The Jeety Starn

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Welcome to Issue 10 of *The Jeety Starn*, the quarterly newsletter of Stirling Astronomical Society. Included in the items in this issue are articles on Dark Sky sites in Scotland, the constellation Leo, the near-Earth asteroid 433 Eros, the 'Eclipse of the Century', and our usual Happy Observing section on the night sky in the coming months.

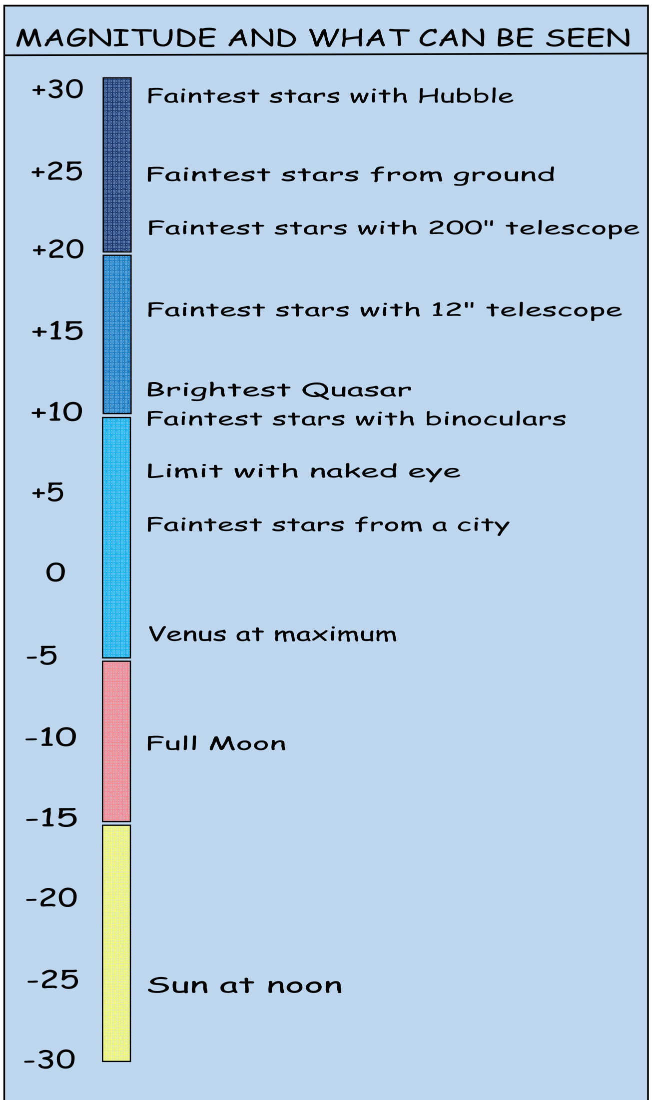
The Stellar Magnitude Scale

By Sandi Cayless

The Stellar Magnitude Scale, to measure the brightness of stars, was inherited from the Greeks, with the brightest objects having the smallest numbers and the faintest the largest. However, the Roman astronomer Claudius Ptolemy's star catalogue is held to have promoted the scale by listing stars from the brightest at 1st magnitude, to the dimmest at 6th magnitude (Toomer 1984), and the current scale was mathematically determined by Norman Pogson in 1856 to match the historical.

The scale is reverse logarithmic, thus the brighter a body, the lower the magnitude number. For each one unit step on the scale, the brightness is multiplied by a given amount; for this scale, a change of five magnitudes signifies an increase or decrease of 100 times in brightness, thus a star of magnitude +1 is one hundred times brighter than a star of magnitude +6 (Cayless & Jarvis 2018). In other words, each 1 unit step in magnitude equates to a brightness change of 2.5 times, thus a star of magnitude +5 is 2.5 times fainter than a star of magnitude +4.5.

From the above, as the scale was originally based on Ptolemy's star catalogue, it can be seen that the brightest astronomical objects will have negative apparent magnitudes. The figure shown here gives examples of various magnitudes and what may be seen (NASA 2025). Venus at its brightest has a magnitude of -4.6, whereas Jupiter has an average magnitude of -2.7. The faintest stars seen by the Hubble Space Telescope are around about +30.0 magnitude, which makes them about +56.7 magnitudes fainter that the Sun. The Full Moon has a magnitude of -12.6 while the sun is around -26.7; the Moon at Full is hence +14.1 magnitudes fainter than the Sun.



Based on a NASA original (https://spacemath.gsfc.nasa.gov/)

These figures are dependent on other factors, however, including atmospheric conditions and the observer's eyesight! The faintest stars visible with the naked eye on a very dark, clear night have apparent magnitudes of around +6.5 (Curtis 1905). Telescopes will of course increase the numbers of objects visible in the sky or in deep space, and the apparent magnitudes of known astronomical objects range from our Sun's –26.832 to those seen in deep space; the Hubble Space Telescope can image stars of magnitude +31.5 (Templeton 2011).

References

Cayless, A. and Jarvis, J. (2018) *1.2 Exploring the magnitude scale*. Open University Open Learn. https://www.open.edu/openlearn/mod/oucontent/view.php?id=114767&section=2.2.

Curtis, H. D. (1903) On the Limits of Unaided Vision. *Lick Observatory Bulletin 2 (38)* 67-69. University of California. https://articles.adsabs.harvard.edu/pdf/1903LicOB...2...67C.

NASA (2025) *Space Math at NASA. Problem 172: The Stellar Magnitude Scale.* https://spacemath.gsfc.nasa.gov/stars/5Page10.pdf.

Templeton, M. (2011) *Magnitudes: Measuring the Brightness of Stars*. American Association of Variable Stars (AAVSO), 21 October 2011, archived from the original on 18 May 2019, accessed 22 January 2026. https://web.archive.org/web/20190518084414/https://www.aavso.org/magnitude.

Toomer, G. J. (1984) *Ptolemy's Almagest*. New York: Springer-Verlag. p. 16. ISBN 0-387-91220-7. https://archive.org/details/ptolemysalmagest0000ptol/page/16/mode/2up.

Image Reference

From the original by *Space Math at NASA*. Problem 172: The Stellar Magnitude Scale. https://spacemath.gsfc.nasa.gov/stars/5Page10.pdf.

A Quote or Two...

Kington, Miles (1942-2008)
Astronomers, like burglars and jazz musicians, operate best at night.

Kilby, Jack (1923-2005)
There was a space program before there was integrated circuits.

King, Martin Luther Jr. (1929-1968)
As marvellous as the stars is the mind of the person who studies them.

Kubrick, Stanley (1928-1999)
The destruction of this planet would have no significance on a cosmic scale: to an observer in the Andromeda nebula, the sign of our extinction would be no more than a match flaring for a second in the heavens: and if that match does blaze in the darkness there will be none to mourn a race that used a power that could have lit a beacon in the stars to light its funeral pyre. The choice is ours.

Laozi (Chinese philosopher, dates unknown)
For the wise man looks into space and he knows there is no limited dimensions.

Letterman, David (1947-)
The Mars Polar Lander has been quieter than George W. Bush after a foreign policy question.

Levy, David H. (1948-)
Comets are like cats: they have tails, and they do precisely what they want.

Lewis, C. S. (1898-1963)
Aim at heaven and you will get earth thrown in. Aim at earth and you get neither.

Lindbergh, Anne Morrow (1906-2001)
We walk up the beach under the stars. And when we are tired of walking, we lie flat on the sand under a bowl of stars.

May, Brian (1947-)
Astronomy's much more fun when you're not an astronomer.

Mach, Ernst (1838-1916)
Similarly, many a young man, hearing for the first time of the refraction of stellar light, has thought that doubt was cast on the whole of astronomy, whereas nothing is required but an easily effected and unimportant correction to put everything right again.

Magnus, Albertus (1193-1280)
Do there exist many worlds, or is there but a single world? This is one of the most noble and exalted questions in the study of Nature.

Marconi, Guglielmo (1874-1937)
Every day sees humanity more victorious in the struggle with space and time.

Metrodorus of Chios (4th century BCE)
To consider the Earth as the only populated world in infinite space is as absurd as to assert that in an entire field of millet, only one grain will grow.

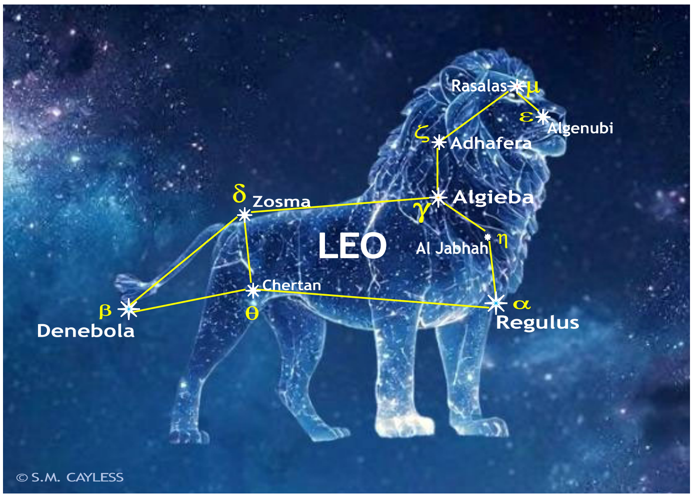
Mitchell, Maria (1818-1889)
Do not look at stars as bright spots only. Try to take in the vastness of the universe.

I have just gone over my comet computations again, and it is humiliating to perceive how very little more I know than I did seven years ago when I first did this kind of work.

Leo – a Spring Constellation

By Alan Cayless FRAS

One of the few constellations to actually look like the creature they are meant to represent, Leo does indeed resemble a seated lion, facing west. The bright star Regulus indicates Leo's front paw, with the constellation's second brightest star Denebola located near the lion's hindquarters. Above Regulus, a curved line of slightly fainter stars forms the characteristic *Sickle asterism* – a backwards question-mark that outlines the lion's mane.



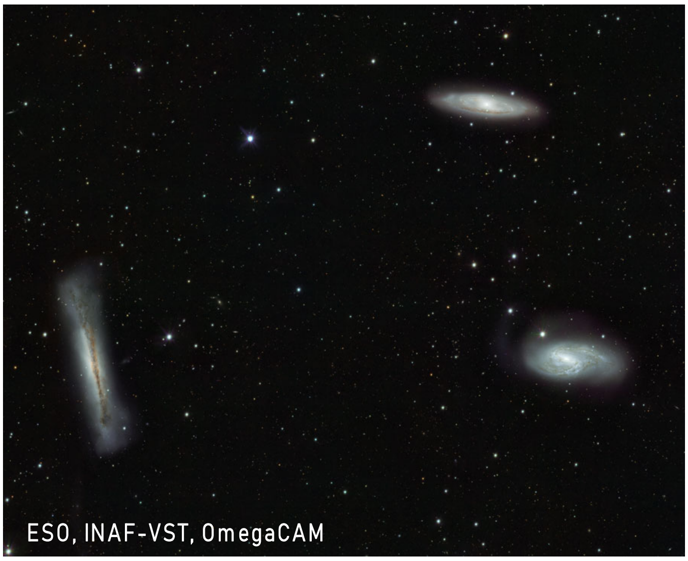
From head to tail, Leo spans a range of right ascensions from 10 h to 12 h. This means that Leo will be well placed for evening observing in March, April and May. Leo is also placed above the celestial equator, meaning that it will be higher than the winter constellation Orion.

Regulus (α Leo, RA 10h 10m Dec +11° 50') is a bright blue star of magnitude 1.4 and spectral type B. At 79 light years from Earth, Regulus is a relatively hot and young star with an absolute luminosity approximately 340 times that of our own Sun. Denebola (β Leo, RA 11h 50m Dec +14° 25') is slightly fainter at magnitude 2.1 and considerably closer at a distance of 35 light years. Although designated γ Leo, Algieba (RA 10h 21m Dec +19° 42') at the nape of Leo's neck is in fact slightly brighter than Denebola, making Algieba the second brightest star in Leo. Reddish in colour, Algieba is a binary system made up of two red giants. With the naked eye, it is interesting to compare the contrasting colours of Regulus and Algieba and with a small telescope it should be possible to split Algieba. Regulus itself is also a multiple system, although at magnitude 8 the faint companion Regulus B is more challenging to observe.

Leo is close to the Ecliptic, which lies approximately half a degree below Regulus. Planets often pass through the constellation and the Moon is a monthly visitor. In 2026, the nearly-full Moon will pass just below Leo in early March. In late March there is an even closer pass, with the now gibbous Moon occulting Regulus as evening twilight falls. On 29 March, Regulus will disappear behind the dark limb of the Moon at 19:19, reappearing just under an hour later. The first part of this occultation will occur in daylight, but by 20:14 the sky should be dark enough to see Regulus reappear from behind the bright north eastern limb between Mare Crisium and the dark crater Endymion.

While no major planets are scheduled to pass through Leo in the spring of 2026, it will be extremely busy next year. Mars and Jupiter will travel through Leo in January and February, and will then be close together in front of Leo's nose for the whole of spring 2027. The two planets will be joined by the Moon on 19 March and 15 April 2027, giving two opportunities to see a spectacular triple conjunction.

With the arrival of Leo in spring our view shifts away from the Milky Way, and the clusters and bright emission nebulae of autumn and winter give way to a deeper view into the Universe beyond. Leo marks the start of Galaxy Season, with many distant galaxies visible in both Leo and Virgo. Perhaps the most prominent of these within Leo itself is the *Leo Triplet*, a group of three galaxies to the west of Denebola.



Two of these are Messier objects – the two spirals M65 and M66, discovered by Charles Messier in 1780. The third is the edge-on galaxy NGC 3628, first identified by William Herschel in 1784, and often known as the *Hamburger Galaxy* because of its prominent dust lanes. All three galaxies are approximately 35 million light years from Earth, and they form a small gravitationally bound group. The Leo Triplet also makes an ideal imaging target, since all three galaxies fit within a one degree field of view.

As March gives way to April a whole field of galaxies opens up to the east of Leo, in the constellation Virgo. This is the Virgo Cluster – a huge cluster of over a thousand galaxies at distances of 40 to 60 million light years. Many of these are also Messier objects, including the giant elliptical galaxies M86, M87 and M89, as well as numerous edge-on and face-on spirals. With so many galaxies of different shapes and sizes close together, there are plenty of opportunities to create an image with an interesting composition. It's time to put away those narrowband filters and get galaxy-spotting!

Image Credits

Constellation Leo: © Sandi Cayless, 2026
The Leo Triplet Galaxies imaged by the VLT Survey Telescope, Paranal, Chile. Image Credit: ESO, INAF-VST, OmegaCAM; Acknowledgement: OmegaCen, Astro-WISE, Kapteyn I.
Virgo Cluster: NSF–DOE Vera C. Rubin Observatory, June 23, 2025. ID: noirlab2521a. The image was captured by Rubin Observatory using the 3200-megapixel LSST Camera. Here, Rubin's view is focused on the southern region of the Virgo Cluster, about 55 million light-years away from Earth and the nearest large collection of galaxies to our own Milky Way. Credit: NSF–DOE Vera C. Rubin Observatory/NOIRLab/SLAC/AURA. Source: (https://noirlab.edu/public/images/noirlab2521a/)
The Cosmic Treasure Chest, accessed 12 Feb 2026.

The Virgo Cluster, imaged by the Vera C. Rubin Observatory. Rubin's view is focused on the southern region of the Virgo Cluster, about 55 million light-years away from Earth and the nearest large collection of galaxies to our own Milky Way.

Credit: NSF–DOE Vera C. Rubin Observatory/NOIRLab/SLAC/AURA

The 'Eclipse of the Century'

By Bert Mackenzie

Some solar eclipses are given special descriptions. I was in Wyoming in 2017 and witnessed the **Great American Eclipse**, so named because the Moon's shadow crossed many USA states from Oregon to the Carolinas.

This year, on **12th August** the Solar Eclipse starts in Iceland, with Reykjavik experiencing its first eclipse since 1433. It is partial in the UK, but total in Northern Spain and the Balearic Islands late in the day. However, this is not the 'Eclipse of the Century'.

Solar eclipses take place about twice a year, and some are Annular, when the Moon is too far from Earth to completely cover the Sun. The Moon's shadow can be up to 270 km wide and moves at 1800 km per hour, sweeping a path several thousand kilometres long. But the Earth is a big planet, with about a third covered by water and large areas in deserts or ice-covered in remote areas. So for the vast majority living in urban areas, the chance of seeing one is poor.

The other factor is the duration of totality, varying from a few seconds to a maximum of seven and a half minutes. In the period from 2999 BCE to 4000 CE, only one (16th July 2186) will be as long. Apart from three in the last Century, none lasted more than 7 minutes in the previous 900 years!

Calculation of the dates of eclipse was developed from many years of observations of Lunar eclipses – much easier to be seen by Earth observers, as Solar eclipses seldom repeat over the same part of the globe. This gave rise to the Saros cycle, where the position of the Sun, Earth and Moon repeat every 8585 days. This is about 18 years and 10 or 11 days (depending on the number of Leap Years) and 8 hours. The 8 hours is equivalent to 120 degrees of Earth rotation, so my example of the Great American Eclipse was a repeat of the eclipse in Europe on 10th August 1999. While the dates of Lunar eclipses were calculated in ancient times, it was only from 1604 with Kepler's predictions, that Solar dates began to be reliable.

Now we have predictions of eclipse on our phones accurate to the second and well in advance of the event. So when is the **Eclipse of the Century**?

It is **Monday, 2nd August 2027**, when totality will be up to 6 minutes 29 seconds long in Luxor, Egypt. The eclipse starts west of Gibraltar and the Moon's shadow moves over Algeria and Egypt and into the Indian Ocean. Nearby viewing opportunities are in Southern Spain or Northern Morocco, but I would advise you to start booking your trip soon.

Dutch Astronomers 4

By Sandi Cayless

This article, number 4 in the series on Dutch astronomers, deals with two perhaps lesser-known scientists from the Netherlands who have made their marks, the husband and wife team of Jacob Clay (1882-1955) and Tettje Clay-Jolles (1881–1972).

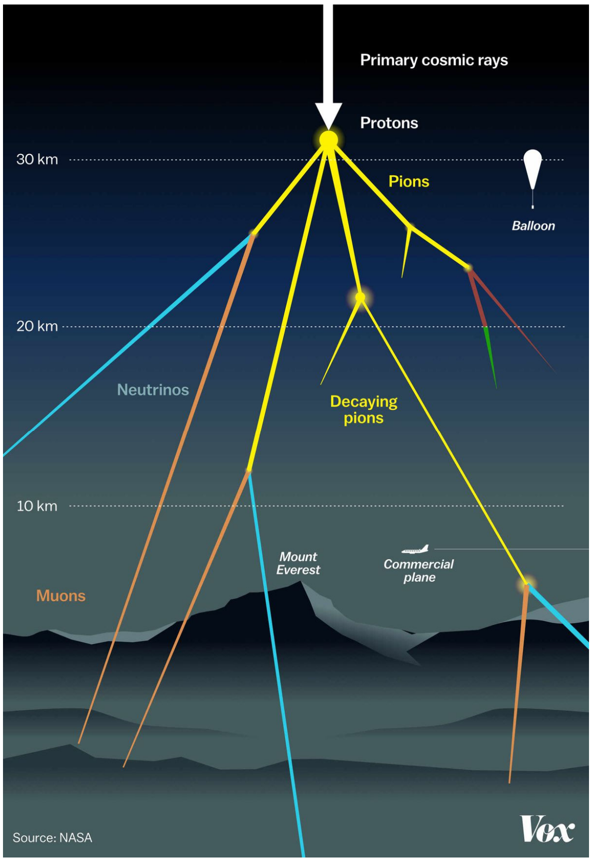
Jacob Clay (1882–1955)

Jacob Clay was a farmer's son, born in Berkhout, Noord-Holland (Rathenau 1956; van Berkel *et al.* 1999). After attending the Erasmiaans Gymnasium (High School) at Rotterdam, he went on to study physics at Leiden (1900-1907) with Heike Kamerlingh Onnes (Nobel laureate, discoverer of superconductivity) and Hendrik Antoon Lorentz (Nobel laureate, Lorentz transformation of the special theory of relativity, Lorentz force, Lorentz oscillator model). Clay obtained his doctoral degree in 1908 with his dissertation *De galvanische weerstand van metakn en legeringen bij lage temperaturen* (The galvanic resistance of metals and alloys at low temperatures). In 1906 he had begun teaching in a secondary school, and from 1907 to 1920 he taught at the Technical School in Deft, publishing his results (Clay 1911). During this time he followed the teachings of philosopher G.J.P.J. Bolland, and obtained a lectureship in Natural Philosophy at Delft (1913-20), publishing a book in 1915 on the history of the concept of the law of nature (Clay 1915). His interest in philosophy continued, but his greatest contributions were in physics (Jongen 1979).

In 1908, Clay had married fellow physics student Tettje Clasina Jolles, who was also doing doctoral research under Onnes on low-temperature physics, although she did not finish her thesis, devoting herself to their children (Oaks 2002). Clay-Jolles had been born in 1881 in Assen, in Drenthe Province, and after attending secondary school for 6 years (at which she was the only girl and passed with extremely good results), she went to the University of Groningen, from there transferring to the University of Leiden in 1903 to study physics. The couple had a daughter and two sons.

In 1920, Clay was appointed as professor of physics at the newly-established Technical College in Bandung (Indonesia, then part of the Dutch East Indies), and before he left for his new post, he stayed with Ernest Rutherford in Cambridge, to keep up-to-date on advances in experimental physics. In Bandung, Clay had to establish a new physics laboratory; he also included a school for instrument-making, following Kamerlingh Onnes' example at Leiden (van Berkel *et al.* 1999). Tettje worked as her husband's assistant in the physics laboratory during this time, and carried out research into vacuum pumps (Oaks 2002). She also edited and typed all her husband's publications, as well as editing a series of lectures for Hendrik Lorentz (van Berkel *et al.* 1999; Oaks 2002). In their joint research from 1920 onwards, the Clays focussed on atmospheric electricity and cosmic radiation (detected by Victor Franz Hess in 1912), many of their results being published in the Proceedings of the Royal (Amsterdam) Academy of Sciences (e.g. Clay 1925, 1927, 1932, 1933, 1937, 1941; Clay & Clay-Jolles 1932). In all, the Clays published about 200 papers and supervised 22 Dissertations (van Berkel *et al.* 1999).

However, on a return trip from Indonesia to Holland between 1927-1928, using his ionization chamber which had been taken along, Clay discovered a decrease of cosmic rays (radiation in the ultraviolet range of the solar spectrum) intensity around the equator (the latitude effect), and assumed it was a result of the Earth's magnetic field, implying charged particles (Carlson 2012). In the first published results (Clay 1927, 1928), Clay describes the ionization chamber used and compares radiation measurements in Bandung on mountain peaks and by plane, to those from ground level (Jongen 1979). Although the Clays returned to the Netherlands in 1929 (when Jacob became professor of experimental physics at Amsterdam), their first results on the *nature* of cosmic radiation were not published until 1932, in the Proceedings of the Royal Amsterdam Academy of Sciences (Clay & Clay-Jolles 1932), as they were controversial. Their opponents included the Nobel laureate Robert A. Milliken (van Berkel *et al.* 1999), who had coined the term *cosmic ray* and maintained that his work had proved that primary cosmic rays were gamma rays, in other words, energetic photons. The Clays argued that the variations in radiation readings were down to geographic latitude, attributing the effect to the changing degree of UV penetrability in the upper atmosphere and the ozone layer. Opponents Jan Boerema and Maarten Pieter Vrij asserted that UV radiation penetrated the atmosphere at the tropics.



Cosmic ray particles collide with and tear apart atoms in the atmosphere... the particles created continue to collide with other matter in a snowball chain reaction. Image: Javier Zarracina/Vox

To resolve the dispute, the Clays measured UV at their location in the tropics with a cadmium electro-cell, and compared their readings to those recorded by their former Leiden colleague Cornelis Braak, who had been (1920-25) the director of the Dutch Magnetic and Meteorological Observatory in Batavia (Oaks 2002). Clay-Jolles then published the findings in the East Indian scientific journal Xatuurkundig Tijdschrift xoor Xederlandsch-Indie in 1933 to challenge Maarten Vrij's publication of his findings. It was not until 1935 and after measurement expeditions around the world that the Clays' work was recognised and widely accepted: cosmic ray intensity increases from the tropics to mid-latitudes, indicating that primary cosmic rays are deflected by the geomagnetic field and therefore are not photons but charged particles. The rift that the whole argument caused between Clay and Millikan was never fully resolved (Jongen 1979).

Clay continued to develop cosmic radiation research during his time in Amsterdam, from 1929-1953, collaborating with other scientists in the field such as Blackett and Lemaître (e.g. Clay *et al.* 1938) and producing numerous publications. He was appointed a member of the Royal Academy of Sciences in 1936 (Jongen 1979). After the Second World War, Jacob Clay played an important role in building the basis of nuclear physics research in the Netherlands (van Berkel *et al.* 1999, OMDB 2018), with the creation of organisations such as the Stichting Fundamenteel Onderzoek der Materie (Foundation for Fundamental Research of Matter, FOM, 1946), the Mathematical Centre (1946) and the Norwegian-Dutch Joint Establishment for Nuclear Energy Research (JENER); all owed much to his drive and enthusiasm (Rathenau 1956). After his retirement in 1952, Clay was the chairman of FOM for several years. He died in 1955 in Bilthoven at the age of 73. Tettje Clay-Jolles gave up her role in research after the family's return to the Netherlands in 1929. She died in Amsterdam in 1972 (Oaks 2002), and in 2021, a street in Eindhoven was named in her honour, the Tettje Jollesstraat (Spoorenberg 2025).

References

Carlson, P. (2012) A Century of Cosmic Rays. *Physics Today 65 (2)30-36 (Feb 2012)* DOI: 10.1063/PT.3.1437.

Clay, J. (1911) On the influence of electric waves upon platinum mirrors (Coherer action), in: KNAW, Proc, 14 I, 1911, Amsterdam, 1911, pp. 126-128. https://dwc.knaw.nl/DL/publications/PU00013127.pdf

Clay, J. (1915) *Schets eener kritische geschiedenis van het begrip Natuurwet in de nieuwere wijsbegeerte.* Stolpian League, Leiden University 1915.

Clay, J. (1925) Electric phenomena in the atmosphere. Proc. Amsterdam Academy of Sciences, Comm. at the meeting of Mar 28, 1925. https://dwc.knaw.nl/DL/publications/PU00015190.pd f.

Clay, J. (1927) Penetrating Radiation. *Proceedings of the Section of Sciences, Koninklijke Akademie van Wetenschappen te Amsterdam 30 (9–10): 1115–1127.* https://dwc.knaw.nl/DL/publications/PU00011919.pdf

Clay, J. (1928) Penetrating Radiation ii. *Proceedings of the Section of Sciences, Koninklijke Akademie van Wetenschappen te Amsterdam 31, 1091–1097.*

Clay, J. (1932) The Earthmagnetic effect and the Corpuscular Nature of (Cosmic) Ultra-radiation. IV Year. Communicated at the meeting of Dec 17, 1932. https://dwc.knaw.nl/DL/publications/PU00016356.pd f.

Clay, J and Clay-Jolles, T (1932) Measurements of Ultraviolet Sunlight in the Tropics. *Proc. Amsterdam Acad. Sciences*. Comm. meeting of Jan 30, 1932.

https://dwc.knaw.nl/DL/publications/PU00016194.pdf.
Clay, J. (1933) The cosmic corpuscular ultra-radiation. V. Ionisation in the Stratosphere and in the highest layers. Comm. meeting Jan 28, 1933. https://dwc.knaw.nl/DL/publications/PU00016373.pdf.
Clay, J. (1937) De energie en het doordringend vermogen van de kosmische stralen Year: . Pages: 11. Comm. meeting Jun 26, 1937. https://dwc.knaw.nl/DL/publications/PU00017083.pdf.
Clay, J., Blackett, P.M.S. and Lemaître, G. (1938) *Rayons Cosmiques*. Hermann et Cie, Paris 1938, 172pp.
Clay, J. (1941) Cosmic Ray Showers. Comm. at the meeting of Sep 27, 1941. https://dwc.knaw.nl/DL/publications/PU00017639.pdf.
Jongen, H.F. (1979) CLAIJ, Jacob (1882-1955), in Biographical Dictionary of the Netherlands. http://resources.huygens.knaw.nl/bwn1880-2000/lemmata/bwn1/claij
OMDB (2018) *Jacob Clay en de Kosmische Straling* (Jacob Clay and the Cosmic Rays) Het Online Museum De Bilt. https://www.onlinemuseumdebilt.nl/jacob-clay-en-de-kosmische-straling/.
Oakes, Elizabeth H. (2002) *Clay-Jolles, Tettje Clasina (1881-1972)*. International encyclopaedia of women scientists, p64. New York, NY, ISBN 0-8160-4381-7. https://archive.org/details/internationalenc00oake.
Rathenau, G.W. (1956) Levensbericht J. Clay, in: Jaarboek, 1955-1956, Amsterdam, pp. 209-212. https://dwc.knaw.nl/DL/levensberichten/PE00004621.pdf.
Resnick, B., Vox (2019) Extremely powerful cosmic rays are raining down on us. No one knows where they come from. Univ. California, Irvine, Sch. of Physical Sciences News, Thursday, July 25, 2019, https://ps.uci.edu/news/67.
Spoorenberg, Jan (2025) *Straatnamen In De Gemeente Eindhoven 1920-2025*. Inhoudsopgave. https://zichtopeindhoven.nl › spoorenberg › STRAATNAMEN%201920-2025.pdf.
van Berkel, K., van Helden, A., and Palm, L. (Eds) (1999) *Jacob Clay (1882-1955)*. A History of Science in The Netherlands. Survey, Themes and Reference, pp 435-437. Leiden/Boston/Köln: Brill, 1999. https://dwc.knaw.nl/wp-content/berkelbio/10.clay.pdf.

Image References
Jacob Clay, date unknown, KNAW (Koninklijke Nederlandse Akademie van Wetenschappen). Image source: https://dwc.knaw.nl/en/?s=jacob+clay. Accessed 08 Jan 2026.
Primary cosmic rays entering the atmosphere: From Resnick and Vox (2019); Image Credit: Javier Zarracina/Vox. Accessed 08 Jan 2026.

Star Clusters

By Alan Cayless FRAS

In a quote that inspired the title of one of his earliest novels, Isaac Asimov once said "The stars, like dust, encircle me in living mists of light" (Asimov, 1952). While the stars are indeed scattered like dust across the heavens, they are not entirely uniformly distributed. On a large scale, they fall into recognisable patterns – the familiar constellations and asterisms that herald the seasons and help us find our way around the night sky. On a smaller scale, stars are often found in tighter groups and clusters. Many of these clusters are Messier objects, visible in small telescopes and making interesting targets for visual observation and for imaging. There are two main types of clusters – open clusters and globular clusters, each with their own ages, compositions and origins.

Open clusters are loose groupings of tens or hundreds of recently formed stars. They tend to lie within the plane of the Milky Way, where density waves associated with the spiral arms and the rotation of the Galaxy can compress vast clouds of interstellar gas, causing them to condense and break up into smaller and smaller globules which ultimately collapse further to form individual stars. An open cluster results, containing numerous stars of different sizes, all formed at the same time. The Orion nebula is a good example of a star-forming region in the earlier stages of this process; currently a large glowing gas cloud illuminated from within by newly formed stars, it will eventually become an open cluster. Our own Sun would most likely originally have been formed in such a cluster, which has now long since dispersed.

Perhaps the most well-known open cluster is the Pleiades, itself a Messier object (M45) and easily found in the winter sky by following the line of the three stars in Orion's belt upwards and to the right, past the 'V' of the Hyades in Taurus. Visually, the Pleiades is a distinctive tight cluster of bright blue stars that give the cluster its alternative name of The Seven Sisters. Through the telescope many smaller, fainter stars are revealed, showing that, although the blue stars are the most prominent, the overall composition of the cluster includes stars of a wide range of mass, temperature, and luminosity.

M45, the Pleiades. Image credit: Alan Cayless

Being a relatively young cluster means that the Pleiades still contains a high proportion of very bright blue stars. These very large, hot stars tend to have short lifespans of tens to hundreds of millions of years, but the Pleiades is young enough still to contain them. At a distance of approximately 450 light years, the Pleiades is estimated to be approximately 65 million years old. Any dinosaurs who happened to look up at the night sky would not have seen the Pleiades.

Interestingly, the Hyades cluster in Taurus is itself also an open cluster. Being closer to Earth (approximately one-third of the distance to the Pleiades) means that the stars in the Hyades appear more spread out, but it is another example of an open cluster.

Globular clusters are much larger and older than open clusters. They are also typically found in a very different location – in the outer halo of the Galaxy, many tens of thousands of light years away from the Earth. These globulars are huge, roughly spherical collections of stars. They are gravitationally bound, with individual stars orbiting in different directions within the cluster around their common centre of gravity.

Globular clusters were typically formed in the early stages of the Galaxy, several billions of years ago. Being very old, they contain only smaller, redder stars that have very long lifetimes. Any larger and hotter stars that may have originally been part of the cluster will long ago have lived out their short lives and died.

M13, the great globular cluster in Hercules.
Image credit: Alan Cayless

The great globular cluster of Hercules is Messier object 13 (M13) is approximately 24 thousand light years away, in the outer halo of the Milky Way galaxy. This image clearly shows the more reddish-orange colours of the stars in this very old cluster – a clear contrast to the bright blue stars of the Pleiades. The two bright stars either side of this image are foreground stars within the plane of the Galaxy and are not part of the Hercules cluster itself, although the distinctive isosceles triangle pattern that they make with the cluster helps to easily identify images of M13.

Other examples of open clusters include M44 (the Beehive) in Cancer and the double cluster H and χ Persei in Perseus. M44 is well placed for observation in the spring, and the double cluster best in autumn and winter. M13, the great globular cluster in Hercules, can be seen in spring through to autumn. Other prominent globular clusters include M3 in Canes Venatici, best seen in the spring, and M15 in Perseus, an autumn globular cluster.

Both types of cluster are easily visible in a small telescope and they make excellent targets for both visual observing and imaging. Whichever season of the year, there are plenty to choose from!

References

Asimov, I. (1952) *The stars, like dust*. Originally published by Doubleday, New York. Republished 1981 by Panther Granada, UK, ISBN 0586024417.

Dark Sky Sites in Scotland

By Graem Farland

Moffat

The town of Moffat, in Dumfries and Galloway, implemented specific street lighting to minimise light pollution, and was named Europe's first Dark Sky Town (Visit Scotland 2026; Scotland Starts Here 2026). The town's light quality is comparable to local rural areas and so it makes a good observation location. Moffat sits on the River Annan in the Southern Uplands and on dark, cloudless nights the skies are particularly clear.

Galloway Forest Park

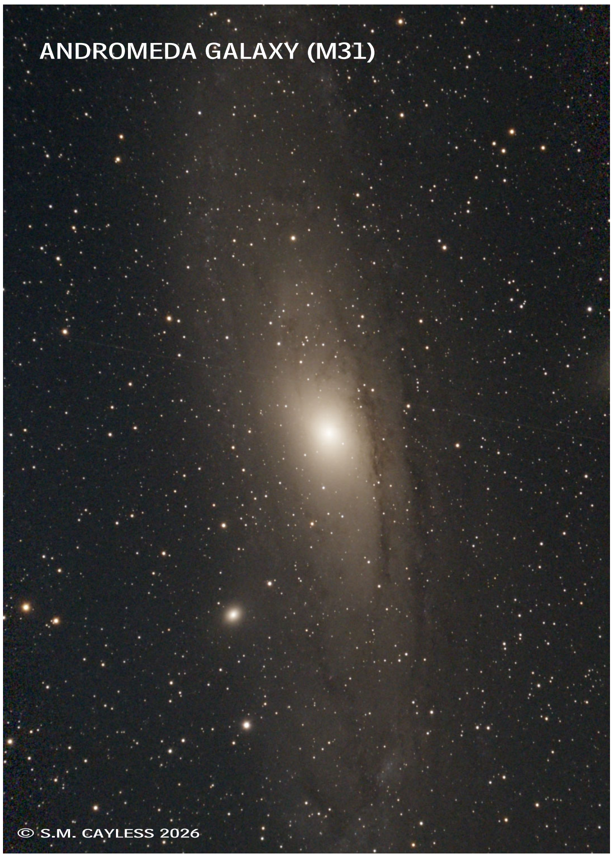
Galloway Forest Park in Dumfries and Galloway is the UK's largest forest park, and home to the UK's first Dark Sky Park. This is one of the best places to observe in Europe, according to Visit Scotland (2026), as few people live inside the boundaries of the Park, meaning the nights are extra clear. Clatteringshaws Loch and Kirroughtree Visitor Centre are recommended as perfect spots to view the night sky from, and there are often stargazing events and guided tours by Dark Sky Rangers (Visit Scotland 2026).

Isle of Rum

The remote Isle of Rum is in the Inner Hebrides, and was made Scotland's first International Dark Sky Sanctuary, or IDSS, in 2024 (BBC 2024). The nearest IDSS to Rum is Ynys Enlli (Bardsey Island) in Wales, which was the first in Europe (Bardsey Island Trust 2026). These are currently the only two IDSS sites in Europe. There is no public lighting on Rum and this small island has a population of only 40, which means the skies are pollution-free. It is also a National Nature Reserve and can be reached by ferry from Mallaig. The island has unique natural habitats and provides prospects for stargazing and night sky conservation. Supporters in 2022 started to record the lighting of all the private structures on the island and to develop a light management plan that stuck to IDSS guidelines (Reagan 2024). More than 80% of the island's lighting now complies with the guidelines; it is hoped to reach 100% soon. The community now hosts educational events, along with experts from the Cosmos Planetarium. [This is a mobile planetarium that runs events for up to 40 children or 25 adults at once and can be transported to venues; there are events planned for the Isle of Coll in the near future (Green & Gray 2026).] The plans for the Isle of Rum IDSS include an observing tower for improved observation, an all-sky camera and weather station, and more education and outreach programs. Rum Community also plans to boost small-scale tourism by modernising Harris Lodge, in the centre of the reserve (Reagan 2024). Rum is reachable on foot or bicycle by ferry from Mallaig; the privately-owned roads are not paved, cars are only allowed by permit, and there is no supermarket and not much accommodation.

Isle of Coll

The Isle of Coll was named a Dark Sky Community in 2013 (Dark Sky 2026). Coll has a land area of 77 km^2, sits in the Inner Hebrides about 10 km off the west coast of Argyll, and has about 200 permanent residents. It has several recognised dark sky viewing sites, and its low population, geographic isolation and outdoor lighting management plan make its night skies some of the darkest in Scotland. The Cosmos Planetarium has upcoming events planned for the Isle of Coll (Green & Gray 2026).



North Ronaldsay Dark Sky Island

North Ronaldsay, in Orkney, is an International Dark Sky Community, designated in 2021 (Dark Sky 2026). With a land area of only 7.0 km^2, and a population of 72 residents, the island is the most northern of the Orkney archipelago. It has been settled since prehistoric times and is home to the unique short-tailed North Ronaldsay sheep. It is also a staging post on the migration route of birds to Scandinavia and the Iceland/Greenland Arctic, and the famous

North Ronaldsay Bird Observatory is now home to the North Ronaldsay Astronomy Group, which organises events at the Observatory. On clear nights, a breathtaking view of the Milky Way can be seen and the community is dedicated to expanding in order to educate and inspire visitors on the importance of dark sky protection; the Bird Observatory has two telescopes, and aims to hold monthly Dark Skies talks and walks (Anon. 2025). The Observatory also has a bar…

Tomintoul & Glenlivet – Cairngorms Dark Sky Park

The remote Tomintoul and Glenlivet area has not only striking dark skies, but it is also easy to get to (Anon 2026). Chosen as the first International Dark Sky Park in the Scottish Highlands in 2018, the Tomintoul & Glenlivet – Cairngorms Dark Sky Park sits across 244 km^2 (Cairngorms Dark Sky Park 2025). The International Dark-Sky Association has awarded it Gold Tier status, and it has three Dark Sky Discovery Sites, Tomintoul (Skyhide), Blairfindy and Scalan, which are all well-known for excellent observation conditions. Through the darker months of the year, this area of the Cairngorms provides many stargazing opportunities, and events take place all the year round, hosted by the Cairngorms Astronomy Group (Anon. 2026).

Tamnavulin, Speyside: Dark-Sky-Friendly Distillery

In December 2025, the Tamnavulin Distillery (part of Whyte & Mackay Ltd.) on Speyside was recognised for its pledge to reduce light pollution (Cairngorms Dark Sky Park 2025). The distillery is inside the Tomintoul & Glenlivet Cairngorms Dark Sky Park. Staff at the distillery worked alongside those from the Dark Sky Park to reach 100% lighting compliance by replacing fifty seven lights at their Glenlivet site with fully-shielded and down-facing alternatives. These use a warm white colour and a temperature of <3000 Kelvin to minimise blue light emission and so to reduce the skyglow from the distillery. This outcome came after a lot of years of discussion with distilleries in the area, and it is hoped that other local distilleries will go along with Tamnavulin's example of full Dark Sky compliance.

References

Anon. (2025) *Island of North Ronaldsay: Dark Skies and Island Astronomy*. https://www.northronaldsay.co.uk/dark-skies-island-astronomy.html.

Anon. (2026) *Cairngorms Dark Sky Park*. https://www.cairngormsdarkskypark.org/.

BBC (2024) Scottish island recognised among world's best night skies. *BBC News 23 August 2024*, https://www.bbc.co.uk/news/articles/cly3x3np09xo.

Bardsey Island Trust (2026) *Ynys Enlli Dark Sky Sanctuary: The island of 20,000+ stars*. https://enlli.org/natural-environment/dark-sky-sanctuary/.

Cairngorms Dark Sky Park (2025) *Tamnavulin Leads the Way as Speyside's First Fully Dark-Sky-Friendly Distillery*. https://www.cairngormsdarkskypark.org/2025/12/15/tamnavulin-leads-the-way-as-speysides-first-fully-dark-sky-friendly-distillery/.

Dark Sky (2026) *All International Dark Sky Places*. https://darksky.org/what-we-do/international-dark-sky-places/all-places/?_location_dropdown=uk.

Green, J. and Gray, S. (2026) *Cosmos Planetarium*. https://www.cosmosplanetarium.co.uk/.

Reagan, D. (2024) *International Dark Sky Places: Isle of Rum*. Published August 23, 2024. Dark Sky International. https://darksky.org/places/isle-of-rum/.

Scotland Starts Here (2026) *Moffat*. https://scotlandstartshere.com/point-of-interest/moffat/.

Visit Scotland (2026) *Dark sky parks & stargazing in Scotland*. https://www.visitscotland.com/things-to-do/landscapes-nature/dark-sky-parks-sites.

Image Credits

Andromeda Galaxy (M31), © S.M. Cayless 2026
Bird Observatory, © Arryll Idrennis 2026

Shooting Stars

By Arryll Idrennis

A streak of fire across the night
A moment's blaze, a dying light –
And dimming stars once more
Shine bright…

Once born of comet's breaking ice
Or rocky world, or satellite
Or interstellar dust in flight –
They fly…

The ice that binds a comet's core
Near fiery Sun can hold no more –
In vaporous trails, the lucent grains
Fly free…

To orbit Sun on endless chase,
In wake of parent's cyclic trace,
To curve by Earth as eons race –
Until…

The nearing world draws closer, 'til
Through aerial space, as stars stand still
In wisps of light they closer spill –
And fall…

At speed they drop through cooling air
Shoot darkling skies and night so fair
And blazing, trace a dazzling trail
To fail…

The New Telescope

By Sandi Cayless

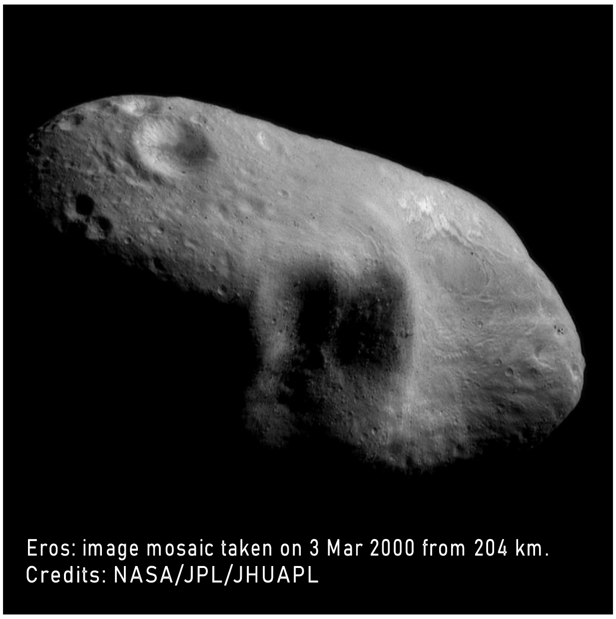
We got it as a bargain –
A new one in the sale;
All packed up nice and tightly,
It came in by the mail.
Unpacked it was a beauty,
Of that we saw quite plain;
But since we've had it all set up
We've seen zip bar the rain…

Overbye, Dennis (1944-)
Few sights in science are sadder than astronomers standing in the rain. (New York Times Article, *Grasping for Light of Distant Worlds*, June 22, 2004)

Interesting Asteroids (7)

By Sandi Cayless

Part of an occasional series on asteroids, here we look at asteroid 433 Eros, a near-Earth object with several claims to fame. Asteroid 433 Eros is a stony asteroid (S-type) of the Amor group and is located in the inner asteroid belt, i.e. it orbits between Mars and Jupiter inside the inner portion of the main asteroid belt. Amor-class asteroids have orbits that approach the orbit of Earth but do not cross it (Space Reference 2026).



Eros: image mosaic taken on 3 Mar 2000 from 204 km.
Credits: NASA/JPL/JHUAPL

The asteroid was discovered on 13 August 1898 by Gustav Witt, who was the director of the Urania Observatory in Berlin. Eros was also independently found on the same day by French astronomer Auguste Charlois in Nice (NASA 2024). The discovery by Witt was accidental: he had made a two-hour photographic exposure of the yellow supergiant β Aquarii to pinpoint asteroid 185 Eunike, but the image also displayed a 0.4-mm image trail as well as Eunike (Yeomans 2014). Observations the next evening showed the object to have oddly high apparent motion across the sky. Under two weeks later, German astronomer Adolf J. Berberich of the Astronomical Calculation Institute in Heidelberg worked out that the body's orbit took it well inside Mars orbit. This made Eros the first known near-Earth asteroid (NEA) and the first known Mars-crosser asteroid.

Eros is also the second-largest near-Earth object (the largest is 1036 Ganymed), but it is not at the moment considered hazardous by NASA JPL. It is elongated in shape and has a volume-equivalent diameter of about 16.8 km (10.4 miles). The asteroid comes close to Earth periodically and has a predictable orbit. Its opposition in 1900–1901 provided the global opportunity to make parallax measurements to establish its solar parallax (Hinks 1909, Perrine 1910). During the closer approach of 1930–1931, direct observation of the parallax of Eros was organised and carried out by Harold Spencer Jones (later Astronomer Royal for England) (Atkinson 1961). Jones' project also provided a value for the Astronomical Unit (au) that was judged definitive until 1968, when radar and other methods were able to provide more exact measurements. (The au was redefined in 2012 by the International Astronomical Union (IAU 2012) as 149597870700 m.) Eros' close approach to Earth in 1975, at a distance of only 22 million km (14 m miles), was again the focus of a worldwide observation campaign (NASA 2024). The asteroid will pass within 22.4 m km of Earth again on 24 January 2056 (Wilder 2022, Space Reference 2026). Currently (12 Feb 2026), it is 0.47 AU from Earth (NASA 2024). At the moment Eros is a Mars-crosser, with an orbit inclined at ~ 10.8° to the solar ecliptic, i.e. it is above the ecliptic plane when it crosses Mars' orbit, and so the orbits do not intersect. Objects in those kinds of orbit can stay only one or two hundred million years – the orbit is subject to perturbation by gravitational interactions. Experimental modelling has indicated that Eros might become an Earth-crosser within that timescale (Michel *et al*. 1998), and suggests that Eros has around a 5% chance of becoming an Earth-impactor.

Asteroid 433 Eros	
Argument of Perihelion (°)	178.92978
Ascending Node (°)	304.27008
Orbital Inclination (°)	10.82847
Orbital Eccentricity	0.2228360
Perihelion Distance (AU)	1.1331992
ΔV w.r.t. Earth (km/sec)	6.1
Semi-Major Axis (AU)	1.4581210
Mean Anomaly (°)	310.55432
Mean Daily Motion (°/day)	0.55977530
Aphelion Distance (AU)	1.783
Period (years)	1.76
Absolute Magnitude	10.38
Diameter (km)	16.84
Phase Slope	0.15
	Data: IAU/JPL

The other claims to fame of Eros are that it was the first asteroid to be orbited by a spacecraft, and the first to have a spacecraft land on it (NASA 2024).

Launch of NEAR, 17 February 1996 Image Credit: NASA

The NEAR (Near Earth Asteroid Rendezvous) spacecraft, launched 17 February 1996, first made a flyby past Eros on 23 December 1998, at a distance of 3,827 km (2,378 miles), after an anomaly almost caused the loss of the spacecraft (NEAR Anomaly Review Board 1999). The instruments on board were a near-infrared (IR) spectrometer to examine asteroidal composition, a multi-spectral imager, a magnetometer to measure the asteroid's magnetic field and a telescope + CCD array to ascertain size, shape and spin (Wilder 2022). During the flyby, images of Eros were taken by the onboard camera, near-IR spectrographic data were collected, and radio tracking was undertaken. The mission's primary goal was to study Eros from orbit for about one year, and after a number of course modifications, NEAR moved into orbit on 14 February 2000 (Valentine's Day, and an apt date for Eros, named for the Greek god of love). Various manoeuvres allowed the spacecraft to carry out a series of close passes over the surface of the asteroid.

After almost a year in orbit, the first asteroid landing took place on 12 February 2001, when Eros was at 315 m km (196 m miles) from Earth. During the orbit, NEAR had been renamed 'NEAR Shoemaker', to honour American geologist and impact crater expert Eugene Shoemaker (1928-1997). The NEAR Shoemaker had been designed as an orbiter and was not expected to survive landing, but as the main mission had been completed, an unrehearsed landing was attempted. The spacecraft made a soft touchdown near the large saddle-shaped depression called Himeros (an impact crater) successfully, and with its instruments still active, the first gamma-ray experiment ever done on an extraterrestrial body could be carried out (Trombka *et al.* 1995, 2001).

Over its mission, NEAR Shoemaker had captured 160,000 images, many high-resolution close-up, of Eros, and recorded the mineral composition of over 70% of its surface (Wilder 2022). The spacecraft found that Eros had no satellites and no magnetic field, was smaller than first thought, and rotated once every 5.27 hours. With a density similar to Earth's crust, it had two huge craters scattered with rocks and boulders, some large, and a 20 km-long surface ridge; and radar showed that its loose rocky and dusty surface had smooth and rough areas, with ridges, grooves and depressions. Eros' surface also showed great variations in brightness and contained high concentrations of silicon, magnesium, iron, uranium, thorium and potassium (Trombka *et al.* 2000; Veverka *et al.* 2000; Watters *et al.* 2011). Subsequent analysis has shown that most of the scattered rocks on Eros probably originated from one crater (Thomas & Robinson 2005), originally called Shoemaker but now named Charlois Regio. There are now 41 surface features on Eros that have been mapped and named (USGS 2026). After 16 days, at 7 p.m. EST on February 28, 2001, the final data signals from the surface of Eros were received from NEAR Shoemaker before it shut down (Worth 2001).

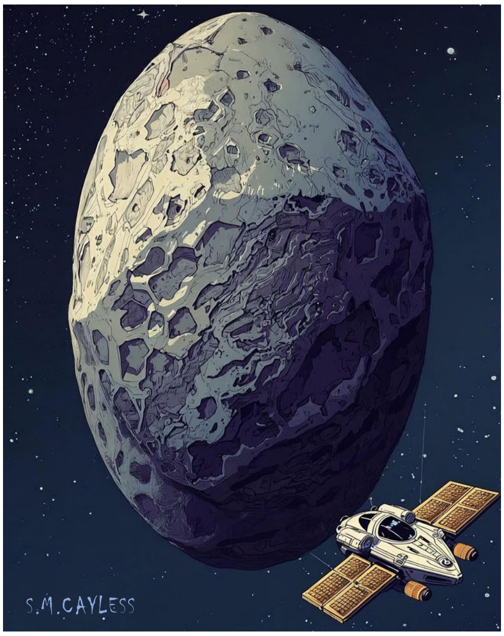
References

Atkinson, R. D'E. (1961) Obituary: Sir Harold Spencer Jones K.B.E., F.R.S. *Journal of the British Astronomical Association 71 (2) 79-80, 89.* https://britastro.org/wp-content/uploads/sites/Jones%20Harold%20Spencer1.pdf.
Hinks, A.R. (1909) Solar Parallax Papers no. 7: The general solution from the photographic right ascensions of Eros, at the opposition of 1900. *Monthly Notices of the Royal Astronomical Society* 69 (7) 544–67. https://zenodo.org/records/1431881.
IAU (2026) The International Astronomical Union Minor Planet Center (433) Eros = 1898 PA = 1956 PC. https://minorplanetcenter.net/db_search/show_object?object_id=433.
IAU (2012) On the re-definition of the astronomical unit of length. XXVIII General Assembly of International Astronomical Union. Beijing: International Astronomical Union. 31 August 2012. Resolution B2. https://web.archive.org/web/20250305215811/http://www.iau.org/static/resolutions/IAU2012_English.pdf.

JPL (2025) Jet Propulsion Laboratory Small-Body Database Lookup, 433 Eros (A898 PA); https://ssd.jpl.nasa.gov/tools/sbdb_lookup.html#/?sstr=Eros.
Michel, P., Farinella, P. and Froeschlé, Ch. (1998) Dynamics of Eros. *The Astronomical Journal 116 (4) 2023-2031.* https://iopscience.iop.org/article/10.1086/300562/pdf
NASA (2024) Eros. https://science.nasa.gov/solar-system/asteroids/433-eros/.
NEAR Anomaly Review Board (1999) *The NEAR Rendezvous Burn Anomaly of December 1998*. Final Report of the NEAR (Near Earth Asteroid Rendezvous) Anomaly Review Board, November 1999. The Johns Hopkins University Applied Physics Laboratory. https://near.jhuapl.edu/anom/Hoffman.pdf.
Perrine, C.D. (1910) *Determination of the solar parallax from photographs of Eros made with the Crossley reflector of the Lick Observatory, University of California*. Carnegie Institution, Washington, DC, pp. 1–104 https://upload.wikimedia.org/wikipedia/commons/4/49/Determination_of_the_solar_parallax_from_photographs_of_Eros_made_with_the_Crossley_reflector_of_the_Lick_observatory%2C_University_of_California_%28IA_cu31924012307157%29.pdf.
Space Reference (2026) *Eros 433 Eros (A898 PA)* https://www.spacereference.org/asteroid/433-eros-a898-pa.
Thomas, P.C., Robinson, M.S. (2005) Seismic resurfacing by a single impact on the asteroid 433 Eros. *Nature 436 (7049) 366–369.* https://doi.org/10.1038/nature03855.
Trombka, J.I., Boynton, W.V., Bruckner, J. *et al.* (1995) Observation of 433 Eros with the X-Ray/Gamma-Ray Remote Sensing Spectrometer on the NEAR Mission. *Meteoritics 30 (5) 589-590.* https://articles.adsabs.harvard.edu/pdf/1995Metic..30R.589T.
Trombka, J.I., Squyres, S.W., Brückner, J. *et al.* (2000) The Elemental Composition of Asteroid 433 Eros: Results of the NEAR-Shoemaker X-ray Spectrometer. *Science 289 (5487) 2101-2105.* https://doi.org/10.1126/science.289.5487.2101.
Trombka, J.I. Nittler, L.R. Starr, R.D. *et al.* (2001) The NEAR-Shoemaker x-ray/gamma-ray spectrometer experiment: Overview and lessons learned. *Meteoritics & Planetary Science 36: 1605-1616.* https://doi.org/10.1111/j.1945-5100.2001.tb01852.x.
USGS (2026) *Eros*. Gazetteer of Planetary Nomenclature. U.S. Geological Survey Astrogeology Science Center. https://planetarynames.wr.usgs.gov/SearchResults?Target=137_Eros.
Veverka, J., Robinson, M., Thomas, P., *et al.* (2000) NEAR at Eros: Imaging and spectral results. *Science 289, 2088–2097.* DOI: 10.1126/science.289.5487.2101.
Watters, T.R., Thomas, P.C. and Robinson M.S. (2011) Thrust faults and the near-surface strength of asteroid 433 Eros. *Geophys. Res. Lett., 38, L02202,* doi:10.1029/2010GL045302.
Wilder, J. (2022) *A guide to asteroid 433 Eros*. BBC Sky at Night Magazine, February 14, 2022. https://www.skyatnightmagazine.com/space-science/433-eros-asteroid.
Worth, H. (2001) *The End of an Asteroidal Adventure: NEAR Shoemaker Phones Home for the Last Time.* Johns Hopkins University Applied Physics Laboratory Press Release Feb. 28, 2001. https://near.jhuapl.edu/news/flash/01feb28.html.
Yeomans, D.K. (2014) *Asteroid 433 Eros: The Target Body of the NEAR Mission*. Report of the Jet Propulsion Laboratory/California Institute of Technology (archived). https://web.archive.org/web/20070928081213/http://trs-new.jpl.nasa.gov/dspace/bitstream/2014/31429/1/95-1108.pdf.

Image Credits

Eros image mosaic, taken by NEAR-Shoemaker on 3 March, 2000 from 204 km, NASA/JPL/JHUAPL.
Launch of NEAR, 17 February 1996, on a Delta 7925-8 (a Delta II launch vehicle with nine strap-on solid-rocket boosters and a Star 48 (PAM-D) third stage), NASA.

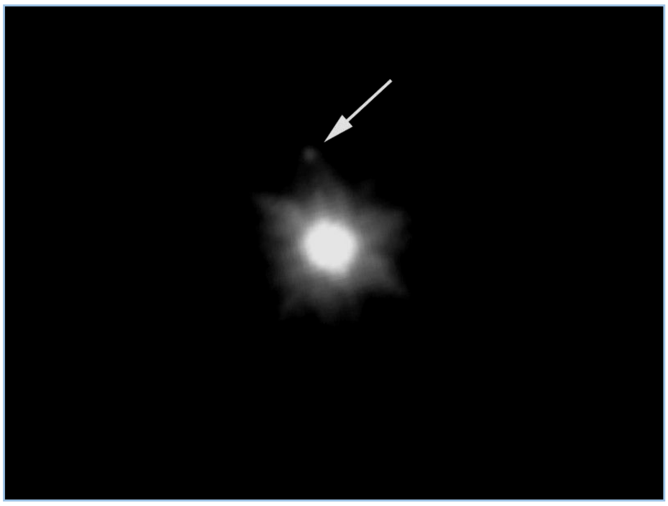


Happy Observing!

On March 3, the Moon will be at full phase and visible during much of the night. A common name for this particular Moon is the Worm Moon, so called because earthworm trails beginning to appear indicate the thawing ground – for other names for this and the other Full Moons occurring through the year, see Issue 5 of *The Jeety Starn*. On March 6 the Moon reaches its aphelion, or furthest point from the Sun. Mercury attains inferior solar conjunction on 7 March, and is so close to the Sun that it will be unobservable for some weeks; the planet also passes perigee, i.e. its closest point to Earth, about the same time, when it would be at its largest apparent size, were it visible. There will be a conjunction Venus and Neptune in Pisces on the same date, but the two will be difficult to see from Stirling, as they will be very close to the Sun.

The Moon on the 10 March is at apogee, i.e. the furthest point along its orbit around the Earth, as it approaches its last quarter, and will appear a little smaller than it is sometimes, in the morning sky. On 11 March, Jupiter reaches the end of its retrograde motion, and will revert to its more typical eastward motion. The planet will be visible in the evening sky from about around 18:32 (GMT), in the south east. There is a conjunction of Mars and Mercury on the 14 March, in Aquarius, but it will not be easy to see from Stirling. Another very difficult object to view, periodic Comet 88P/Howell, makes its closest approach to the Sun (perihelion) on 18 March, but it will barely reach 16° above the horizon, and will need a telescope to observe. The New Moon on March 19 is followed by the Equinox, on 20 March, and the beginning of Spring in the northern hemisphere. On March 21, asteroid 20 Massalia, in Virgo, is at opposition, and will be visible (by telescope) from Stirling from about 21:18; it reaches its highest point at 00:23, above the southern horizon. A close approach of the four-day old Moon and M45 (the Pleiades) occurs in Taurus on 23 March; the two will become visible from Stirling about 19:30 (GMT). A conjunction of the Moon and Jupiter occurs on 26 March and will be visible locally in the evening sky. The Moon and M44 (Beehive Cluster, NGC 2632, Cr 189) pass close to each other on the 28th, in Cancer, and on the 29th, the Moon will pass in front of the star Regulus (Alpha Leonis). The event *is* visible from Stirling, but as it begins at 19:17 BST, the sky will be light. Regulus will reappear at 20:15. [Caution: take great care when viewing the sky by binoculars/ telescopes when the Sun is above the horizon.]

The first day of April brings the opposition of minor planet 136472 Makemake (Kuiper belt object), in the constellation Coma Berenices. It can be seen by telescope from Stirling throughout the night (clouds permitting!), becoming visible about 21:26 (GMT) above the eastern horizon. The image below was taken by the Hubble Space Telescope in April 2015 and shows the planet's tiny moon, named S/2015 (136472) 1, which is estimated to be 1,300 times fainter than its parent and have a diameter of about 160 km (NASA 2025)



Credits: NASA, ESA, and A. Parker and M. Buie (SwRI)

For our astrophotographers, the Sombrero Galaxy (M104, NGC 4594) reaches its highest point at the beginning of April, and over the next weeks will be well placed for viewing. On 4 April, M94 (a spiral galaxy in Canes Venatici) reaches its highest point around midnight and will also provide a good observation target. On April 14 the Whirlpool Galaxy (M51, NGC 5194), also in Canes Venatici, reaches its highest point about midnight, and will make a good viewing object for several weeks. As well as a New Moon, the 17 April brings the large and very bright globular cluster M3 (NGC 5272) in Canes Venatici to its highest point in the sky, allowing viewing opportunities over the coming weeks. The Moon (in Aries) reaches perigee on April 19, and will thus appear larger than usual. It will also be in conjunction (i.e. share the same right ascension) with Venus (in Taurus). April also brings us the Lyrid meteor shower (active 16-25 April), with the peak on 22 April perhaps producing 16 meteors/hr. The shower's radiant is in Hercules and it will be active all through the night. The parent body of the Lyrids is comet C/1861 G1 Thatcher.

Minor planet 136108 Haumea reaches opposition on 23 April, in Boötes. From Stirling and through a good telescope, Haumea will be visible from about 22:27 (GMT), 33° above the south-east horizon. Another good photogenic object is the Pinwheel Galaxy (M101, NGC 5457) in Ursa Major, which reaches its highest point in the sky about midnight local time on 23 April. It is best viewed by binoculars or through a small telescope. Finally, the Moon and the Beehive Cluster (M44, NGC 2632, Cr 189) come close to each other again on 24 April, in the constellation of Cancer.

May 1st brings a Full Moon. This moon is known as the Flower Moon, as in many cultures, it heralds the blooming of several diverse kinds of flowers. Other names for this Full Moon are the *Mulberry Moon*, the *Milk Moon*, the *Hare Moon* and the *Moon Of The Green Leaves*.

A few days after Full Moon, on May 6, the η-Aquariid meteor shower (active 19 April-28 May) reaches its peak. The radiant point is in Aquarius, and meteors should become apparent from about 02:50, with the best displays just before dawn; near Stirling, we may see 6-8 meteors per hour, and some may be long tailed. The parent body of the η-Aquariids is comet 1P/Halley. The second meteor shower of May, the η-Lyrids (active 3-14 May, radiant Lyra), peak about May 9, and are active all through the night, although we can only expect 2-3 meteors/hr over Stirling. The parent body of the η-Lyrids is comet C/1983 H1 (IRAS-Araki-Alcock).

On 12 May, globular cluster M5 (NGC 5904) in Serpens, one of the oldest globular clusters in our galaxy, reaches its highest point and will make a good object for astrophotography, as it is visible all night from Stirling. On 14 May, Venus will reach its highest point at sunset, as seen from Stirling. Although shining brightly (mag -4.3), it may be hard to observe, as it will only reach 20° above the horizon. Venus reaches perihelion on May 15, and will become visible about 21:50 at altitude 16° in the western sky. May 16 brings a New Moon (in Aries), and a good time for observing the night sky. On May 19, the Moon and Venus make a close approach to one another, a conjunction, which will become visible from 22:00, in Taurus. The 20th brings another conjunction, of the Moon and Jupiter, in Gemini.

The Moon at first quarter (waxing gibbous) on 23 May, when it appears almost exactly half-illuminated, brings an opportunity for lunar photographers to look for terminator features such as Rupes Recta or *Straight Wall*, a linear rille (fault line), which appears as a straight shadow during a first quarter phase moon. This line is about 110 kilometres long and is east of the small crater Birt. Moon watchers may also spot two optical illusions that seem to appear at this moon phase: Lunar X and Lunar V. These look to the human eyes like letters; the X illusion is formed by sunlight on the rims and ridges between craters La Caille, Bianchini and Purbach, and the V by light falling on the crater Ukert and various smaller craters.

May ends with a second Full Moon, or Blue Moon, the name given to any second full moon falling within a single month. As this is a May Moon, it is also called a Flower Moon.

Happy observing all!

Reference
NASA (2025) *Dwarf Planets: Makemake Facts*. https://science.nasa.gov/dwarf-planets/makemake/.

Image Credit
Image taken by Hubble's Wide Field Camera 3 in April 2015. Credits: NASA, ESA, and A. Parker and M. Buie (Southwest Research Institute).

Many thanks to all our contributors to this quarter's issue of *The Jeety Starn*. Members, please hand submissions to the editor, or any contributions can be sent via the Society's contact email address. Illustrations and snippets also welcome!

S.C.

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Contact us at:
contactstirlingastronomy@gmail.com

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