https://www.pretoria-astronomy.co.za

https://assa.saao.ac.za/

EVENTS: ***All are welcome to join these events.***

Next Observing Evening : November 21st 2025

From sunset onwards near the Pretoria Centre Observatory at Christian Brothers College.
Turn left immediately after entering the main gate. Carry straight on through the car park and proceed straight down the tarred road. About 50 to 100 metres after the last row of studs there is a cricket sightscreen on the right. Observing will be on the cricket pitch just past the sightscreen.
Please do not drive onto the grass.

Monthly Meeting : November 26th 2025

Chairperson Michael Poll Programme:

- An extended **What's Up** presentation — Michael Poll (See below)
- What not to buy for Christmas — Johan Smit

The meeting is held on-line. The web link to join the meeting is:
https://meet.jit.si/ASSAPretoriaMonthlyMeeting
If you are on our invitation list you will receive an e-mail from Johan Smit on the day of the meeting, which has the link included. If you are not on the Invitation list please and wish to be included, send your mail address to johanchsmit@gmail.com

REMINDERS

- The Centre's Financial Year runs from July 1st until June 30th , so subscriptions are now due. The cost is R200.00 per year, for individuals and /or family. The subscription form is on the Centre website. The ASSA Skyguide is ***included*** in the subscription.

EDITORIAL : What is it about astronomy?

We enjoy looking at the stars (and the Moon and the planets, and all the other celestial phenomena). Well, they can be viewed for pleasure, and what is more you can look at them for free. But why do we persevere and learn more?

You do not have to feel that you have to be a Hubble or an Einstein before you can start. Even if you just learn the names of a few of the bright stars that you see, and watch them return year after year, that may be enough for you. Conspicuous constellations and identifying the planets may be next on your agenda, but even if that is as far as you go, that's fine. You can dive into the subject as little or as deeply as you like – you can even go as far as doing a degree at UNISA. Depending on your area of interest, you can find yourself learning optics, physics, chemistry, biology, geology, mathematics, history and cosmology. Not many other pastimes would introduce you to such variety of subjects, and you can explore any or each of these avenues as far as you wish.

I was doing viewing at a school once and by way of introducing the stars, I said that that they rise and set like the Sun and Moon – a bit obvious you may think – but one of the teachers said that she did not know that. It is true that, if you look casually from one night to another everything looks much the same, but the sky is changing all the time, and you have to be patient and keep looking to see the changes. If you do this you have started making observations, and then you may wish to find out the reasons for the changes you have seen.

It seems a shame to have such great night skies in South Africa and not to take much notice of the stars and planets. People *see* them, but they do not *look* at them. I used to go on a lot of the national hiking way board hikes. Many people took various books to identify wildlife and geology – birds, lizards, butterflies, rock formations and so on – but given the interest in nature shown and the opportunity to get away from city lights, which is what these hikes afforded – no-one thought about taking a star map (did they even know that such things were available?).

We are all on an equal footing when out observing – professions and social classes are as one – just sharing the night sky. There are beginners and more experienced observers, but one frequently hears the comment that astronomers are always willing to share their knowledge. I think that the reason is that we get used to the workplace where there are those, especially the less competent managers, who feel that feel that having information or knowledge is power and are not prepared to share, even though it may motivate people more if they know that they are being kept well informed. Unlike the workplace experiences, the astronomers do not have hidden agendas, and the stars do not answer back, or indulge in politics.

I do reply sometimes, that, after my experiences in the work place and on the Management Committee of the complex that I live in, sharing astronomy is the only time that anyone will listen to me!

I got my first book with star maps in 1960 (By JB Sidgwick - it cost a small fortune - one shilling and sixpence in a second hand bookshop). When I first learned the names of a few stars and constellations and found about them moving out of the evening sky, it was like seeing old friends returning when they came back the following year. I did only naked eye observing for 25 or so years. A telescope did come my way eventually!

REPORTS

Observing Evening Report October 17th 2025 Michael Poll and Johan Smit

This was a fun social evening with a bit of viewing thrown in. The attendance was a pleasant surprise – there was a very encouraging turnout of elders and newcomers – and it was refreshing to see so many young people there. We were a dozen or more with 5 or 6 telescopes.

The sky conditions were marginally better than last month enabling us to see a few more targets. Nevertheless, only the bright stars were visible – Vega, and Altair for example, and we could just see Deneb in Cygnus, which we could not see last month, so we were able to complete the (Northern) Summer Triangle. These three stars are at the apices of the triangle.

We looked at Alpha Centauri before it set behind the trees. Antares was heading down in the south west, and Fomalhaut was high in the south. The colour of Antares was enjoyed by many.
The open clusters M6 and M7 in the tail of Scorpius were admired and in the north Johan's favourite double star Albireo impressed with the colour contrast between the components.

Apart from the open clusters and double stars, Johan concentrated mainly on Saturn. We could see it in the east and noted how much higher in the sky it was than at this time last month – the effect of the Earth's journey around the Sun. It always impresses everyone, and we returned to it regularly during the evening. The rings are just a sliver at this time – they were edge on, and not visible, earlier in the year.

In the evening at this time of year, at the latitude of Pretoria, the South Galactic Pole is almost directly overhead, and the Galactic Equator and thus the Milky Way, run around the horizon, so the bright winter constellations have set and the bright summer ones have yet to rise.

There were lots of discussions, including that the colour of a star tells of its surface temperature (e.g Vega compared with Antares), and we touched on stellar life history.

We left fairly early, 8'oclock or so, because there was a very strong wind that was unpleasant and none too warm. When the wind became too bothersome we had an enjoyable discussion about astronomical sketching. It looks like some of the young members want to try "classical" techniques of observing. Johan has hope for the future!

We intend to bring the register next time, that way will better be able to remember the names of those that attended !

The next observing evening is on Friday November 21st 2025.

Meeting Report October 22nd 2025 "Light Curves of Variable Stars" Analize Jooste.
Summary by Michael Poll

This was a very interesting and well-presented talk by Annelize. She started by showing the characteristics of light curves of variable stars – the curves have maxima and minima, which are used for determining the period of the brightness cycle. One should note that data from different sources may have different time protocols and this should be noted and allowed for in plotting the graphs.

The different types of Variable star are : **Extrinsic, Pulsating and Eruptive.**

- **Extrinsic Variables** may be Eclipsing (Detached, Semi-detached or Contact); Ellipsoidal; or Rotational
- **Pulsating Variables** may be Cepheids, RR Lyrae, Delta Scuti, or Long Period Variables (LPVs). Examples of the light curves of each type of variable were shown.
- **Eruptive variables** include Supernovae, Novae, Dwarf Novae, and R Corona Borealis types, but these were not discussed in this presentation.

Eclipsing Binaries are two gravitationally bound stars, whose orbits are seen edge on, or nearly so from the Earth, so that they pass alternately one in front of the other. The eclipses can be annular, partial or full. The shape of the light curve can provide information about the relative brightness, size and type of the stars; the distance between them; and the inclination of the plane of the orbits. Examples of light curves shown were those for RW Ursae Majoris (detached), and VO336 Cassiopeiae (semi-detached), and WW Ursae Majoris (contact).

Ellipsoidal Binaries are two stars which are extremely close together. The low separations lead to gravitational tidal distortion which causes the stars to become elliptical. They do not eclipse one another but the variation in brightness is caused by the variation in size of the light emitting areas in the observer's line of sight. Example: TYC 5985-958-1

Rotational Variables have bright or dark spots which affect the amount light that the observer detects. Example ASASV-V J 001545-47

The brightness variation of **Pulsating Variable** stars is caused by events from within the star itself, rather than being caused by a companion star. A small disturbance causes the star's radius to decrease. The compression caused by the decrease in radius causes the internal temperature to increase, and more light is emitted, causing the star to lose energy. The loss of energy causes a temperature drop and less light is emitted. Various pulsation modes occur, but in any case the pulsations are very regular.

Types of pulsating star:

Cepheid Variables: periods of 1 – 70 days. The longer the period, the brighter the star is. The prototype is Delta Cephei. There are various subtypes of Cepheid, (DCEP, DCEPS, CWA, CWB, RVA and RVB) each of which is classified by its characteristic light curve.

RR Lyrae stars. These are older white giants with low mass. The period is less than 1.2 days. The RR Lyraes with longer periods are less dense, cooler and larger. There are a number of subtypes viz. RRAB, RRC and RRD, which again are classified according to their light curves.

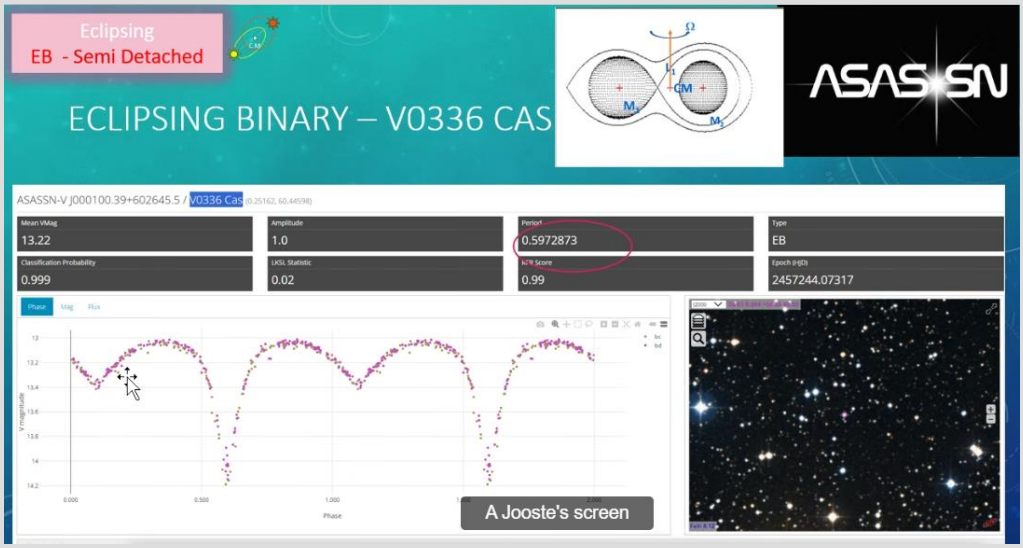
Delta Scuti stars. The period is less than half a day, and they have various pulsation modes. The subtypes are DSCT and HADS

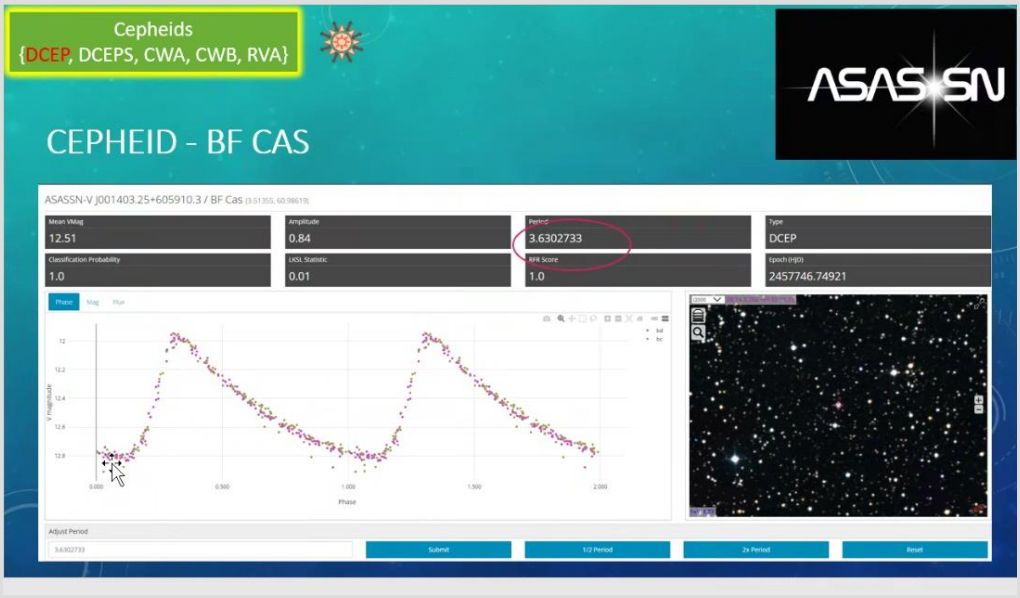
Mira Type variables.

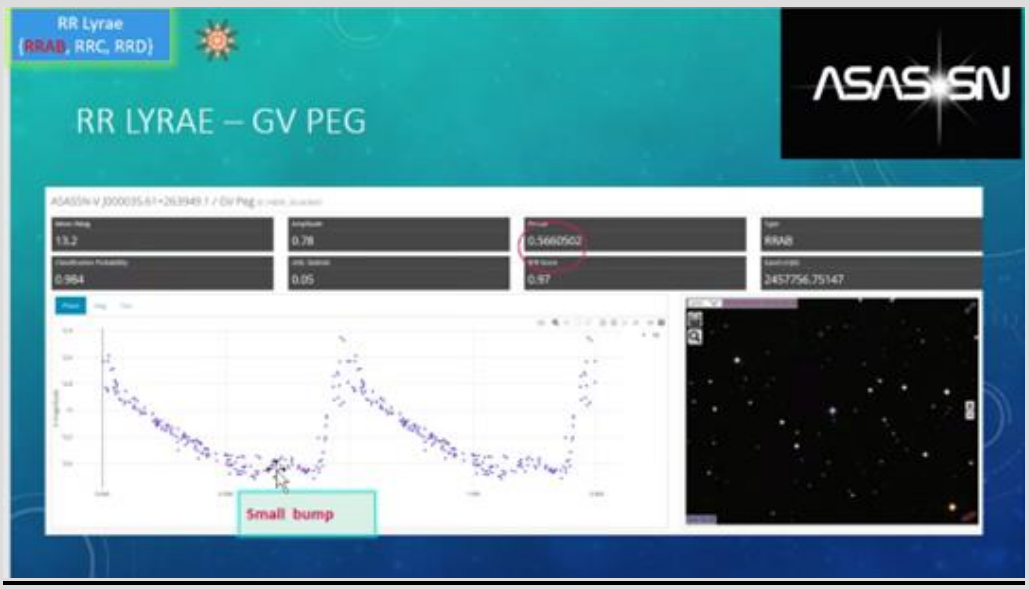
These are the Long Period Variable (LPVs), which are massive stars in a transitional stage to becoming Red Giants. Variability is irregular or semi-regular and varies from 100 to 1000 days, but because of the long time scales it can be difficult to determine the period. The prototype is Mira itself (Beta Ceti).
The much appreciated talk led to a number of questions including a discussion with Percy Jacobs about changes in the spectra of during the brightness cycle.

Annelize showed a number of links to resources about variable stars ….. see page 10

Some examples of light curves are shown below:


Eclipsing
EB - Semi Detached
ECLIPSING BINARY – V0336 CAS
ASAS-SN
ASASSN-V J000100.39+602645.5 / V0336 Cas
Mean VMag
13.22
Amplitude
1.0
Period
0.5972873
Type
EB
Classification Probability
0.999
LKSL Statistic
0.02
RFR Score
0.99
Epoch (HJD)
2457244.07317
Phase
Mag
Flux
V magnitude
Phase
A Jooste's screen


Cepheids
{DCEP, DCEPS, CWA, CWB, RVA}
ASAS-SN
CEPHEID - BF CAS
ASASSN-V J001403.25+605910.3 / BF Cas
Mean VMag
12.51
Amplitude
0.84
Period
3.6302733
Type
DCEP
Classification Probability
1.0
LKSL Statistic
0.01
RFR Score
1.0
Epoch (HJD)
2457746.74921
Phase
Mag
Flux
V magnitude
Phase
Adjust Period
3.6302733
Submit
1/2 Period
2x Period
Reset


RR Lyrae
{RRAB, RRC, RRD}
ASAS-SN
RR LYRAE – GV PEG
13.2
0.78
0.5660502
RRAB
0.984
0.05
0.97
2457756.75147
Small bump

SUMMARY OF WHAT'S UP FOR DECEMBER 2025 AND JANUARY 2026

The following will be illustrated and described

Moon near bright objects: Evening sky

		Moon near:
2025	December 3rd	Pleiades
2025	December 7th	Jupiter
2025	December 26th	Saturn
2025	December 31st	Pleiades
2026	January 3rd	Jupiter
2026	January 3rd (4th)	Pollux
2026	January 6th	Regulus
2026	January 23rd	Saturn
2026	January 27th	Pleiades
2026	January 31st	Jupiter
2026	January 31st	Pollux

Moon near bright objects : Morning sky

		Moon near:
2025	December 10th	Regulus
2025	December 14th & 15th	Spica
2025	December 18th	Mercury & Antares
2026	January 11th	Spica
2026	January 14th & 15th	Antares

These events will be illustrated using Stellarium screen shots

For description and discussion:

Turning Points

2025 November 30th	Mars furthest from Earth 2.424 Au
2025 December 7th	Mercury Greatest Elongation West
2025 December 14th	Geminid Meteor Shower
2025 December 20th	New Moon
2025 December 21st	Solstice
2026 January 3rd	Full Moon
2026 January 3rd	Earth at Perihelion
2026 January 6th	Venus at Superior Conjunction
2026 January 9th	Mars in conjunction with the Sun.
2026 January 10th	Jupiter at opposition
2026 January 18th	New Moon 19h52
2026 January 21st	Mercury at superior conjunction

.. and these constellations will be described and individual stars and deep sky objects will be highlighted.

Cetus	The Whale
Sculptor	The Sculptor
Grus	The Crane
Piscis Austrinus	The Southern Fish

ARTICLE (Previously published in the November 2002 Newsletter)

The Geminid Meteor Shower — Michael Poll

The Geminid shower is one of the most prolific meteor streams of the year and is active from December 6th to December 19th . An increase in activity may be seen over the period, with a sharp peak of maximum activity on the mornings of December 13th and 14th . The meteors are slow and yellowish, with about 4% displaying persistent trains.

The best time to observe the shower is from about midnight onwards, although some may be seen before midnight. The radiant point of the meteors is in Gemini, which will be in the north east, but drifting towards the north towards morning twilight..

Decades of visual counts have enabled the complex structure of the Geminid debris stream to be mapped. Photography of individual meteors has shed light on the particles' trajectories and densities.

At 2 grams per cubic centimetre on average, Geminid meteoroids are several times denser than the cometary dust flakes that supply most meteor showers. Add this to the relatively slow speed with which Geminids encounter Earth (35 kilometres per second), the meteors linger a bit longer in view than most.

The shower was first noted in 1862, by Robert P. Greg (Manchester, England), and independently by B. V. Marsh and Prof. Alex C. Twining in the United States. During the 1870s, observations of the Geminids became more numerous as astronomers realized that a new annual shower had been discovered.

Over the decades since the discovery the hourly rates have steadily increased. In 1877 it was about 14 and by the 1930s it was from 40 to 70. Between 1980 and 1985 it ranged from 60 to 110. In the ASSA Sky Guide the figure for 2025 is given as 150.

A major advance in the understanding of this meteor stream was made in 1947 when Fred Whipple was able to determine the orbital elements of the stream. The Geminids have a period of only 1.65 years. The orbit has a high eccentricity which places perihelion within the orbit of Mercury and aphelion in the main asteroid belt, between the orbits of Mars and Jupiter. The orbit is inclined at 23° to the plane of the Earth's orbit.

Miroslav Plavec (Prague) began investigating the effects of perturbations on the orbit, and found that for practical purposes, only Jupiter could affect the orbit of the Geminids, and noted that "From the observer's point of view, the most important effect is the rapid backward shift of the node." The nodes are two points of intersection between the plane of the stream's orbit and the plane of the Earth's orbit, and the node referred to is the one that lies near the Earth's orbit, and which is where the Earth encounters the meteoroids. In 1900, the node was located inside the Earth's orbit, and by 2100, the intersection point will lie outside Earth's orbit - the intersection point will eventually *cross* the Earth's orbit which shows why the activity of the Geminids is steadily increasing . After the crossing the activity of the shower will decline and sometime in the future Earth will no longer intersect the stream's orbit.

In 1982, Ken Fox, Iwan P. Williams and David W. Hughes confirmed Plavec's findings of the nodal retrogression as well as his recognition of the relative newness of the shower in historical records, and that the Earth's orbit would encounter the Geminid stream only between 1800 and 2100.

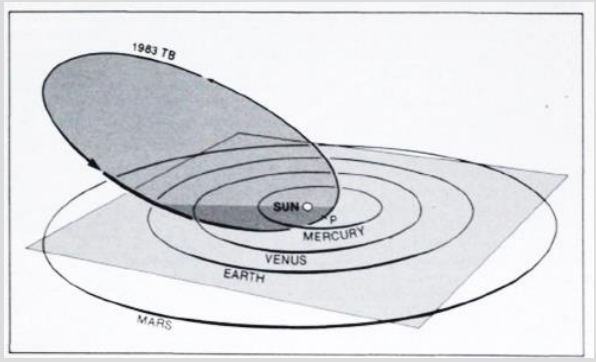
Computer simulations predicted that the meteoroids within the stream are sorted by mass, which causes the average brightness of the meteors to differ each day. In an analysis in 1982 George Spalding said, "in the two days before maximum there is a moderate concentration of small particles, but ... the Earth then moves into a region of larger particles."

In 1983 Fox, Williams and Hughes summarised : "At present, during its period of activity, the Geminid shower slowly builds up to maximum rate and then drops away from maximum relatively sharply. About 50 years ago the opposite would have occurred, with a sharp build up to maximum rate and a much slower falling away."

A major question concerning the Geminid stream was its origin. Meteor streams are thought to be the dusty debris released by comets, but while the Geminids provide one of the most predictable annual displays they had no known parent body.

Considering that the orbital characteristics of the Geminid stream was not known until 1947, there were not many proposals as to their origin before then. In 1950, Miroslav Plavec theorized that it was unlikely that a parent comet could exist in an orbit with such a short period. He thought that more probably, the Geminids were separated from a parent comet into their present orbit by the close approach of the comet to the Sun. Plavec considered the great comet of 1680 as a possible candidate because of the close approach of the two orbits at a point near the Geminid perihelion point.

Lubor Kresak favoured a more direct formation of the Geminids. In 1972, he wrote that because of the compact nature of the stream, the parent comet "must have occupied the present orbit". Eleven years later, Kresak's theory would effectively be confirmed.



On October 11th , 1983, during a search for moving objects amidst the data gathered by the Infrared Astronomical Satellite (IRAS), Simon Green (Leicester University) and John K. Davies noticed fast moving object in the constellation of Draco on seven consecutive scans. The object was an asteroid at 16th magnitude, and it received the preliminary designation 1983TB. Within two weeks of the discovery of 1983TB, Fred Whipple reported that its orbital elements were almost identical to those of the Geminid meteor stream Additional observations confirmed the link. At last the parent body of this stream had been discovered, and it was proposed that 1983TB, rather than being an asteroid, was an extinct comet that somehow got trapped into an unusually tight orbit.

The asteroid received the permanent designation of 3200 Phaethon, named after the mythical son of Helios. Phaethon is an Apollo asteroid, a group whose orbits carry them very close to the Sun. Phaeton gets closer to the Sun than all the other Apollos, meaning that it has the smallest perihelion distance of all the known minor planets - it gets as close as 21 million kilometres (0.14 astronomical unit) to the Sun, one third of the average distance of Mercury from the Sun. (The previous record holder was Icarus, 7.0 million kilometres further out).

The excitement of having found the parent body of the Geminid stream was almost dwarfed by the realization that this was the first time that a meteor shower had been definitely linked to an asteroid

and it subsequently served as an important link between comets and meteor streams - the Geminids may be comet debris after all if Phaeton *is* the dead nucleus of a burned-out comet.

Until the discovery of Phaeton, it had been assumed that the original Geminid comet had disappeared centuries ago. Phaeton was too far away for detailed observations when it was first discovered, but with an orbital period of 1.43 years it became possible to observe it late in 1984. It was found to rotate once every 4 hours, which would confirm that it was a rock and not a comet nucleus, because an icy comet nucleus would break apart if it spun as quickly - the rapid rotation implies a rocklike material of high tensile strength. Further spectroscopy at IR wave lengths found that, in fact, it did not resemble any type of asteroid class. These observations also showed the thermal characteristics, which suggested that Phaeton had a surface that conducts heat much as bare rock does, and that it had a diameter of nearly 5 km.

The fact that its surface conducts heat well would seem to exclude the extinct comet theory, because it is thought that, as comets age, they develop and insulating crust that seals the volatile ices inside. In summary, apart from the orbital similarities, Phaethon shows no cometary characteristics, but it is not a good spectral match to major asteroidal types either.

The meteor stream maybe the result of a collision long ago, which knocked Phaethon out of a previously stable orbit within the main asteroid belt. Alternatively the Geminids may have arisen from much smaller collision which occurred when Phaethon was already in Earth crossing orbit

Bo Gustavson (Max Planck Institute for Nuclear Physics) has presented additional evidence that Phaethon is the source of the meteoroids and suggested further theories for their origin.. Gustavson followed 20 Geminid orbits, and that of Phaethon, backward in time, and found that the meteoroids have crossed Phaethon's path many times - more than 1000 crossings over the last 3000 years. Most of the crossings occurred near perihelion where the chance of a collision would be least, but where any out gassing from Phaethon's surface would be greatest. Also the meteoroids appear to have been ejected from their parent body over several hundred years and not all at once.

Gustavson showed that ejection from outgassing would lead to the required ejection velocities and directions in the right parts of the orbit to explain the origin of the Geminids. Material from the nucleus of an active comet is carried away by gas and sublimating ices, and the meteoroids could have been thus ejected into their orbits. However, Phaethon has shown no sign of a coma or other cometary activity, but it could be a recently extinct comet, or a dormant one.

References

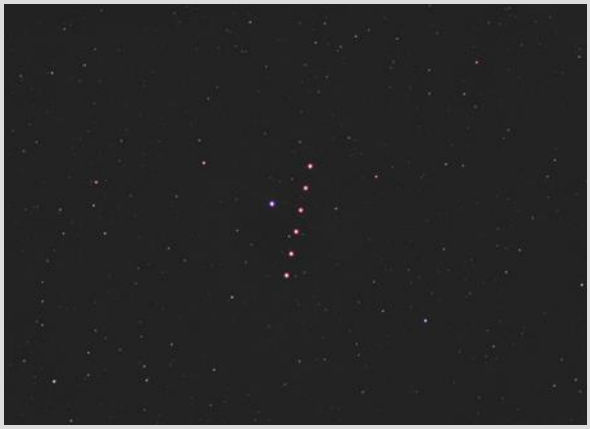
Minor Planet 1983 TB	News Note	Sky & Telescope January 1984 p 5
Is 3200 Phaethon a Dead Comet?	John K Davies	Sky & Telescope October 1985 p 317
Phaethon and the Geminids	News Note	Sky & Telescope December 1990 p 587

Acknowledgements to Tim Cooper (MNASSA October 2002, Centrepiece page i)

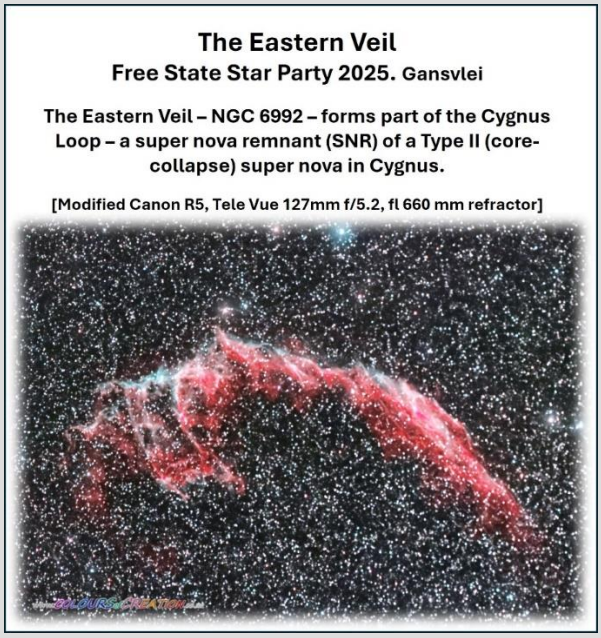
X AU = Astronomical Unit = average distance of the Earth from the Sun = 149 000 000 km

X ZHR = Number of meteors which would be seen in an hour with the radiant overhead.

GALLERY Images taken by members of the Pretoria Centre

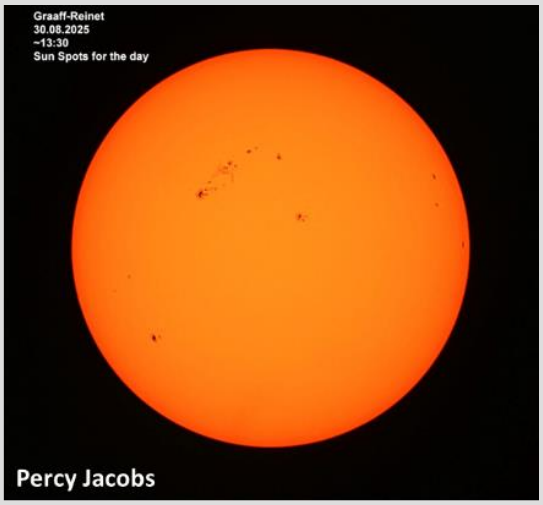


Mars passing Regulus (Alpha Leonis)
June 14th – 19th 2025. by Barbara Cunow
Movement is "upwards"



By Johan Moolman.
I have an old book (1939) where the name given to this Nebula was the "Bridal Veil". I have not seen named as such anywhere since. MP

Image of Saturn October 14th at 22h 53
by Barbara Cunow



By Percy Jacobs 30 August 2025

FROM THE ARCHIVES

We used to have Observing Evenings at Members' homes.
This one was at Michael's house in 1990.
Left to right: Johan Swart, Jan Wolterbeek, Harald Pauler, can't remember, Diethelm Schmieder, Michael Poll

FROM THE ARCHIVES Continued

May 2010: Observing at CBC

Die Transvaaler : Monday October 5th 1987

Walter Wargau is holding copy of the UNISA Halley's Comet booklet.
The two Michaels in the caption have been swapped over.

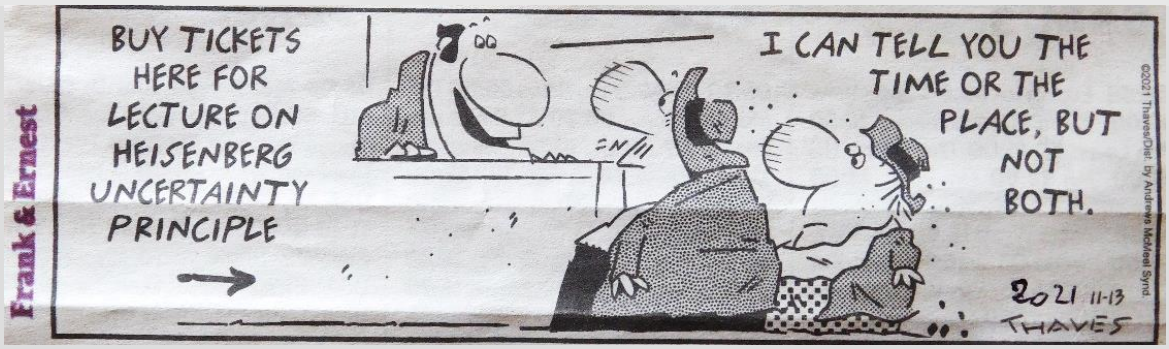
DIE TRANSVA

Die Astronomiese Vereniging van Suid-Afrika is 75 jaar gelede op 3 Oktober 1912 gestig en om hierdie heuglike gebeurtenis te vier is daar verlede week vanaf 28 September tot 3 Oktober 'n Nasionale Astronomie-week gehou. 'n Uitstalling van sterrekundige toerusting is Saterdag by die Faerie Glen Hipermark gehou. Op die foto verskyn van links **Michael Poll, prof. Walter Wargau,** voorsitter en dosent in Astronomie by Unisa, **Gerhard Wolmarans, Mike Haslam** en **Neville Young.** Op die voorgrond is 'n teleskoop waarmee die hemelruim deeglik bestudeer word.

VARIABLE STAR RESOURCES

SOME RESOURCES

- **Background reading**
  - https://www.aavso.org/education/vsa
  - https://www.aavso.org/sites/default/files/education/vsa/Chapter6.pdf
  - https://cdsarc.u-strasbg.fr/ftp/cats/B/gcvs/vartype.txt
  - https://www.cambridge.org/core/books/understanding-variable-stars/8363B48D96BA232AFD620C50E274C430
  - https://www.aavso.org/sites/default/files/Variable%20Star%20Classification%20and%20Light%20Curves%20Manual%202.1.pdf
- **Light curve Generators:**
  - Https://www.aavso.org/LCGv2/ (dependent on data stored by AAVSO)
  - https://onlineobservatory.eu/wp-content/uploads/2021/03/UserGuide_LightCurvePhotometry.pdf
- **Video on modes of pulsation in asteroseismology**
  - https://slideplayer.com/slide/8742764/ https://asas-sn.osu.edu/variables
- **Light curve data and viewers**
  - https://asas-sn.osu.edu/variables (uses data provided by ASAS-SN)
  - https://cdsarc.u-strasbg.fr/ftp/cats/B/gcvs/vartype.txt



ASSA PRETORIA CENTRE : COMMITTEE

Chairman:	Johan Smit	johanchsmit@gmail.com	072 806 2939
Vice Chairman:	Neville Young	nevyoung@gmail.com	083 303 2840
Secretary:	Michael Poll	pollmnj@icon.co.za	074 473 4785
Treasurer	Michelle Ferreira	michellem.ferreira@standardbank.co.za 073 173 0168	
Membership Secretary	Michelle Ferreira	michellem.ferreira@standardbank.co.za 073 173 0168	
Newsletter Editor:	(Michael Poll)		
Webmaster	Danie Barnardo	daniebar403@gmail.com	084 588 6668
Social Media:	Johan Smit	johanchsmit@gmail.com	072 806 2939
Curator of Instruments:	Johan Jordaan	jjordaan121@gmail.com	082 373 3395
Centre Representative:	Johan Smit	johanchsmit@gmail.com	072 806 2939
Telescope making:	Johan Smit	johanchsmit@gmail.com	072 806 2939
Observing & Whats App	Neville Young	nevyoung@gmail.com	083 303 2840