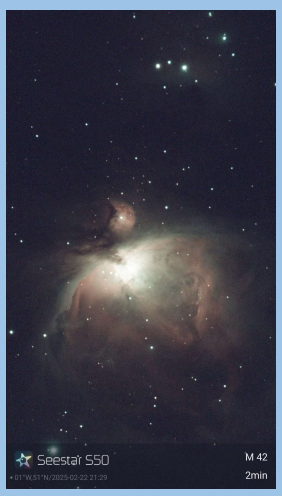
Newsletter

Wiltshire Astronomical Society

April 2025

NGC3718, and NGC3729 as imaged by Matthew Terrell

Inside:



Seestar Image of M42—by David Starling

Upcoming Observing Session

Prime Session **Friday 18th April 2025**
Back Up Friday 25th April 2025

Start time 20:30 Hrs. for Prime Session
21:00 Hrs. for Back up Session
Please look out for a confirmation email from Chris that the session is either ON or OFF (Also shown on the Members Facebook page)
Location:
Red Lion Pub carpark SN15 2LQ
W3W - airbag.shudders.losing

Sign up to the Observing Mailing List here: https://wasnet.org.uk/observing/

Wiltshire AS Contact Info:

Chairperson: Simon Barnes
Newsletter: Simon Barnes
Treasurer and Membership: Sam Franklin
Speaker secretary: Position Vacant
Observing Sessions coordinators: Chris Brooks, Jon Gale,
Web coordinator: Sam Franklin
PR and Design: Tracey Kelly
Contact the Society here:

Email: contact@wasnet.org.uk
Website url: https://wasnet.org.uk/
Follow our Public Facebook Page
https://www.facebook.com/Wiltshire-Astronomical-Society-154077261327030/
Join the members only Facebook group:
https://www.facebook.com/groups/wiltshire.astro.society/
Committee Page:
https://wasnet.org.uk/committee/

Member Society

2025 Upcoming Speakers:

4t

1st April	**Astronomical Causes of Climate Change**	**James Fradgley** (Z)
6th May	**Lunar Geology**	Barry Fitzgerald (Z)
3rd June	**6 various topics TBA**	Society Members (Z)

Z = (Zoom Meeting) IP = (In person at meeting hall)

****Interested in Joining the Society? See https://membermojo.co.uk/was/**

Report from the Chair

Hello Members.

It has been nice to get some clear skies at last, I trust you have all been taking advantage!

It would be really nice to see more interaction between members on our Members Only Facebook page. I thank those that already post images of their observing, however, I am sure that there are other members that do astrophotography that could be posted or beginners questions asked that other members could respond to. We have a large number of experienced members in the Society that I am sure would be willing to help others. The Members Facebook page has been set up for you, the members, not public, give it a try, don't be shy!

This month I have added a page specifically for beginners. This month we explore the meaning of magnitude for objects in the sky. I hope this is helpful. Additionally, in the page about the moon phases there is another beginners textbox and infographic explaining the phases. If there is a topic that our beginners want to understand better, please let me know. Looking to the future it maybe nice to have some meetings or events aimed at the younger generations, we need younger enthusiastic young blood in our membership. Some of us members are not getting younger!

I have received some logo ideas from two members. When the committee gets a chance we will review the submissions and announce the final design in the near future.

A good response has been received to the survey sent to all members. Thank you for taking time to complete it. I have had a short opportunity to look through the results (all anonymous when they come back to me). A detailed overview of the results from the survey will be made available as soon as we (committee) have fully collated them.

Our special partial solar eclipse event on 29th March was a great success and well attended. A special thanks goes out to the society volunteers that helped on the morning, with their viewing equipment and their time. Pictures from the event appear on page 3,4 and 5. For once the weather was more accommodating for this observing session!

Thanks to Tony Vale for his submission about semi detached eclipsing binary stars and his observations.

We now have 3 members willing to give a short presentation for the June meeting. Jon Gale, Matthew Terrell and John Dartnell. If anyone else would like to add their name, please let me know.

We welcome our April 2025 Speaker:

James Fradgley BA (Physics and Astronomy) MSc, FRAS, MInstP

Topic for this meeting: 'Astronomical causes of climate change'

A very experienced speaker on a very large number of astronomy subjects. He has served as Chair of the Southern Area Group of Astronomical Societies (SAGAS) as well as having roles in several other groups.

"I'm more interested in the mechanics of astronomy than observational astronomy since it's too cold!" (Ed: A sentiment I can relate to)

Photos by Carl Rutkowski (New Member)

Photos by Andy Burns

Photos from Sam Franklin

Photos by Sam Franklin

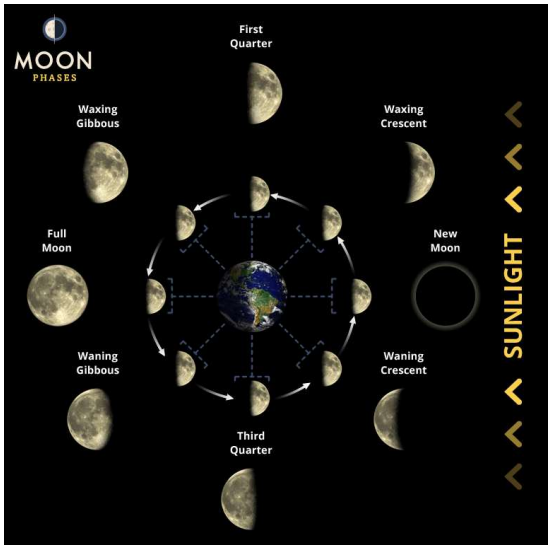
A Very Big Thank You to the organisers, helpers, members and those that attended for making it a great success!

Additional thanks to the Lacock Parish Council for allowing us to use the playing field.

Moon—April 2025 Phases with Rise and Set Times

April 2025

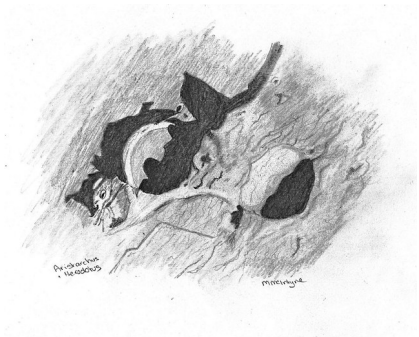
Sun	Mon	Tues	Wed	Thur	Fri	Sat
30 Sun: 05:50 18:40 Moon: 06:02 20:38	31 Sun: 06:48 19:43 Moon: 07:19 23:14	1 Sun: 06:45 19:44 Moon: 07:40 ——	2 Sun: 06:43 19:46 Moon: 08:10 00:47	3 Sun: 06:41 19:48 Moon: 08:54 02:13	4 Sun: 06:38 19:49 Moon: 09:54 03:21	5 Sun: 06:36 19:51 Moon: 11:08 04:09 First Qtr.,03:16
6 Sun: 06:34 19:52 Moon: 12:28 04:41	7 Sun: 06:32 19:54 Moon: 13:48 05:04	8 Sun: 06:29 19:56 Moon: 15:05 05:20	9 Sun: 06:27 19:57 Moon: 16:18 05:32	10 Sun: 06:25 19:59 Moon: 17:30 05:42	11 Sun: 06:23 20:01 Moon: 18:39 05:51	12 Sun: 06:21 20:02 Moon: 19:50 06:01
13 Sun: 06:18 20:04 Moon: 21:02 06:11 Full Moon,01:24	14 Sun: 06:16 20:06 Moon: 22:15 06:23	15 Sun: 06:14 20:07 Moon: 23:29 06:39	16 Sun: 06:12 20:09 Moon: —— 07:01	17 Sun: 06:10 20:11 Moon: 00:41 07:31	18 Sun: 06:08 20:12 Moon: 01:47 08:13	19 Sun: 06:06 20:14 Moon: 02:40 09:11
20 Sun: 06:04 20:15 Moon: 03:21 10:22	21 Sun: 06:02 20:17 Moon: 03:50 11:42 Last Qtr.,02:37	22 Sun: 06:00 20:19 Moon: 04:11 13:07	23 Sun: 05:58 20:20 Moon: 04:27 14:32	24 Sun: 05:56 20:22 Moon: 04:41 15:59	25 Sun: 05:54 20:24 Moon: 04:53 17:28	26 Sun: 05:52 20:25 Moon: 05:06 19:00
27 Sun: 05:50 20:27 Moon: 05:21 20:35 New Moon,20:32	28 Sun: 05:48 20:29 Moon: 05:40 22:12	29 Sun: 05:46 20:30 Moon: 06:06 23:45	30 Sun: 05:44 20:32 Moon: 06:44 ——	1 Sun: 05:42 20:34 Moon: 07:39 01:04	2 Sun: 05:40 20:35 Moon: 08:51 02:03	3 Sun: 05:39 20:37 Moon: 10:12 02:42
4 Sun: 05:37 20:39 Moon: 11:34 03:08 First Qtr.,14:53	5 Sun: 05:35 20:40 Moon: 12:53 03:26	6 Sun: 05:33 20:42 Moon: 14:08 03:40	7 Sun: 05:32 20:43 Moon: 15:20 03:51	8 Sun: 05:30 20:45 Moon: 16:30 04:00	9 Sun: 05:28 20:47 Moon: 17:40 04:10	10 Sun: 05:27 20:48 Moon: 18:51 04:20



<u>Beginners Information</u>

For our new members who are very new to astronomy, this infographic shows the meaning of moon phases and how the sun illuminates the surface of the moon during the course of a month.

The moon can be a very rewarding object to view with even a small telescope. Its better to observe when the moon is not full. This can be very bright and quite painful to observe. Look for the phase where you can see the terminator (the edge of sunlight and darkness). Very stark shadows fall away from mountains and crater rims. Full moon will not show these shadows. These dark ight images lend themselves nicely to drawing with pencil or ink or pastels.



One of the well Mary Macintyre's sketches of the craters Aristarchus and Herodotus with pencil.

https://marymcintyreastronomy.co.uk/astronomy-sketching-art/

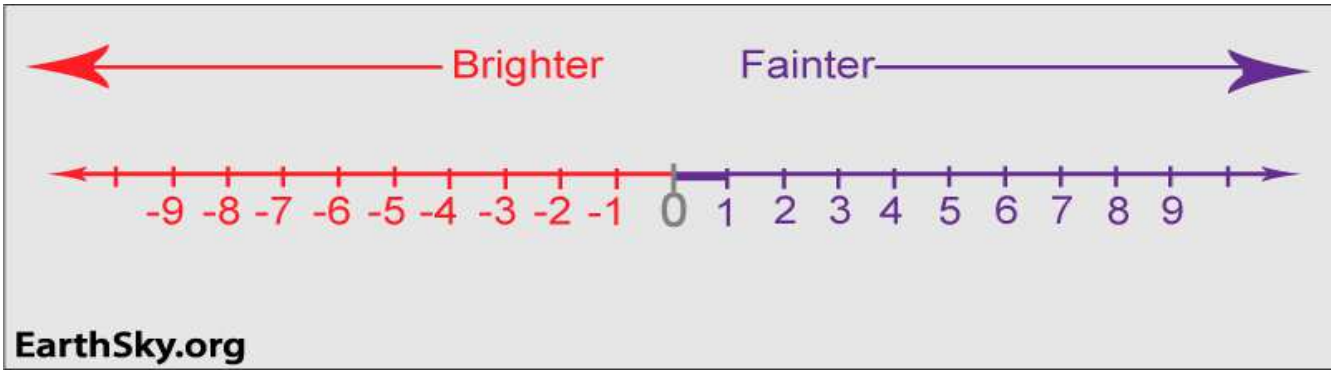
Beginners Section—Definition of Brightness of Objects

The magnitude scale in astronomy is how astronomers categorize differences in brightness among the stars in our sky.

And that scale used by astronomers – the magnitude scale – dates back to the early astromers Hipparchus (c.190 – c.120 BCE) and Ptolemy (c.100 – c.170 CE) used this scale. Both men compiled star catalogs that listed stars by their apparent brightnesses, or magnitudes.

This system remains intact to this day, though with some modifications. And maybe that's why the magnitude scale doesn't seem as simple as it might be. According to this ancient scale, the brightest stars in our sky are 1st magnitude. And the very dimmest stars visible to the eye alone are 6th magnitude.So, a 2nd-magnitude star is modestly bright. But it's fainter than a 1st-magnitude star.

And a 5th-magnitude star is still pretty faint. But it's brighter than a 6th-magnitude star.



To extend this above information the terms 'Absolute' and 'Apparent' magnitude are also used.

In 1856, the British astronomer **Norman Pogson** standardised the magnitude scale to make an increase in magnitude of 5 a decrease in apparent brightness by a factor of 100 and vice versa. So for example, a star of magnitude 6 is a hundred times fainter than one of magnitude 1. As photometry, measuring the brightness of objects developed, it became clear that there was more than a hundred-fold variation between the brightest and the faintest stars. So, the scale was extended so that the brightest stars had a magnitude of less than one. The brightest star in the sky, Sirius, has a magnitude of -1.46. Stars too faint to be seen with the naked eye have a magnitude value greater than 6.0.

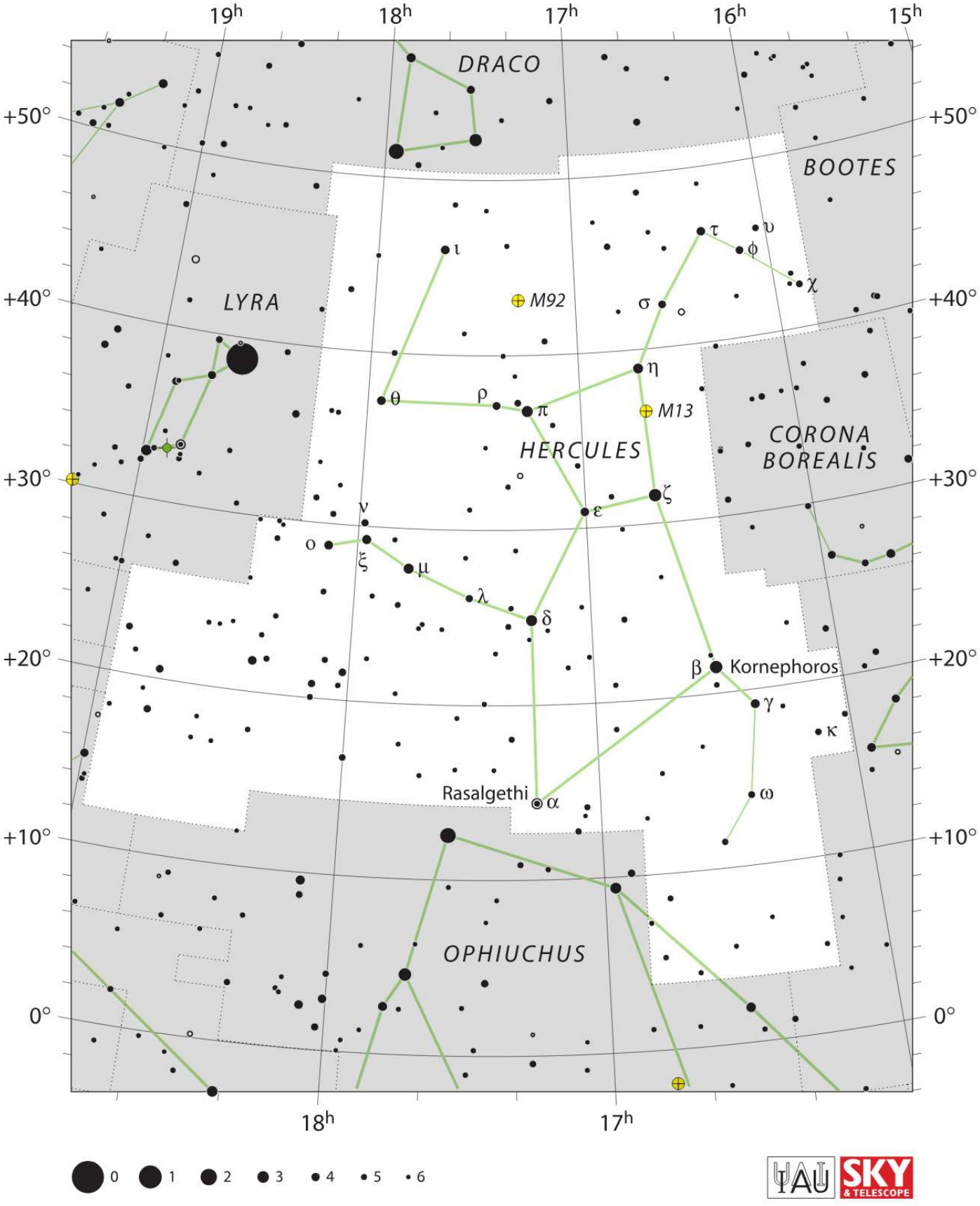
Any scale must have at least one reference point. For example, on the centigrade scale 0^{o} is the freezing point of water and 100^{o} its boiling point. On Pogson's scale the bright star Vega in the constellation Lyra was given a magnitude of zero and an increase in magnitude value of 1 a decrease in brightness of the fifth root of one hundred ($5\sqrt{100}$) which is roughly equal to 2.512. Apparent magnitude is the brightness of an object as it appears to an observer on Earth.
The Sun's apparent magnitude is −26.7, that of the full Moon is about −11, and that of the bright star Sirius, −1.5. The faintest objects visible through the Hubble Space Telescope are of (approximately) apparent magnitude 30.

Early astronomers believed that all the stars were at the same distance from us. In the 19th and early 20th century it became clear, as the distances to more and more stars were measured, there was a vast variation between them. To provide a measure of real brightness there was this need for the introduction of **absolute magnitude** was introduced.

Name	mag	Abs mag
The Sun	-26.74	+4.83
Proxima Centauri (closest star)	+11 (appx)	+15.5
Sirius (brightest star)	-1.46	+1.43
Arcturus (brightest star in the Northern Celestial Hemisphere)	-0.05	-0.3
Betelgeuse (giant red star in Orion)	+0.6	-5.8
Polaris	+1.98	-3.6
Andromeda galaxy	+3.44	-21.5
3C 273 (brightest quasar - distance 2.5 billion light years from Earth)	+12.9	-26.7

Constellation of the Month

Hercules



Hercules is a constellation named after Hercules, the Roman mythology hero adapted from the Greek hero Heracles. Hercules was one of the 48 constellations listed by the second-century astronomer Ptolemy, and it remains one of the 88 modern constellations today. It is the fifth-largest of the modern constellations and is the largest of the 50 which have no stars brighter than apparent magnitude +2.5.

Hercules contains two Messier objects – Messier 13 (M13, NGC 6205) and Messier 92 (M92, NGC 6341) – and has 12 stars with known planets. The brightest star in the constellation is Kornephoros, Beta Herculis, with an apparent magnitude of 2.81. The Tau Herculids are the only meteor shower associated with the constellation.

The constellation contains 11 formally named stars. The star names approved by the International Astronomical Union (IAU) are Cujam, Franz, Hunor, Irena, Kornephoros, Maasym, Marsic, Ogma, Pipoltr, Rasalgethi, and Sarin. The Keystone asterism is formed by four bright stars in Hercules – Pi, Eta, Zeta, and Epsilon Herculis

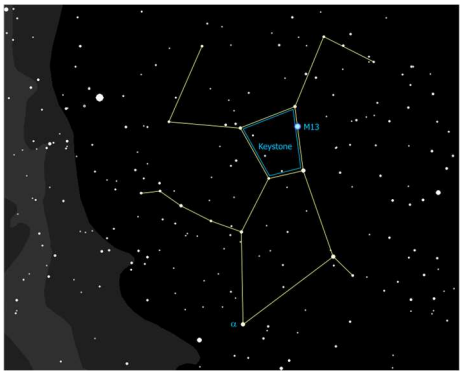
Messier 13, also known as the Hercules Globular Cluster or Great Globular Cluster, is a globular cluster that consists of about 300,000 stars located in Hercules constellation. The cluster is 20 arc minutes in size and has an apparent magnitude of 5.8. It is approximately 22,200 light years distant.

The Hercules Globular Cluster was discovered by the English astronomer Edmond Halley in 1714 and included in Messier's catalogue as Messier 13 on June 1, 1764. The cluster can easily be seen in small telescopes, but is hard to find without visual aids even on a clear night.

M13 is 145 light years in diameter. The brightest star in the cluster is V11, a variable star with a visual magnitude of 11.95. The Arecibo message, sent in 1974 to space to let hypothetical extraterrestrials know about life on our planet, was transmitted in the direction of Messier 13, as it was believed that, because star density was higher in that area of space, chances of finding a planet that harbours life were greater too. By the time the message gets there, however, M13 will have moved to a different location. It is a great easy to find for amateurs using the 'Keystone' as a guide and even easier using a GOTO scope!

Messier 92 is another well-known globular cluster in the Hercules constellation. It was discovered by the German astronomer Johann Elert Bode in 1777 and then independently discovered by Charles Messier in 1781.

Messier 92 is relatively bright. It has an apparent magnitude of 6.3 and is approximately 26,700 light years distant from the Sun. It is one of the oldest clusters in the Milky Way, with an estimated age of 14.2 billion years, which is the same age as the universe itself.



The 'Keystone'

Messier 13

NGC 6229 is another globular cluster in Hercules, magnitude 9.39 so more difficult find. A large aperture will allow the stars to be resolved.

Messier 92

Mercury reaches its highest point in the sky on 11th March at mag 0.3 during the daytime. Its greatest elongation occurs on 21st April.

Venus passes reaches it maximum brightness this month (mag –4.5) and will rise shortly before sunrise, and greeting earlier as the month progresses. Its crescent continues decreasing during the course of the month.

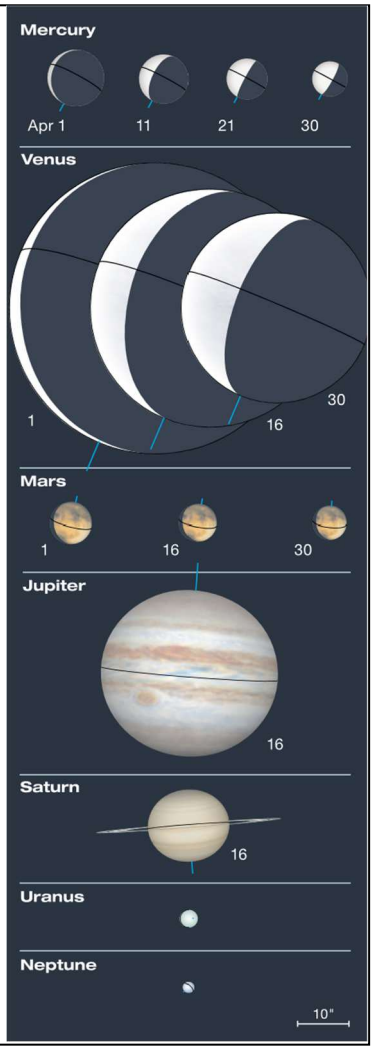
Mars Will be visible high in the sky ahead of midnight., its magnitude ranging between 0.4 and 0.9. As always shing with its reddish colour.

Jupiter at magnitude –2.1 to –2.0 and can be viewed viewed early in the evening, located in Taurus.

Saturn will be close to Venus and Neptune on 28th April.They all pass with 4^{0} of each other in Pisces before sunset.

Uranus at magnitude 5.8 is in Taurus

Neptune lies in Pisces at magnitude still at mag 7.8.



Other key moments during March:

1st April— Pleiades0.60S of the moon.

5th April— First Quarter

5th April— Pollux 2.0^{0}N of the moon. Mars 2.2^{0}S of the moon.

9th April– Mars 1.7^{0}S of the moon

13th April– Full Moon at 06.55

16th April -28th May– Lyrid Meteor Shower (Peak 22nd see page 8)

27th April— New Moon at 19.31

28th April— Venus 3.7^{0}N of Saturn 19.00

30th April– Jupiter 5.4^{0}S of the moon

For further information about the current night sky, you can go to various web pages e.g., Sky and Telescope

https://skyandtelescope.org/observing

or the British Astronomical Society

https://britastro.org/news/sky-notes

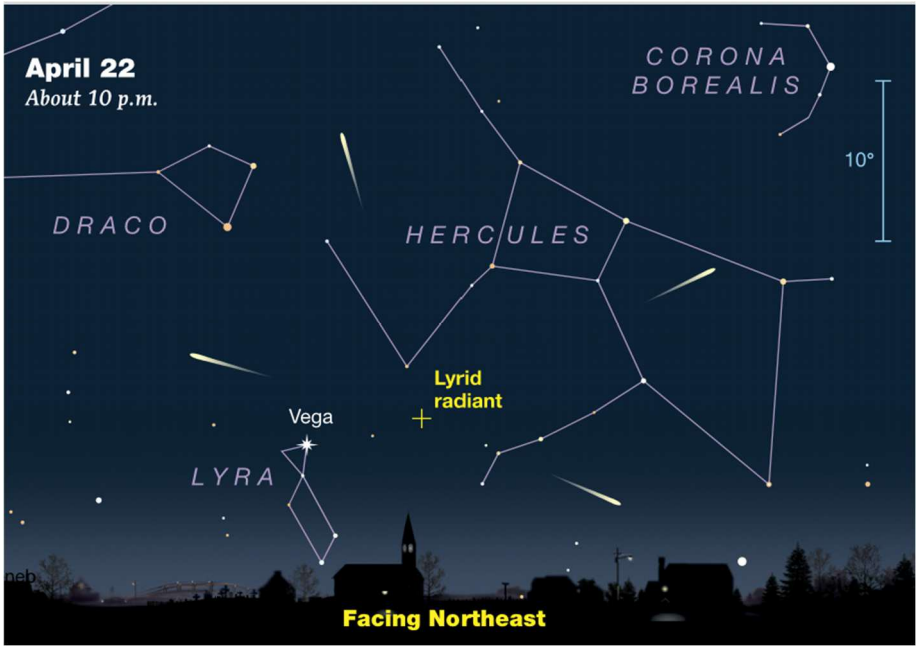
ISS Sightings

ISS Sighting data is readily available by going to the various web pages that provide such information for the public. It does not make sense to fill these pages with data that is so easily available elsewhere. This data can be tailored to a location and most members I would imagine have access to the internet. There are also Apps for your phone or tablet that sightings can be found. I have been using the Heavens Above web page, where data for many other vehicles can be accessed.

Suggested ISS Data web pages:

https://www.heavens-above.com

https://www.spotthestation.nasa.gov/home.cfm



Lyrid Meteor Shower location showing radiant

In 2025, since the radiant rises before midnight, watch for meteors before the fat crescent moon rises after midnight. The Lyrids are known for uncommon surges that can sometimes bring rates of up to 100 per hour!

How to find the Lyrid meteor shower radiant point

From the Northern Hemisphere. the bright star Vega in the constellation Lyra – near the radiant point for the Lyrid shower – rises above your local horizon, in the northeast, around 9 to 10 p.m. your local time in April. That's the time on your clock, from mid-latitudes, from the northern part of the globe. Vega climbs upward through the rest of the night. By midnight, Vega is high enough in the sky that meteors radiating from that direction streak across your sky. Just before dawn, Vega and the radiant point shine high overhead, and the meteors will be raining down from the top of the Northern Hemisphere sky.

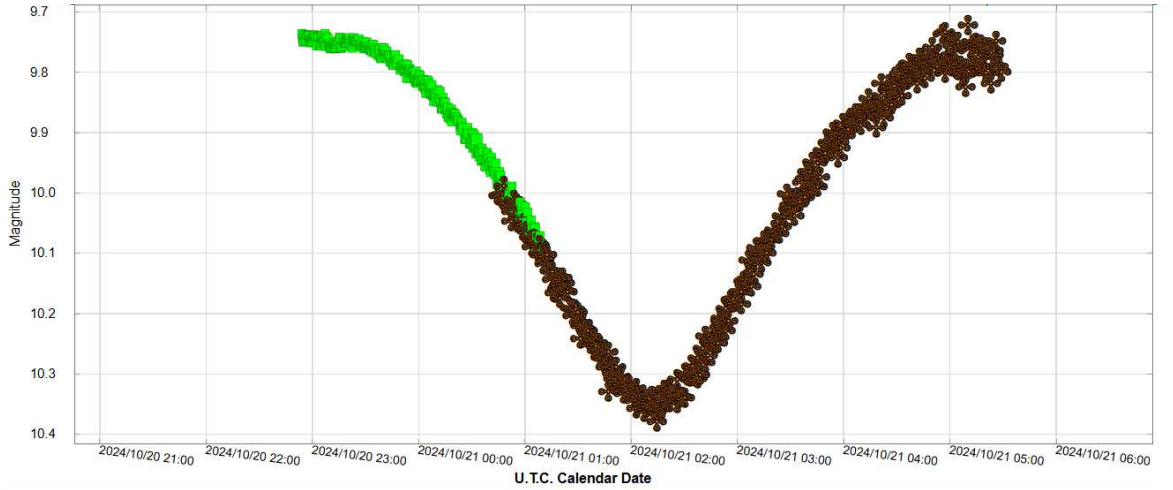
Another Matthew Terrell image. Messier 57, the lovely Ring Nebula in Lyra.

The Semi Detached binary PV Cas

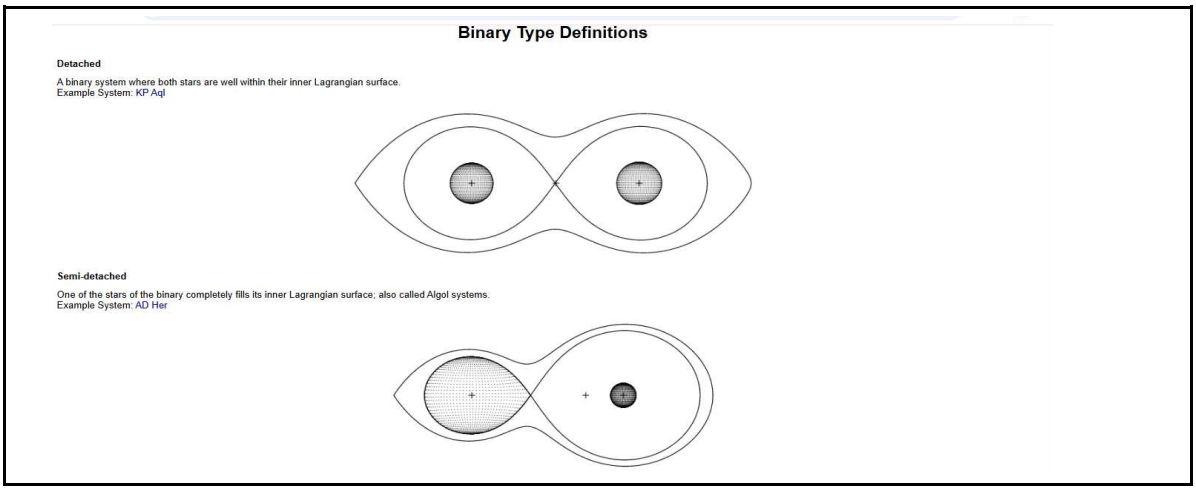
I wrote a short article in the December newsletter about some observations I had made in Andalucia of the over contact eclipsing binary CW Cassiopeia and how plotting the timing differences of actual observations compared to expected timings could reveal some changes taking place in the system.

In this article, I would like to discuss another type of eclipsing binary which I observed a few days later, also in Andalucia on the night of 20th to 21st October 2024. The light curve below was extracted from the AAVSO photometric database and shows my observations as brown crosses. The green squares represent observations made by Teofilio Arranz, a Spanish observer. Both sets of observations were taken in V band, a similar waveband to the green channel of a DSLR. Taken together, these observations cover the duration of the eclipse, ie about 6 hours. The eclipse was a primary which occur every 1.75 days.

Light curve of PV Cas 20th to 21st Oct 2025

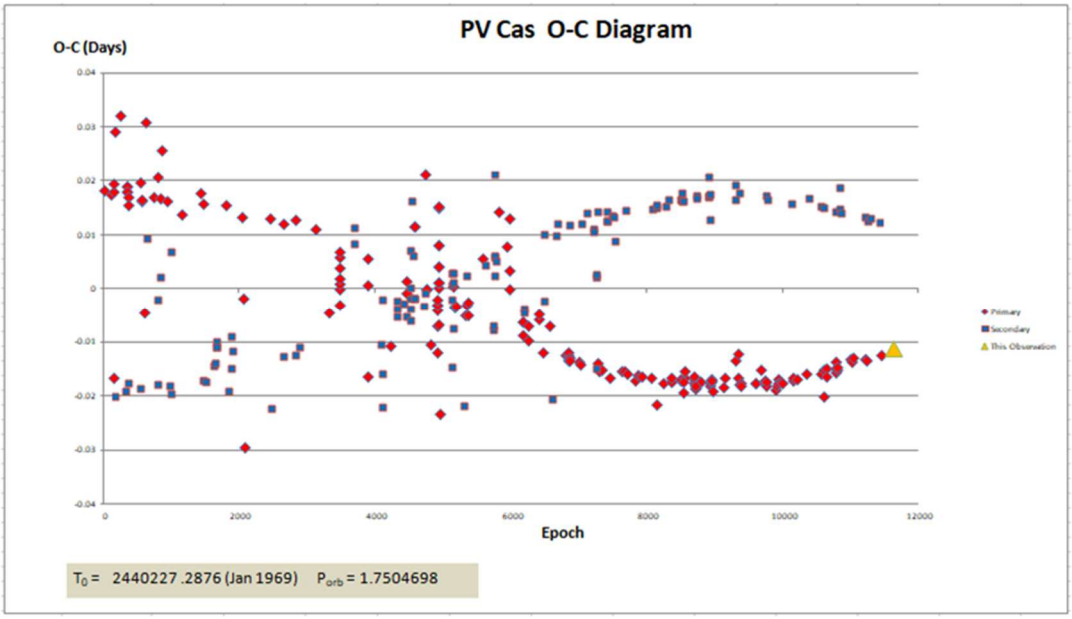


The AAVSO database of variable stars (known widely as the VSX) lists PV Cas as being of type EA/DM. EA means it's an Algol type binary and DM means the components are detached main sequence stars. In the diagrams below, the tear-drop shapes surrounding the stars show their Roche lobes,



(also known as inner Lagrangian surfaces). These surfaces join the points in the system where the net gravitational field of the two stars is zero. If one of the stars fills this tear drop shape, mass may transfer across the intersection, from that star to the other. This is the situation in the lower of the two systems which are here described as semi-detached or Algol systems. By this definition the AAVSO categorisation seems a little puzzling as it suggests the system is both detached and semi-detached. This may be one of the perils of variable star classification which often use the first discovered example as the prototype of the class. As our understanding of the prototype improves it sometimes reveals differences between members of the class.

Certainly mass transfer has been occurring in the Algol system and is the cause of something known as the Algol paradox. Large stars evolve more quickly than small ones, that is to say they change from main sequence to red giant and so on more quickly. So in a binary system, in which the components are likely to have been formed about the same time from the same molecular cloud, we might expect the more evolved star to be the primary and the less evolved star to be the secondary. In the Algol system we see the opposite. This is believed to be because the primary evolved to a red giant and filled its Roche lobe. Sufficient mass was transferred to the secondary to make it the more massive (and therefore the primary) of the system, even though it was less evolved. So unless we can find evidence of mass transfer in PV Cas it may be more likely to be detached than semi detached like Algol.



One thing we can say from its O-C diagram though, is that the orbit is eccentric (the major axis is significantly bigger than the minor axis) and also that precession is taking place. Precession means that the major axis is rotating as seen from the earth. When we look along the major axis, eclipse timings are symmetrical (i.e. the interval from primary to secondary eclipse is the same as the interval from secondary to primary eclipse) but when we are looking along the minor axis this is not the case. This motion produces the diagram we see above with separate sinusoidal curves for primary and secondary eclipses offset by half a cycle. The eclipse from the light curve drawn from my observations above is shown as the yellow triangle. From the diagram it appears that one full rotation of the major axis takes place over around 9000 cycles. As each cycle (epoch) is 1.75 days this corresponds to 43 years. The diagram represents observation from January 1969 to 2025. These will have been made with photoelectric photometers (PEP), CCDs, DSLR and CMOS detectors. No visual observations were included. It's interesting to see how the modern detectors have reduced the "noise" over recent decades.

Written by Tony Vale