a guitarist as one of his skills, together with telescope making. His music tastes included *Gymnopédie 1* by Eric Satie - his favourite classical piece - but also many other genres of music.

Born in Zimbabwe, Chris went to school and worked in Harare. Later he completed an MDP at UNISA. We can be grateful that he ended up in the Cape after his retirement. The current Chair of Cape Centre, **Willem Brazelle**, echoed my own recollections as Chair of the Centre: "Chris was at almost every meeting and contributed interesting – and often tough – questions and funny comments. He was such an inspiration for us all. He made more than 50 mirrors, and most of those are still in telescopes valued by their owners. I would have loved to learn mirror grinding from him, but just never really got started."

"I always seated myself just behind Chris and enjoyed his questions of speakers at the meetings," **Robin Horn** adds.

Among the many people who own one of Chris' telescopes is honorary member of Cape Centre, **Karen Koch**: "the proud owner of a tabletop 8-inch Newtonian on a Dobsonian mount that he crafted. He named it Claire." **Elsabe Uys** had a similar experience: "Chris built a rotating table-top stand for my telescope and gave me an astronomical nickname which he engraved on it. I'll always remember him with fondness."

Another memorable scope is that of **Kechil Kirkham**: "Having seen a photo of me climbing up Lion's Head with a Dobsonian, Chris quietly set about building the ideal telescope. This was the alchemical process by which he created telescopes for people, which matched more than their technical needs but expressed a much deeper connection between person and instrument."

Renier Mulder tells how "Chris first inspired me into making my own telescope at the first star party I attended in 2018. He later made two mirrors for me which are now in telescopes. He always had time for questions and was eager to point out tips and practical engineering hacks on his telescopes." Similarly, **Paul Grapendaal** said: "Chris was an incredible help and very patient in helping with my first mirrors…"

Justin de Reuck recalls how knowledgeable Chris was: "I learned a lot from him. A legend has passed." **Chris de Coning** agreed: "When I was a rookie amateur, Chris

Forder taught me a few handy tips," while **Marius Reitz** said simply "I will fondly remember our Cederberg trips and the beer. He took me under his wing when I was very new to the hobby. So passes a legend in our minds..."

Peter Dunsby is Professor of Gravitation and Cosmology in the Department of Mathematics and Applied Mathematics at the University of Cape Town, and outstanding astro-photographer admired among his fellow Cape Centre member. He summarises the feelings of many people about Chris' passing: "Very sad news and a big loss to the community."

Other tributes have come from far afield and express admiration for his wit and knowledge. He enthusiastically welcomed newcomers: "Indeed very sad. One of the first members I met when I first visited SA," says **Barry Linton**. **Carol Botha** of the Orion Observation Group (OOG) in Paarl commented: "Chris Forder was a dear friend who diplomatically helped with the collimation of my very first rubbish telescope. Somehow, he actually made the scope work! He will be missed." And **Pierre de Villiers**, past ASSA President and Chair of the Hermanus Centre said: "Chris will indeed be sadly missed by all who experienced his friendliness and technical help."

Kechil Kirkham again: "Chris had an extraordinary capacity to withstand the cold, sitting out all night in winter with his telescope at the Cederberg Observatory. His pride was the geodesic dome he eventually built, which at least kept the wind off and provided superb acoustics for his music collection."

Carl Lindemann took over Chris' share in the Cederberg Observatory, "and had hoped he would still participate. A bad case of Covid-19 had impaired his mobility. It was time for him to hand over the baton for a place he'd devoted himself to for decades… Later, renovations removed what had been his shrine, the "tank" dome where he'd spent countless nights. After his departure, who could take his place there? We lovingly and carefully cleared it before demolition, saving whatever he cared to have. All that remains now is the pier where he'd installed his handcrafted mount and optics… His gear is replaced by manufactured Chinese products. But the Cederberg skies - and the passion he had for them - live on."

Many thoughts of sympathy go to Chris' talented wife, Camille. Long-standing Cape Centre Secretary **Wendy Vermeulen** says Camille is as creative and kind as her legendary husband had been: "When I took my telescope tube to their house some time ago, we had tea in their pleasant courtyard and I commented on the birds that are attracted to their home-made feeders. When I returned weeks later to collect the beautiful Dobsonian mount that Chris had made, Camille presented me with a feeder

she had made for me!" Camille was unselfish enough to share Chris with us – and we thank her for that.

Whether playing tennis, strumming his guitar, patiently grinding a telescope mirror, imaging a celestial object, or answering a child's question at a dark sky event, Chris gave his best – and earned numerous friends and admirers along the way.

A world without Chris wearing his jacket with its NASA patch will not be quite the same. May more of us become more like him, because amateur astronomy can only benefit by having more Chris Forders around.

Fig 1: Chris at his home-made classic Cassegrain inside the geodesic dome. Everything was made by him from scratch, including the dome, the mount and drive system.

Fig 2: (left) Chris at Leeuwenboschfontein with a typical "collapsible Forder Dobsonian" which he made for Marius Reitz

Fig 3: (right Chris Forder's Telescope inside its dome at the Cederberg Observatory which has since been demolished. The pier is still visible at the Cederberg Observatory today.

Recent Southern African Fireball Observations Events # 508-522

Tim Cooper, Director, Comet, Asteroid and Meteor Section

Summary: 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 (mv) -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. Solar longitudes for dates and times of events were calculated from the SollongCalc app by Kristina Veljkovic. 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 508 updated – 2025 April 10 – Muldersdrift, Germiston, Pretoria, Gauteng

After publication in *MNASSA* Vol, 84, p78, new observations were received of Event 508. Consequently, the updated report including all observations received is given now.

Observed by Manuela Smith at 19h39, solar longitude 20.8°. She was looking through a window and saw a 'very bright white fireball which looked a bit like a firework with all the sparks.' The fireball was captured on a security camera, entering the field of view already bright top left of frame at approximately az/alt 84°, 20°, and is visible for 2.7 seconds, descent angle 212° before fading out in az/alt 76.5°, 10°. Path length in the video is 12.8°, angular speed 4.7°/s. The start and end points compute to approximately RA/Decl. 15.5h, -3.5° to 16.0h, +7.5° and the path is consistent with an Anthelion meteor.

Observed by Meldee Nel who gave the time as around 19h35, observed 'a green flash of light descending down to the surface at a very high speed. There was an unfamiliar crack sound just before it happened.'

Observed by Kayla Ludick who gave the time as 19h40, duration 1-2 seconds, white, blue and green colours observed, and 'there might have been fragmentation.' Estimated brightness slightly fainter than the Moon, which was then 96% illuminated, magnitude -12, altitude 58° in azimuth 31°. Path from az/alt 91°, 13° to 78°, 5°. AMS Event 2036-2025.

Event 509 – 2025 April 19 – Kloof, KwaZulu-Natal

Observed by Andrew Janssens at 16h00, solar longitude 23.6°, duration 3-4 seconds, long enough for others to have seen it after Andrew called out; yellow-orange colour, about as bright as the first quarter Moon [not visible at the time] and said 'it was much brighter and seemed closer than normal shooting stars.' Appeared to have sparks behind it [disintegrating] for the last 1-2 seconds, before disappearing at the end of its path. Approximate path from az/alt 68°, 29° to 57°, 37°, that is RA/Decl. 11h30, +2° to 10h43, +5° and there is a good agreement with the Anthelion radiant. AMS Event 2211-2025.

Event 510 – 2025 May 9 – Seafield, Eastern Cape

Observed by Frikkie Jacobs at 21h17, solar longitude 49.1°. Bright yellowish white fireball, duration >4 seconds, magnitude given as -9, not as bright as the 93% illuminated Moon which was then magnitude -12, altitude 60° in azimuth 322°. The meteor split into two large pieces, later on disintegrating into many small fragments before burning out. Path from az/alt 50°, 30° to 52°, 15°. No persistent train and no sounds heard. The fireball was most likely Anthelion. AMS Event 2563-2025.

Event 511 – 2025 May 16 – George, Western Cape

Fig 1: Event 511 captured on GMN camera ZA000D on 16 May 2025. Just below the fireball is Venus, to its immediate right is Saturn, and the bright star towards the right forming a triangle with the two planets is beta Ceti.

Detected by camera ZA000D operated by Johann Swanepoel at 03:51:06, solar longitude 55.19°, screen grab shown in Figure 1. Path from RA, Decl. 23h04, -1°27' to 00h11, +6°07', path length 18° and there is good agreement with the Anthelion radiant. Johann also saw the fireball visually while setting up for a parkrun event at Aloe Gate, and said it was very bright white, much brighter than Venus, then magnitude -4.6 but low above the horizon, and left a persistent train, which is visible in screengrabs from the video in Figure 2. The train is initially visible extending 12° from the top of frame and terminates at the moment of the bright flare. The resulting meteoric smoke quickly

dispersed in high altitude winds, becoming curved, and was visible for up to six minutes in the video.

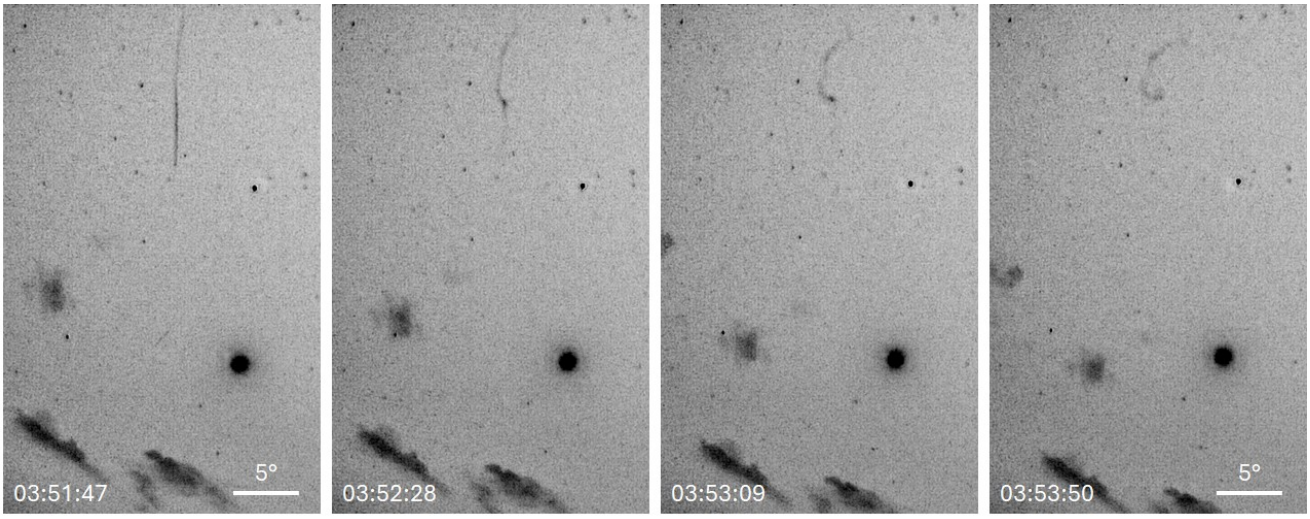


Fig 2: Event 511 captured on GMN camera ZA000D on 16 May 2025, converted to a negative image and contrast enhanced to show the persistent train at top. Spots below are clouds, with Venus lower right. Panels show the dispersion over the first 2 minutes.

The fireball was also detected on camera ZA0001 (Astrosoc, Bonnievale), where the sky was mainly cloudy. From points derived when the fireball was visible between clouds, path from 23h29, -7°10' to 0h00, -3°25'.

Event 512 – 2025 May 22 – George, Western Cape

Fig 3. Event 512 captured by GMN camera ZA000D on 22 May 2025.

Detected by camera ZA000D operated by Johan Swanepoel at 18:30:05, solar longitude 61.56°, screengrab shown as Figure 3. Bright meteor with terminal flare. Path from RA/Decl. 16h42, 29°43' to 17h30, -28°35' and the fireball was sporadic.

Event 513 – 2025 May 27 – George, Western Cape

Detected by camera ZA000C operated by Andre Bruton at 23:09:18, solar longitude 66.55°. Screengrab shown in Figure 4. The short path is low above the horizon making astrometry difficult, but projecting backwards the path is in good agreement with the Anthelion radiant.

Fig 4: Event 513 captured on GMN camera ZA000C on 27 May 2025. Stars in the constellation Corvus are in the centre of the image, Crux Australis lies on its side in the top left-hand corner.

Event 514 – 2025 May 29 – Gqeberha, Eastern Cape, and George, Western Cape

Fig 5: (left) Event 514 captured on GMN camera ZA000A on 29 May 2025. The fireball crosses the region of eta Carinae and terminates with a double flare close to the False Cross in Carina.

Fig 6: (right) Event 514 captured on GMN camera ZA000D on 29 May 2025. Just above the fireball are stars in Sagittarius, above those are those in the tail of Scorpius.

Detected by camera ZA000A operated by Louw Ferreira at 19:52:48, solar longitude 68.34°. Screengrab shown as Figure 5. Path from RA/Decl. 11h35, -59°10' to 09h16, -59°02' where it ends in a double terminal flare. Detected by camera ZA000D operated by Johann Swanepoel, screengrab shown as Figure 6. Path from RA/Decl. 19h15, -24°33' to 19h50, -25°10'. Retracing the paths from both cameras gives a radiant at RA/Decl. ~252° (16h48), -15°, close to the stars eta and zeta Ophiuchi and the fireball may have been a May Ophiuchid. The radiant is close to that listed by Molau (2013) as the Southern May Ophiuchids (SOP, IAU shower #150), which includes radiants at 251.7°, -15.4° and 248.2°, -10.8°. Jenniskens (2024) however gives the mean radiant of the Southern May Ophiuchids as 261.2°, -29.6° at solar longitude 65.4°, but also lists the Northern May Ophiuchids (NOP, #149) as 258°, -14° at solar longitude 58.6°. In any case, the radiant is located just 7.8° from the Anthelion radiant, for which both showers SOP and NOP are considered components.

Event 515 – 2025 May 30 – Gqeberha and East London, Eastern Cape

Observed by Justin and Candice Addison from Gqeberha at 04h20, solar longitude 68.7°, who 'saw a massive object falling from the south-western sky towards the eastern sky where the sun would come up later, and [appeared to move] much slower than a normal, fast shooting star. Duration about 8 seconds until it went behind the buildings on the horizon. It was circular in shape with a long tail. The circular part was a blueish white with red-coloured edges and the tail was red.'

Observed by Marc Wandoff travelling by car on the N2 freeway at East London in direction 252°, the fireball was travelling right to left, starting from slightly to his left and moving towards the south-easterly direction. Duration 3-4 seconds, Marc said it was larger than any meteor he had seen and appeared to break apart into several pieces, each of which 'turned into fireballs' before disappearing. Colour was said to be yellow.

The fireball was independently observed by Marc's colleague Rohan Bach who also gave the time as 04h20. Rohan was on the same road headed in direction 225° when he saw the fireball moving from right to left across the road ahead, duration about 6 seconds, 'white colour with a tail, and there were smaller pieces breaking off it and burning out.'

Considering the distance between the reports it is uncertain whether the three reports refer to one fireball or two separate events seen coincidentally at the same time.

Event 516 – 2025 June 4 – Laingsburg and Bonnievale, Western Cape

Fig 7: Event 516 captured on GMN camera ZA0008 on 4 June 2025. Triangulum Australis is in the upper right corner, and the Pointers alpha and beta Centauri are in the bottom right corner.

Detected by camera ZA0008 operated by Laingsburg High School at 04:33:24, solar longitude 73.48°, screen grab shown in Figure 7. Path from RA/Decl. 17h32, -87°57' to 06h22, -80°10' and there is excellent coincidence with the Anthelion radiant. The fireball was also detected by camera ZA0001 operated by Astrosoc, Bonnievale, where the fireball was seen during bright twilight and partly obscured by cloud (Figure 8).

Fig 8: Event 516 captured on GMN camera ZA0001 on 4 June 2025. Twilight was well advanced and the fireball was seen through clouds. On the left is the planet Venus.

Event 517 – 2025 June 7 – Mabula Private Game Reserve, Limpopo

Observed by Paul and Jane Goldschagg at 18h14, solar longitude 76.9°. Brighter than Venus at its brightest [so mv >-5], fainter than the Moon which was then 89% illuminated, magnitude -11.8, and located above the fireball at altitude 73° in azimuth 67°. Said 'colour was initially white, could see a smoke trail then turned red then blue then exploded.' From a sketch provided path from approximately RA/Decl. 11h45, +8° to 09h30, +17° and the fireball was sporadic.

Event 518 – 2025 June 8 – Mouille Point, Cape Town, Western Cape

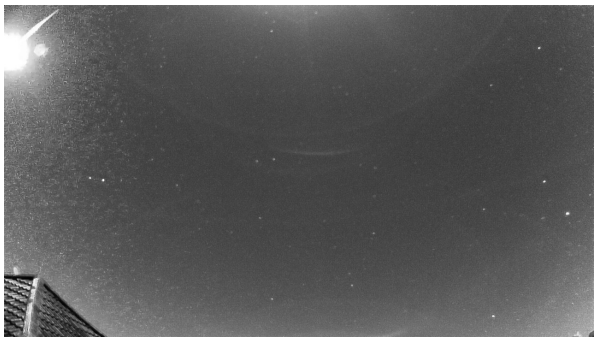
Observed by James Bisset at 19:46:33, solar longitude 78.16°. Duration 3-4 seconds, bright green, said to be brighter than the Moon, which was then 94% illuminated, magnitude -12, altitude 72° in azimuth 50°. Path from az/alt 355°, 45° to 357°, 30°, that is RA/Decl. 13h55, +11° to 13h58, +26°, and the fireball was sporadic. Towards the end of its path the fireball disintegrated, the fragments becoming orange colour before burning out. The bright flash was also caught on James' security camera, from where the accurate time was obtained. The video is 30 frames/second, and the flash is seen reflected off the surface of the ocean in 14 frames, giving a visible duration of 0.47 seconds and peaking at frames 4 and 5 before slowly fading. During this time there is no apparent sideways motion of the reflection, confirming the report that the motion of the fireball was almost vertically downwards. AMS Report 3088-2025.

Event 519 – 2025 June 9 – George, Western Cape

Detected by camera ZA000C operated by Andre Bruton at 17:07:18, solar longitude 78.76°, screengrab shown as Figure 9. Path from RA/Decl. 07h37, -28°30' to 08h31, -15°49'.

Fig 9: Event 519 captured on GMN camera ZA000C on 9 June 2025. At upper left is the bright star Canopus, lower centre Sirius is partly obscured by cloud and top right is Alphard.

Event 520 – 2025 June 11 – George and Bonnievale, Western Cape



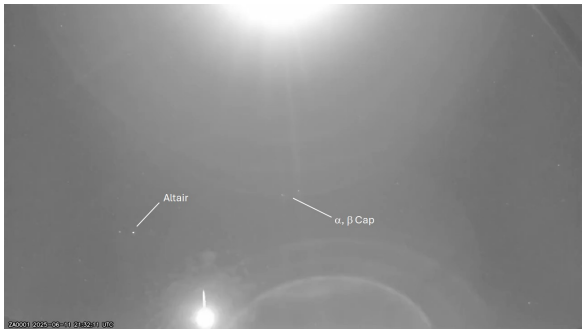


Fig 10: (left) Event 520 captured on GMN camera ZA000D on 11 June 2025. The brightest star towards the left is Altair, and at the right is the constellation of Grus. The two stars near the centre of the images are alpha and beta Capricornis.

Fig 11: (right) Event 520 captured on GMN camera ZA0001 on 11 June 2025. The near-full Moon is just outside the field at top.

Detected by camera ZA000D operated by Johann Swanepoel at 21:31:46, solar longitude 80.85°, screengrab shown as Figure 10. Very bright terminal flash at the edge of the field of view, no astrometry attempted. Also detected by camera ZA0001 operated by Astrosoc, Bonnievale at 21:32:00, screengrab shown in Figure 11. Short path approximately from RA/Decl. 20h38, +4°34' to 21h06, +3°46', and the fireball was possibly Anthelion.

Event 521 – 2025 June 13 – George, Bonnievale, Touwsrivier and Laingsburg, Western Cape

Detected by four GMN cameras at 23:00:25, solar longitude 82.819°, showing several bright flaring events along its path. Details of the four images as follows: ZA0002 operated by Astrosoc, Bonnievale, image shown in Figure 12. The fireball entered the field of view just prior to the terminal flare. ZA0007 operated by Touwsrivier Primary School, image shown in Figure 13, path from RA/Decl. 19h33.2, -77°05' to 02h36.0, -79°07'. ZA0008 operated by Laingsburg High School, image shown in Figure 14, path

from 13h09.7, -69°57' to 10h15.2. -66°43'. ZA000C operated by Andre Bruton, image shown in Figure 15, path from 13h01.9, -25°07' to 12h17.5, -20°35'. Paths derived from cameras ZA0007, ZA0008 and ZA000C were plotted to derive a radiant around 17h36, -29.2°. The radiant position is very close to that of the Southern mu-Sagittariids (SSG, IAU shower #69) which is part of the Anthelion source.

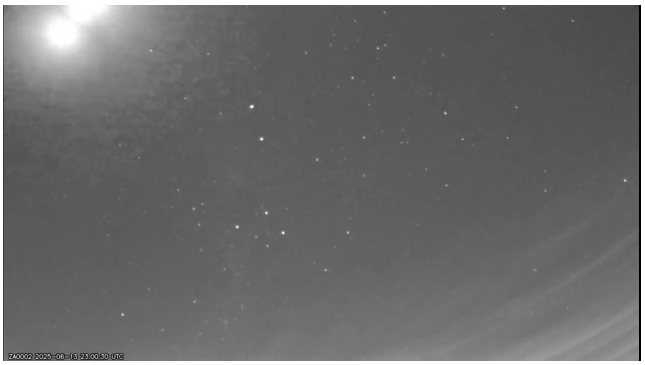


Fig 12 (left): Event 521 on 13 June 2025, captured by GMN camera ZA0002. Left of centre is Crux, and above that the two Pointers alpha and beta Centauri.

Fig 13: Event 521 on 13 June 2025, captured by GMN camera ZA0007. The streak at right is an internal reflection from the bright fireball. Above centre is the constellation of Apus, while Musca is towards the right.

Fig 14 (left) Event 521 on 13 June 2025, captured by GMN camera ZA0008. The constellation of Musca is at top right and the terminal flash is close to the centre of the Diamond Cross in Carina.

Fig 15: (right) Event 521 on 13 June 2025, captured by GMN camera ZA000C. Crux is at top left, the path of the fireball starts in Centaurus and ends in Corvus.

Event 522 – 2025 June 27 – Kenton-on-Sea and East London, Eastern Cape

Observed by Daniel Schoeman at 19h26, solar longitude 96.0°, duration 3-4 seconds, bright yellow-orange, estimated magnitude -6 and left a persistent train visible for about 5 seconds. From a sketch provided, path from approximately az/alt 52°, 15° to 47°, 10°, that is RA/Decl. 19h15, +20° to 19h15, +28°, which is consistent with an Anthelion meteor. AMS Event 3590-2025.
Observed by Sally Schulze from East London at 19h25, 'large orange fireball with a long, thick tail', facing azimuth 300° it appeared to be moving northwards. Visible for almost 8 seconds before disappearing from view behind trees. 'Just before it disappeared, the tail seemed to split into two.'

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Molau S., (2013), Results of the IMO Video Meteor Network – May 2013, WGN, 41, 133.

Acknowledgments
Thanks to Bob Lunsford for forwarding fireballs reported to the AMS website (https://www.amsmeteors.org/fireballs/fireball-report/). Solar longitudes were calculated from the SollongCalc app by Kristina Veljkovic, Department of Probability and Statistics, Faculty of Mathematics, University of Belgrade, Serbia, accessed through the IMO webpage at https://www.imo.net/resources/solar-longitude-tables/.

Some Important Historical instruments in the SAAO Museum

I.S. Glass, SAAO

Summary: The SAAO contains several hundred items in its museum collection. A number of these played essential roles in projects of scientific significance.

First observations leading to a stellar distance

The first major scientific achievement of the Cape (formerly Royal) Observatory was the first observation of a significant stellar parallax, leading to the distance to a star, namely α Centauri (Henderson, 1840). The instruments used for this work were a Mural

Circle, a Transit and a Regulator clock. All date from the foundation of the Observatory in 1820.

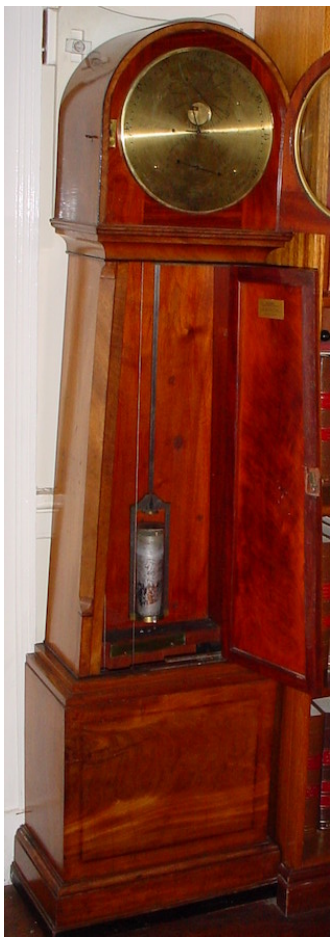


Fig 1: (right) Of these, only the Hardy Regulator Clock (M221) still exists in complete form. Like many other Regulators of the period, the pendulum terminates in a cylinder of mercury for thermal compensation.

Figs 2 & 3: The upper photograph is of the Dollond Transit's objective (M096, 5 inches diameter) and the lower one is that of the Jones Mural circle (M097, 4 inches diameter). These instruments ceased to be used around 1850.

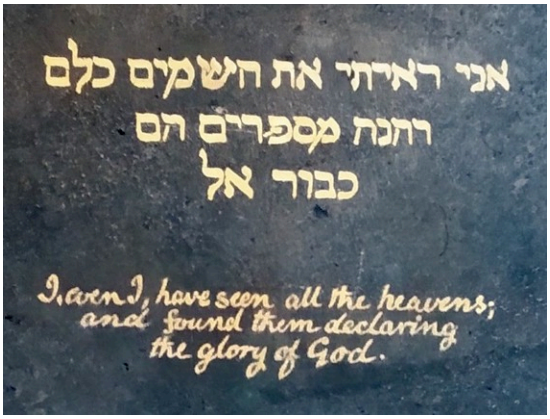
It will be noticed that the Transit objective's cell has a part cut off. This happened when it was pressed into service for a guide telescope in an experimental photographic telescope in 1886.

Mirror used by Sir John Herschel

Fig 4: *This (M063) is one of three similar mirrors used in Sir John Herschel's famous survey of southern hemisphere objects conducted from his private observatory in Claremont, Cape Town during the years 1835-1838 (Glass, 2021).*

It was made by Sir John himself from speculum metal, a copper-tin alloy. As speculum metal tarnished rapidly and lost its reflectivity, it was necessary to have more than one mirror so that while one was in use another could be re-polished, an extremely delicate process.

The diameter of this mirror is approx. 47.3 cm and its focal length is 6.1 m. Its thickness is 37-38 mm, rather thin for such a large diameter. It formed part of his "20-foot" telescope.



Figs 5a & b: On the back of the mirror is written this touching description.

Maclear's Geodetic Survey

Several instruments in the SAAO Museum were used by Thomas (later Sir Thomas) Maclear and his team in Verifying and Extending La Caille's controversial measurement of the shape of the Earth. Shown (1840s) here is the "Beaufort Theodolite" (M133) originally owned by Sir Francis Beaufort, the Hydrographer of the Royal Navy, but presented to Maclear.

Fig 6: This beautiful instrument was made by Reichenbach and Ertel of Munich, probably around 1814.

In its day, it was carried with great care to the summits of many mountains, all the way up from Cape Point to Bushmanland (Maclear, 1866).

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Cape Standards of Length, Mass and Volume

The Royal Observatory was chosen as the repository of standard bars, masses and volumetric containers for the Cape Colony.

The original standard yard was destroyed in a fire at the Houses of Parliament in London in 1834 and a large number of precise copies of the new standard were made in 1845 and distributed to British colonies worldwide.

Fig 6: The upper item shown (M141a) is a standard "End Bar" of one yard.
Fig 7: A similar standard with marks under caps (M141b) is also shown.

Celestial Photography (1880s)

Fig 8: In 1882 a bright comet appeared and was photographed successfully by David Gill and a local photographer, Edward Haggar Allis, using this Ross lens (M049) of 2½ inches (64 cm) diameter and 11 inches (28cm) f.l. (Gill, 1913). It was strapped to the 6-inch Grubb telescope for tracking and guidance.

Because the starry background showed up so clearly, Gill realised that photography was now sensitive enough for cataloguing the stars.

He acquired the lens below of 6 inches (15 cm) diameter and 54 inches (137 cm) f.l. and used it for the first comprehensive photographic sky catalogue, the Cape Photographic Durchmusterung. Made by Dallmeyer, London. #33311. Its type was "Rapid

Rectilinear". The photograph to the left shows how it was mounted in the 'Wind Tower', a building constructed in the 1840s and demolished in 1966.

The images were recorded as negatives on glass plates for stability. To extract the star positions for the catalogue, it was necessary to devise a number of special instruments of the "travelling microscope" type, known as "measuring machines".

Fig 9: The Dallmeyer rapid Rectilinear Portrait lens Used for the Cape Photographic Durchmusterung or CPD catalogue.

Photoelectric Photometry

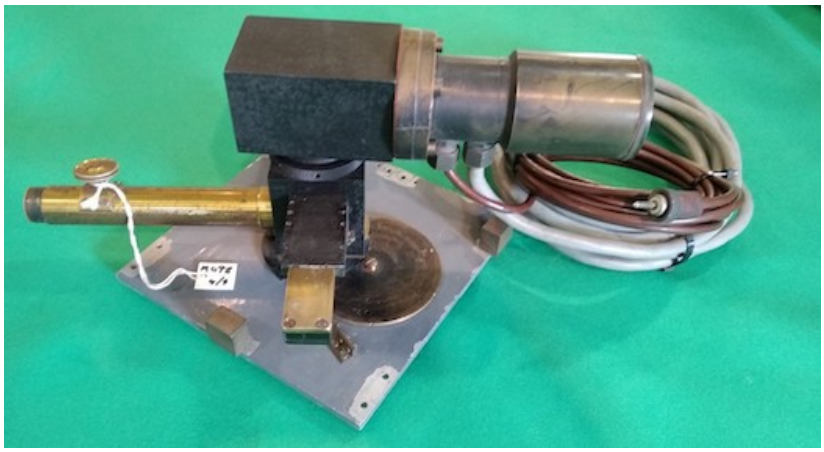
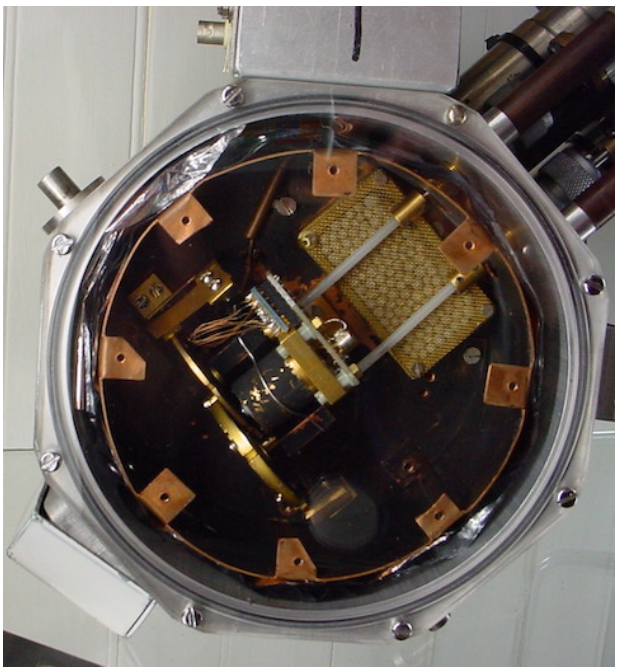


Fig 10: Shown (left) is Cousins's first photoelectric photometer (M082) using a photomultiplier detector of 1948. This was succeeded by better and better instruments over the next five decades (Glass, 2023).

Fig 11: On the right is an RCA 931A photomultiplier (M244), the heart of this photometer.

From the late 1940s onward the Cape became known for the precise measurement of the brightness of stars, known as photometry. This was the result of its excellent climate and the ability of the astronomer AWJ Cousins.

Infrared Photometry



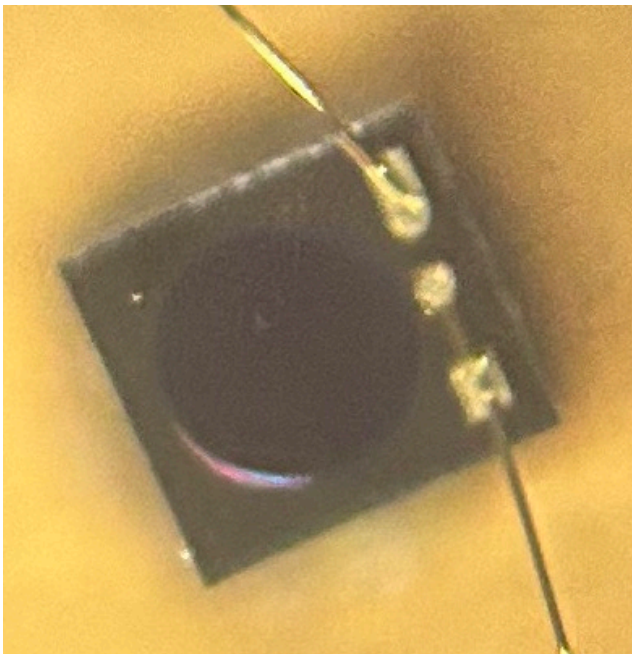


Fig 12: Infrared cryostat and InSb detector (M126). Designed by IS Glass and made at Royal Greenwich Observatory (1971). Starting with a PbS detector, it was used with modifications at SAAO until about 2008. It was cooled by nitrogen slurry to about 65° Kelvin and contained filter and aperture wheels as well as the infrared detector. The whole system was under vacuum, maintained by a zeolite sorption pump. Modified several times as detectors improved. The base of the cryostat has been replaced with Perspex and the bottom of the copper radiation shield has been removed for display reasons.

Fig 13: On the right is an InSb infrared photodiode (M251) measuring 0.5 mm diameter, the heart of this instrument in later years.

Used for many pioneering infrared studies.

Note: The Museum Inventory numbers are given as “Mnnn” etc.

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Amateur observations of Nova V0462 Lup

Percy Jacobs (ASSA Member, Graaff-Reinet)

Summary: Based on AAVSO Alert Notice #896, I observed Nova V0462 Lupi and took spectra.

Introduction

Nova V0462 Lup was discovered and reported by the ASAS-SN survey (K. Z. Stanek reporting for the ASAS-SN team) on 2025 June 12. 8700 UT, magnitude 8.7 Sloan g. Spectroscopy was obtained by Y. Tampo (SAAO) using the SAAO 1-m Lesedi telescope on 2025 June 14.745 UT.

What is a Nova ?

A nova is a star that has shown a strong, rapid, increase in brightness. The word comes from the Latin for "new". Sometimes a star previously too dim to be seen with the naked eye can become bright – even, occasionally, the brightest object in the sky (excluding the Sun and the Moon!) when it becomes a nova.

Nova V0462 Lupi, also known as Nova Lupi 2025, occurred when a white dwarf star siphoned material from a nearby companion star, triggering a thermonuclear explosion on its surface.

A white dwarf is a small, incredibly dense star that has exhausted its nuclear fuel and is slowly cooling down.

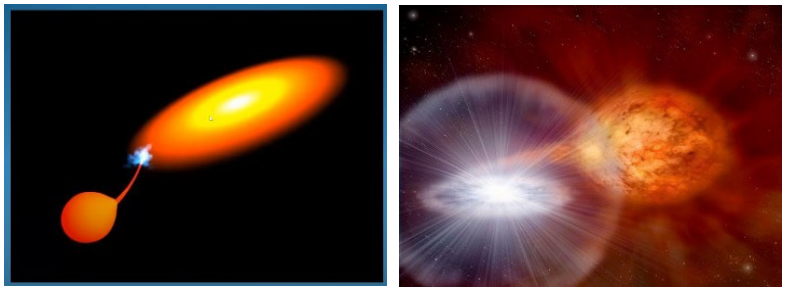

Fig 1: An illustration of a white dwarf star siphoning material from a nearby companion star, which then illustrates the triggering a thermonuclear explosion on the white dwarf star surface

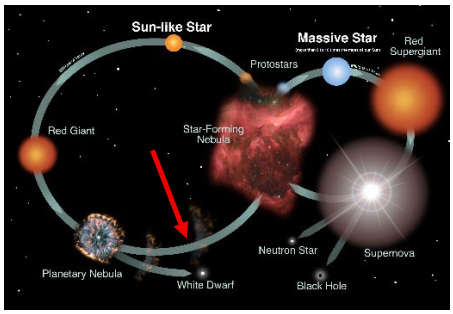

Fig 2: This diagram summarizes the evolution of stars.

Details of Nova V0462 Lup

Constellation: Lupus
Right ascension: 15h08m 03.274s
Declination: -40° 08’ 29.58”
Apparent magnitude: (V) - 5.3 – 18.5

Fig 3: Chart taken from Sky & Telescope Magazine.

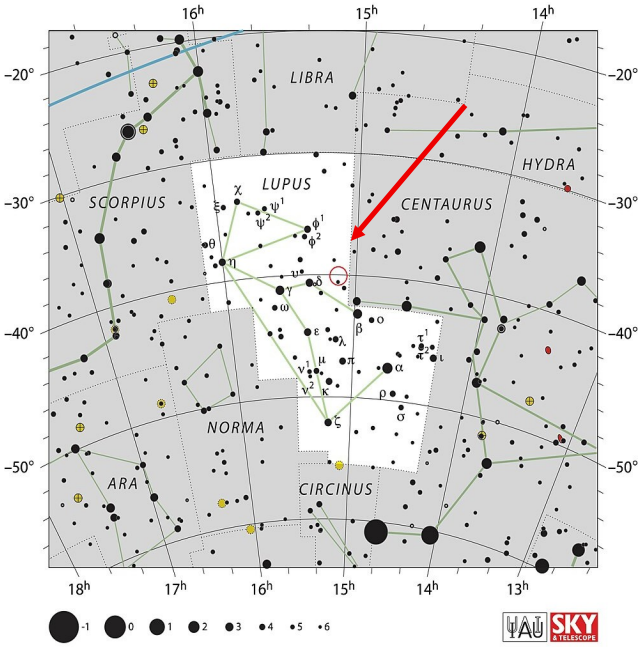

Fig 4: Photo taken on 19.06.2025, by Professor Barbara Cunow (Pretoria Centre of ASSA).

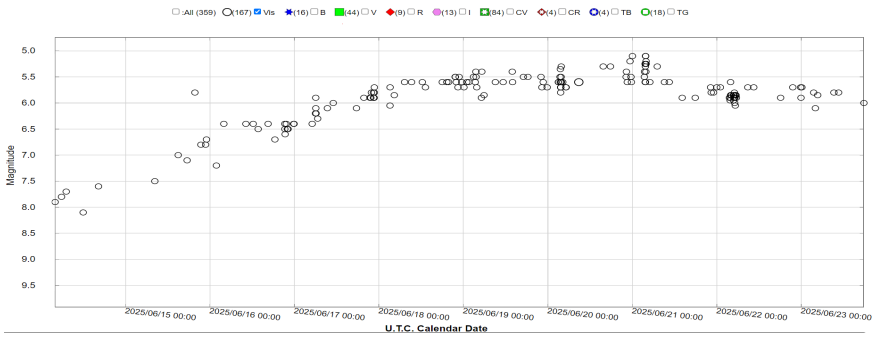

Fig 5: Data from AAVSO Light Curve Data (visual data)

Spectra taken

Area of Interest – H Alpha line – 656.28nm
Date:
20.06.2025 - approximate magnitude 5.5
21.06.2025 – approximate magnitude 5.9
23.06.2025 – approximate magnitude 6.1
Green Line: 20.06.2025
Blue Line: 21.06.2025
Red Line: 23.06.2025

In novae, the H-alpha (Hα) spectral line, a prominent feature of hydrogen, undergoes significant changes as the nova evolves. Initially, the Hα line may exhibit a **P-Cygni profile**, indicating an expanding envelope of ejected material. As the nova progresses, the Hα line can broaden, weaken, or even disappear as the ejecta expand and become less dense. The Hα line can also show variations in intensity and shape due to changes in the density and temperature of the emitting gas, as well as the presence of different velocity components in the outflow. *(Google explanation)*

Note: Definition of P-Cygni profile

A P Cygni profile is a specific type of spectral line shape observed in some stars, characterized by a bright emission line accompanied by a blue-shifted absorption line. This unique pattern indicates the presence of a stellar wind or outflow of material from the star. The emission line arises from the expanding gas, while the blue-shifted absorption line is caused by the gas moving towards the observer, absorbing some of the light from the star.

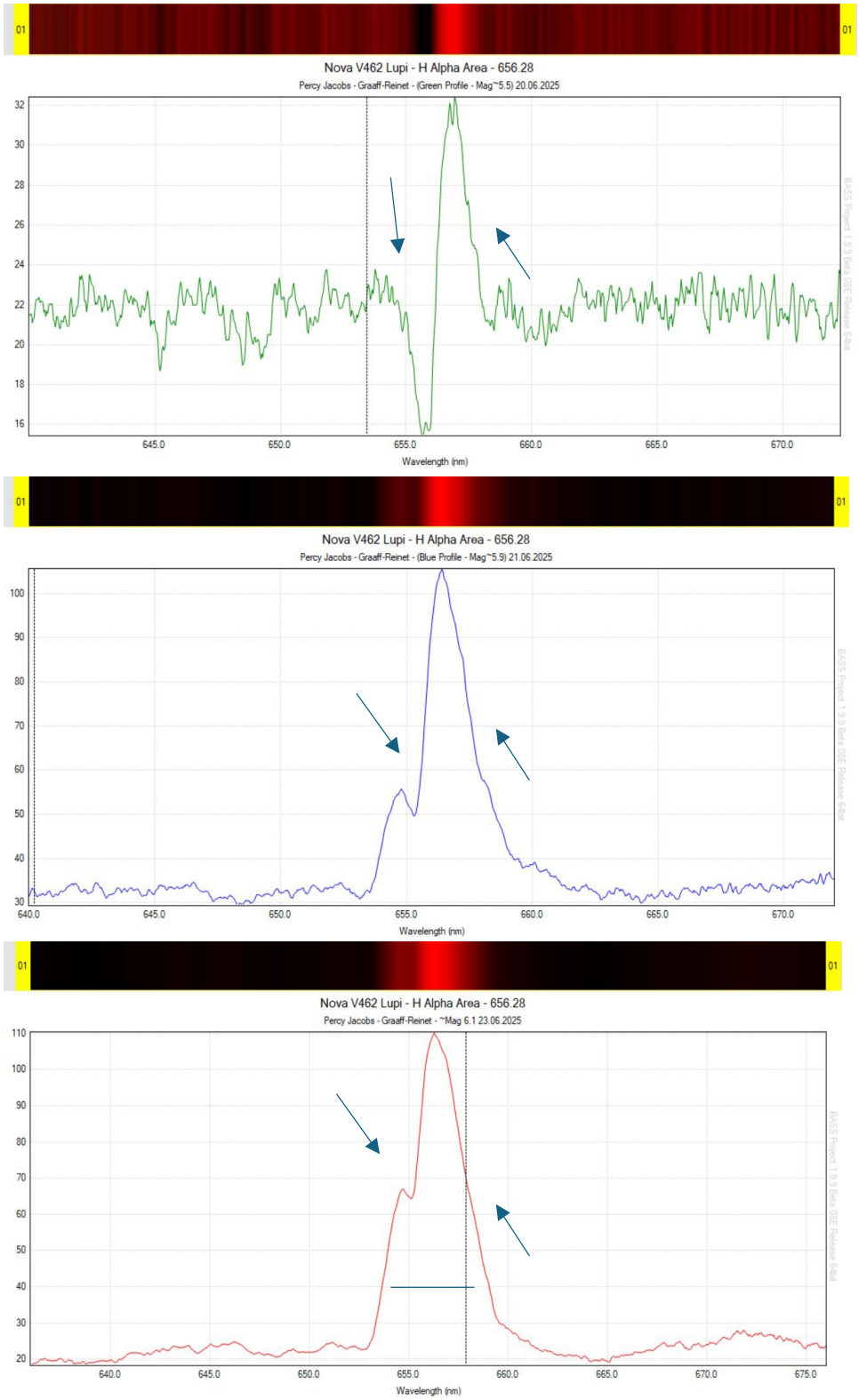

Figure 6: Development of P-Cygni profile in NovaV462 Lupi

Analysis of the spectra of Nova V0462 Lup – H-Alpha area (656.28nm)

Measuring gas expansion velocity towards us:

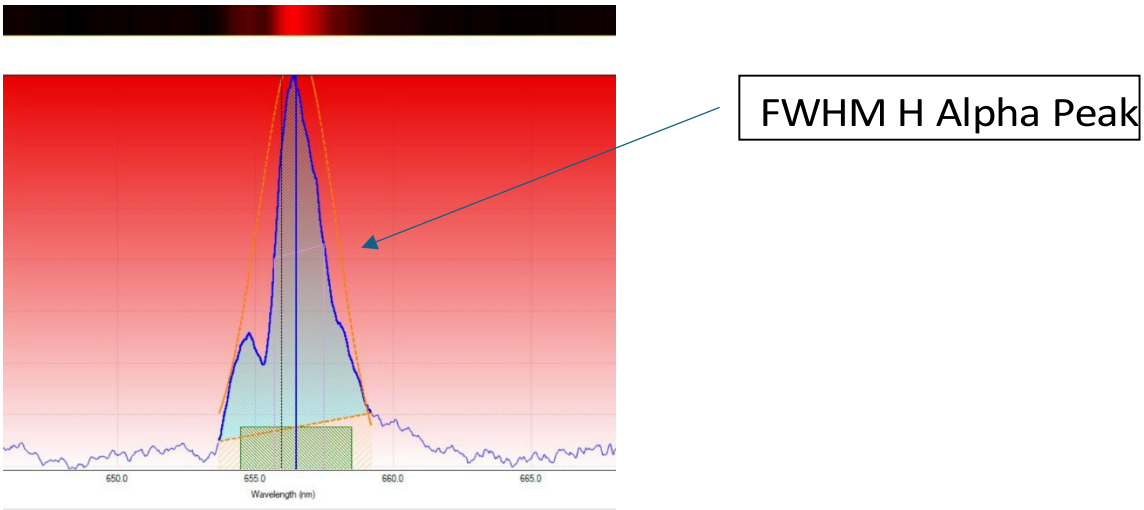

Fig 7: Illustration showing the FWHM measurement area, at the H Alpha peak area, for the P-Cygni profile in Nova V0462 Lup

Values of C x FWHM/λ
20.06.2025 approx.. 530km/s (300 000 x 1.16357/656.9nm)
21.06.2025 approx.. 850km/s (300 000 x 1.86713/656.4nm)
23.06.2025 approx.. 1200km/s (300 000 x 2.57715/656.28nm)

The results may not be 100% accurate but will not be far off those based on professionally based observations. The given values, at least, demonstrate the change over time.

Factors affecting the calculations

Line Broadening Mechanisms: Besides Doppler broadening due to expansion, other factors can also contribute to the width of the H-alpha line, such as thermal broadening and Stark broadening (due to electric fields). These effects can complicate the velocity calculation and should be considered when interpreting the results.

Spectral Resolution: The accuracy of the velocity measurement depends on the spectral resolution of the instrument used. Higher resolution spectra allow for a more precise determination of the FWHM.

Hα in Emission

In more active M dwarfs, the Hα line can appear in emission, meaning, it is brighter than the surrounding continuum. This is because the chromosphere is more active and emits more radiation at this wavelength.
The H-alpha emission line's Full Width at Half Maximum (FWHM) can be used to estimate the expansion velocity of gas in a nova. This method relies on the Doppler broadening of the spectral line caused by the motion of the ejected material. By analysing the H-alpha line profile, specifically its FWHM, and knowing the wavelength of the line, the expansion velocity can be calculated.

Nova Evolution:

The expansion velocity of a nova's ejecta can change over time as the material expands and cools. Therefore, it's important to track the FWHM of the H-alpha line over time to study the evolution of the expansion velocity.

Line Profile Shape:

The H-alpha line profile might not always be a perfect Gaussian, especially in later stages of a nova's evolution. In such cases, more sophisticated modelling of the line profile might be necessary to extract the expansion velocity.

Note on the method used in the calculations:

1.Obtain the spectrum:

Observe the nova using a spectrograph, which separates light into its constituent wavelengths. Focus on the H-alpha emission line, which is a strong spectral line emitted by hydrogen.

2. Measure the FWHM:

Determine the peak intensity of the H-alpha line in the spectrum.
Find the wavelengths at which the intensity drops to half of the peak intensity.
The difference between these two wavelengths, when converted to velocity, is the FWHM.:

3. Calculate the Expansion Velocity

Use the following formula, derived from the Doppler effect:

$$v = (c * FWHM) / (\lambda)$$

Where:
v is the expansion velocity
c is the speed of light
FWHM is the full width at half maximum
λ is the wavelength measurement area of the H-alpha line (656.28nm or as 6563Å)

Typical gas expansion speeds in a nova event range from 500 to 4000 km/s. The initial wind is typically slower, around 500-2000 km/s, followed by a faster wind of 1000-4000 km/s.

Details of spectra taken by the author

8" / F10 Schmidt-Cassegrain
Celestron CGX Mount
LOWSPEC, Ver3, 600L/mm, self-made spectrograph
Visible wavelengths – 390nm to 690nm
ZWO 178 colour camera
15 to 20 images x 40 sec's each, then stacked
Spectra Processing Software - BASS Project (Basic Astronomical Spectroscopy Software)

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2. From Wikipedia, https://en.wikipedia.org/wiki/V462_Lupi#:~:text=V462%20Lupi%2C%20also%20known%20as, nova%20on%2014%20June%202025.
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4. Spectroscopic Atlas for Amateur Astronomers. Richard Walker

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