



# ORBIT

Volume 58 Number 1  
January to March 2023



## *Cassiopeia's Bubble Nebula*

*The magazine of the Irish Astronomical Society*

[irishastrosoc@gmail.com](mailto:irishastrosoc@gmail.com)

[www.irishastrosoc.org](http://www.irishastrosoc.org)

# Contents

News Notes		page 3
Sky Notes	<i>by Michael McCreary</i>	page 4
Moonlight	<i>by Donnacha O'Driscoll</i>	page 6
90 with the C-90	<i>by Kevin Berwick</i>	page 8
Observers' Corner	<i>by Aubrey Glazier</i>	page 9

## On the cover

Michael Murphy took this photo from his Dundrum location of NGC 7635, the delicate Bubble Nebula, that is located in Cassiopeia. Skywatcher ED80, Atik 414Ex, Skywatcher NEQ6 Mount. 40 H $\alpha$ , 50 S2, 46 O3 subs. Each sub 5 minutes. Captured with NINA, guided with PHD, and processed in PixInsight.

---

## Events

IAS meeting details will be notified to members in due course but take place on the last Monday of each month (except in December or if a bank holiday) in Ely House, 8 Ely Place, Dublin 2. This season we are very grateful to Dr Donnacha O'Driscoll of UCD who has very kindly arranged for meetings to be streamed online. A link to the broadcast is posted with the meeting details on our website [www.irishastrosoc.org](http://www.irishastrosoc.org)

- The Galway Astronomy Festival is on January 28th in the Menlon Park Hotel in the city. More details will be available on the GAC web site ([www.galwayastronomyclub.ie](http://www.galwayastronomyclub.ie)) closer to the time.
- European Astrofest returns to London after a Covid-induced hiatus. It will be held on Friday, February 4th and Saturday, February 6th next. More details on the Conference website [europeanastrofest.com](http://europeanastrofest.com)
- The IAS will host a public lecture on February 19th and March 19th in the Phoenix Park Visitors Centre. We will let you know the exact time of each afternoon talk closer to the February date.
- Irish National Astronomy Week is the brainchild of Galway Astronomy Club member Ronan Newman who many of us know. It will be held from March 20th to March 26th next and every club countrywide is backing the Week, along with the major observatories, libraries, and many other groups. The IAS will host a number of events and we welcome input by members in running them. Ronan is currently developing a website to host details of the various events.
- Midlands Astronomy Club will run Cosmos 2023 on the weekend of March 24th next. More details to follow on the Club's website [midlandsastronomy.ie](http://midlandsastronomy.ie)
- The Skelligs Dark Sky Festival is also on the same weekend as Cosmos, March 24th to 26th. The inaugural event last year was a tremendous success and we had two perfectly clear nights for public observing.

### Committee

President: Michael McCreary; Vice-President: John Flannery; Secretary: Greg Coyle;  
Treasurer: Val Dunne; Others: Maire Ní Chearbhaill, Peter Denman, John Dolan, and Donnacha O'Driscoll

### Other Society Officers

Observations: Aubrey Glazier; Sky-High Editor: John O'Neill; Webmaster: John O'Neill



## Orion's success

On December 11th NASA's *Artemis I* mission splashed down in the Pacific Ocean. The return of the uncrewed Orion spacecraft marks the end of the *Artemis* Program's inaugural mission, which launched on November 16th and validated the spacecraft and its heavy launch vehicle - the Space Launch System (SLS). During its 25.5-day circumlunar flight, Orion travelled more than 2.25 million km and flew beyond the Moon's orbit, establishing a new distance record.

On December 5th, the spacecraft came within about 130 km (80 mi) of the Moon and took many breathtaking images of the lunar surface.

This effectively demonstrated how it will hold up during *Artemis II* (scheduled for May 2024), which will see it fly with a crew of four astronauts on another circumlunar flight. This will be followed by *Artemis III* in 2025, which will send four astronauts to the Moon and land two of them.

## Time's up for the leap second

An international coalition of agencies recently voted to retire the leap second system, which officially ends in 2035.

Similar to leap years, leap seconds are a measure of time that get added periodically to clocks to make up for the difference between astronomical time (Universal Time 1, or UT1), also known as the Earth's rotation, and Coordinated Universal Time (UTC), which is based on the atomic clock.

As the Earth's rotation continues to slow down, it accumulates one minute of delay each century and one hour of delay over 5,000 years. Thus, the leap second was invented.

First introduced in 1972, leap seconds have long been the bane of timekeepers' existence and have increasingly come under pressure for elimination as highly used technologies demand extreme accuracy in time keeping.

Different computing networks have developed their own methods to add in extra leap seconds and errors can arise if there isn't international synchronization when applying the leap second. Going forward, instead of adding in seconds on an annual basis, the new methodology will involve compounding seconds over the course of a century or more.

## First JWST Deep Field

JWST recently gathered the primordial photons from the early Universe over several days to create its first Deep Field image.

The JWST's field is 15 times larger than the Hubble's and is deeper and sharper. Out of over 100,000 galaxies in the JWST Deep Field, four have redshifts

greater than 10 - than value means light has been travelling for than 13.184 billion years.

Two galaxies with redshifts of 13 are from only 350 million years after the Big Bang. These illuminated the Cosmic Dawn and are critical to understanding how galaxies form and evolve.

### In brief...

Astronomers using two Mauna Kea observatories have found the closest known black hole to our planet. Located a mere 1,560 light-years away from Earth in the constellation Ophiuchus, the black hole, named Gaia BH1, is three times closer to us than the previous record-holder.

A research team made the discovery by tracking Gaia BH1's companion - a bright Sun-like star that orbits the black hole once every 185.6 days at about the same distance as the Earth orbits the Sun.

In early-December ceremonies at both sites in Australia and South Africa, the SKA Observatory (Square Kilometre Array) celebrated the start of construction of its world-leading radio telescopes and announced €300 million worth of construction contracts.

A new study shows that some 4.5 billion years ago, there was enough water for the entire planet Mars to be covered in a 300-metre-deep ocean.

At this time, Mars was bombarded with asteroids filled with ice. It happened in the first 100 million years of the planet's evolution. Another interesting angle is that the asteroids also carried organic molecules that are biologically important for life.

## Wanted

I am looking for the following issues of Sky & Telescope if you have any copies to sell. Thank you. The request for the full year sets is only more to complete a collection from then as I have the pdf files for those years. I can be contacted via [aurorawatcher@gmail.com](mailto:aurorawatcher@gmail.com) - *John Flannery*.

Sept 2018; Jan to Apr 2019; Apr to Aug 2020; Oct 2020; and the full year sets for 2011 to 2014.

## The Sun

- On January the 1st, a Sunday, sunrise at Dublin is 08:40 UT. It transits the meridian at 12:27 UT at just 14° altitude. Sunset that day is at 16:16 UT. We will soon begin to see “the grand stretch”!
- Perihelion at 16h on January 4th is just two weeks after the December solstice. Our orbital speed around the Sun is then 30.5 km/s versus 29.5 km/s when at aphelion in early July.
- The spring equinox occurs on March 20th at 21:25 UT.
- Daylight Saving Time for Ireland and the UK begins on March 26th.
- Sunspot activity for Solar Cycle 25 has begun to pick up recently. As always, use caution when observing the Sun: solar projection is the safest method, or a suitable (certified) solar filter for your instrument.

## The Planets

**Mercury** is at perihelion on Jan 2nd and reaches inferior conjunction on the 7th. The planet begins its period of morning visibility on Jan 17th (+0.7m) and is visible to the unaided eye. It is highest for our latitude at the beginning of civil twilight on Jan 24th (0.0m) at an elevation of 5°, and reaches greatest western elongation on Jan 30th when low in the SE.

Mercury can be seen for a short while at the beginning of February but is lost to view in the morning sky after the first week of the month. It then moves into the evening sky and may be seen low in the west the last week or so of March. Mercury is 6.5° at the end of civil twilight from our latitude on the 31st.

**Venus** is visible shortly after sunset very low in the SW in the constellation Sagittarius. The planet is then a prominent -3.9m object in the twilight. Both it and Saturn are in conjunction on the 22nd when Venus is 0.4° from Saturn. February sees the planet near Neptune on the 14th and 15th, then moving on to Jupiter by the end of the month. Venus remains close to Jupiter in the first week of March and has a minimal separation of 0.5° from Jupiter on the 2nd. Venus and Uranus are in conjunction on March 30th when they are 1.3° apart.

**Mars** is still a well-positioned evening planet during January and crosses the meridian at 60° altitude. Mars is stationary on January 12th and will then begin its prograde motion. It is still pretty bright (-0.8m) and easily visible to the unaided eye. February and March see the planet still prominent but fading in brightness. The apparent size of the disk shrinks too - from 10 to 8 arc-seconds in February. Mars is near the open cluster M35 in Gemini on March 30th.

**Jupiter** is a bright object (-2.4 to -2.2) in our evening sky as the year opens and can be found in Pisces. It sets around 10pm at the end of January and

gradually earlier as the quarter elapses. March sees a close pairing of Jupiter and Venus with them having a minimal separation on the 1st when Jupiter is 0.6° from Venus. On March 27th it is in conjunction with Mercury.

**Saturn** is an evening planet at the start of January and reaches a minimal angular separation on the 22nd when the planet is 0.4° from Venus. Saturn is in conjunction with the Sun on February 16th and therefore not visible this month. It then moves into the morning sky but is still poorly placed to be seen during March.

**Uranus** shines at +5.7m in Aries at present and is occulted by the Moon later in the night on January 1st. This will be a far easier occultation to see than that of December 5th last.

Although the planet is visible to the unaided eye under a very dark sky, it is best use binoculars or a telescope to view it when Uranus appears like a pea-green “star”. Uranus can be seen throughout the quarter but its duration above the horizon lessens each month as Aries begins to sink in the west. The planet is 1.3° from Venus on March 31st.

**Neptune** (+7.9m) begins the quarter in Aquarius and can be seen in our January evening skies for short while but will be lost to view by February. It crosses into Pisces on March 6th.

Dwarf planet **1 Ceres** (+7.1m) can be found in southern Coma Berenices when it is at opposition on March 21st. There are few bright stars to guide you to the object but the region is strewn with galaxies of the Coma-Virgo clusters.

Ceres will actually pass very close to the galaxy M100 on the evening of March 26th and that encounter will be visible in a telescope.

## Eclipses in 2023

There are two eclipses of the Sun and two of the Moon during 2023.

A hybrid solar eclipse on April 20th is visible from the southern hemisphere. These less common eclipses occur because the Earth's surface is curved, so sometimes an eclipse can shift between annular and total as the Moon's shadow moves across the globe. Western Australia will see just one minute of totality.

The second solar eclipse is an annular on October 14th and will cross North, Central and South America. It is unfortunate that neither will be seen from Ireland.

There are two lunar eclipses - that on 5/6th of May is a penumbral but is not visible from Ireland. However, on Saturday, October 28th, a shallow partial lunar eclipse is visible from here.

## Meteors

The **Quadrantid** meteor shower peaks on Jan 4th. At its peak there can be 120 meteor per hour (ZHR). This year the maximum is badly affected by a 95% waxing gibbous moon. The radiant is in northern Boötes.

February and March tend to be characterised by low meteor rates with only the minor showers producing some activity. Things will then begin to pick up again in April with the Lyrids later that month.

## Comets

**C/2022 E3 ZTF** reaches peak brightness at the end of January and may be a borderline naked-eye object, or at least a fine sight in binoculars. It rises after midnight in Corona Borealis at the beginning of the year and becomes circumpolar mid-January.

C/2022 E3 (ZTF) lies 1.5° from Capella in Auriga on Feb 6th which makes for a nice photo opportunity. Another encounter on Feb 10th and 11th sees the comet glide by Mars. The comet will have faded to about magnitude 9 at the end of the quarter when it can be found in the constellation Eridanus.

## Variable Stars

**Algol** ( $\beta$  Persei, varies from 2.1m to 3.4m): Minima are predicted for Jan 2d 3.1h; Jan 4d 23.9h; Jan 25d 1.6h; Jan 27d 22.4h; Feb 14d 3.3h; Feb 17d 0.1h; Feb 19d 20.9h; Mar 9d 1.8h; and Mar 11d 22.6h

The following Mira-type stars are approaching maximum: R And (Dec/Jan, mag. 6.9); R Aql (Jan, mag 6.1); UV Aur (Jan, mag 7.4); V Cyg (Jan, mag 9.1); R Cyg (Feb, mag 7.5); T Uma (Feb, mag 7.7); U Cvn (Mar, mag 9.9); W Lyn (Mar, mag 9.9). All dates and magnitudes for Mira stars are approximate.

## Bright star lunar occultations (at Dublin) - produced with IOTA's Occult 4 software

The occultation of Uranus on January 1st should be easier to see than last December's event. Uranus disappears at the waxing Moon's dark limb when binoculars will let you see the planet's speck suddenly wink out as it is smothered. Observers in the southeast of Ireland will see a graze event at 22h 40m 59s. The occultation of Omicron Piscium is a graze event for anyone observing from south of latitude 52.4°N.

Date	Star (Mag.)	Event (and Cusp Angle °)	Moon Ill.
Jan 1	Uranus	disappears 22h 23.9m (+53S°)	78%
Jan 27	Omicron Psc (4.3)	disappears 21h 09.9m (+27S°) / reappears 21h 31.9m (-11S°)	42%
Feb 3	76 Gem (5.3)	disappears 18h 18.9m (+54N°)	96%
Feb 26	32 Tau (5.6)	disappears 20h 11.1m (+48N°)	45%
Mar 3	76 Gem (5.3)	disappears 02h 53.5m (+50N°)	83%

*Cusp Angle (CA) is the angle of the event around the limb of the Moon measured from the nearest cusp. Negative values (-) indicate a bright limb event. The cusps are usually N (north) or S (south) but can be E (east) or W (west) near Full Moon.*

## Lunar phases and Lunation

Each cycle of the Moon (new moon to new moon) is called a lunation and each lunation is given a specific sequential number.

There are various numbering systems, each differing only by when the first new moon in the sequence is. A popular system is the **Brown Lunation Number** which refers to Lunation 1 as the new moon of January 17 1923.

You will note in our lunar phase table for January to March 2023 that the Lunation Duration varies from month to month. In fact the difference between the shortest possible lunation and the longest is approximately eight hours, which is significant.

The reason of the variation is because the Earth-Moon system does not move at constant speeds in perfect circles. Throughout the year the alignment of the elliptical path of the Moon relative to the Earth's orbital path around the Sun changes as does the movement of both bodies. This means that the period of time between each new moon will vary from month to month. It also gives rise to the phenomenon known as **libration**.

## Libration

The Moon always keeps the same face to us, but not exactly the same face. Because of the tilt and shape of its orbit, we see the Moon from slightly different angles over the course of a month, and that changing view of the Moon makes it look like it's wobbling. This wobble is called libration.

The word comes from the Latin for "balance scale" (as does the name of the zodiac constellation Libra) and refers to the way such a scale tips up and down on alternating sides. The sub-Earth point gives the amount of libration in longitude and latitude. The sub-Earth point is also the apparent centre of

the Moon's disk and the location on the Moon where the Earth is directly overhead.

The Moon is subject to other motions as well. It appears to roll back and forth around the **sub-Earth** point. The roll angle is given by the position angle of the axis, which is the angle of the Moon's north pole relative to celestial north. The Moon also approaches and recedes from us, appearing to grow and shrink. The two extremes, called perigee (near) and apogee (far), differ by as much as 14%.

The most noticed monthly variation in the Moon's appearance is the cycle of phases, caused by the changing angle of the Sun as the Moon orbits the Earth. The cycle begins with the waxing (growing) crescent Moon visible in the west just after sunset. By first quarter, the Moon is high in the sky at sunset and sets around midnight. The full Moon rises at sunset and is high in the sky at midnight. The third quarter Moon is often surprisingly conspicuous in the daylight western sky long after sunrise..

Date (UT)	Distance		
	(km)	in Lat	in Long
Jan 01d	389,534	7.0°	0.9°
Jan 16d	382,146	-7.8°	0.4°
Jan 28d	383,668	7.8°	1.0°
Feb 13d	383,352	-7.4°	1.0°
Feb 25d	381,950	7.3°	-0.3°
Mar 04d	405,881	0.7°	-6.6°
Mar 18d	364,508	-2.2°	6.7°
Mar 31d	404,813	1.3°	-6.8°

**Major Librations January - March 2023:** Libration angles over 6.5° in either latitude (negative is south) or longitude (negative is west) are selected for 0h UT - note that libration is still favourable two to three days before and after a given date.

## Perigee and Apogee

The Moon's orbit path around Earth is elliptical in shape. This means the distance between Earth and the lunar orbit varies from day to day. The point of the path that is closest to Earth is called **perigee** and the point furthest from Earth is called **apogee**. When the full moon occurs at perigee, the Moon appears at its largest from Earth and is popularly known as a Super-Moon. When it occurs at the apogee it is at its smallest and is occasionally referred to as a Micro-Moon. There are no Micro or Super Moon in the Jan - Mar 2023 period.

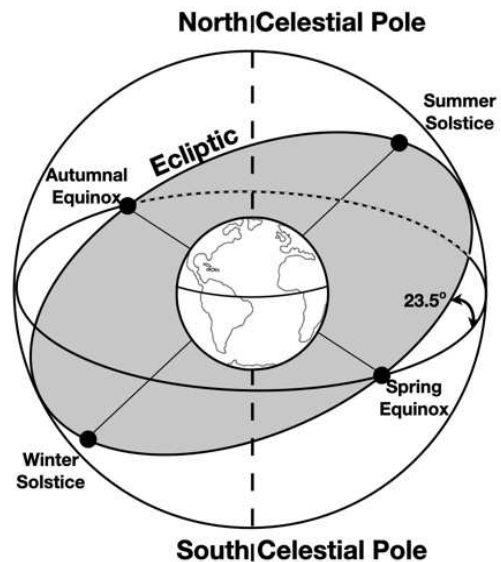
Perigee		Apogee	
Date and Time	Distance	Date and Time	Distance
Jan 01d 23h 01m	358,036	Jan 14d 09h 29m	405,804
Jan 30d 07h 10m	362,249	Feb 11d 02h 40m	404,896
Feb 26d 22h 19m	367,785	Mar 10d 23h 06m	404,267
Mar 23d 23h 29m	369,762	Apr 07d 19h 12m	404,437

## Moon's Phases

New Moon	First Quarter	Full Moon	Third Quarter	Lun/Duration
Dec 23d 10h 16m	Dec 30d 01h 20m	Jan 6d 23h 07m	Jan 15d 02h 10m	29d 10h 36m
Jan 21d 12h 53m	Jan 28d 07h 19m	Feb 5d 10h 29m	Feb 13d 16h 00m	29d 10h 13m
Feb 19d 23h 06m	Feb 27d 00h 06m	Mar 7d 04h 40m	Mar 15d 02h 08m	29d 10h 17m
Mar 21d 10h 23m	Mar 28d 19h 32m	Apr 5d 21h 34m	Apr 13d 10h 11m	29d 10h 49m

## The Moon and Planets

From the vantage point of Earth, the Sun, Moon and planets seem to travel on or near an imaginary line around the sky known as the **ecliptic**. This is because the planets and their Moons have orbital planes which, though not fully parallel to each other, are closely parallel. The result of this phenomenon is that the Moon is seen to move amongst the planets each month, sometimes making very close approaches and on occasion occulting (moving in front of) a planet. This quarter two planets are occulted by the Moon - Mars and Venus. Unfortunately for us in Ireland, we will be unable to observe these events as the Moon from our observation point will be below the horizon. However, there are some notable close approaches by the Moon to some planets between January and March and these are listed in the table.



\*\* = not visible from Ireland. Graphic: themoon.ie

Date	*Time	Event
<b>Jan 1st</b>	<b>22:23</b>	<b>Uranus occulted by the Moon</b>
Jan 23rd	07:21	Saturn 3.8° N of Moon
Jan 23rd	08:18	Venus 3.5° N of Moon
Jan 26th	02:03	Jupiter 1.8° N of Moon
<b>Jan 31st</b>	<b>04:25</b>	<b>Mars Occulted by Moon **</b>
Feb 18th	20:52	Mercury 3.6° N of the Moon
Feb 19th	23:58	Saturn 3.7° N of Moon
Feb 22nd	07:55	Venus 2.1° N of Moon

Date	*Time	Event
Feb 22nd	22:00	Jupiter 1.2° N of Moon
Feb 28th	04:23	Mars 1.1° S of Moon
Mar 19th	15:22	Saturn 3.6° N of Moon
Mar 22nd	00:10	Mercury 1.8° N of the Moon
Mar 22nd	19:56	Jupiter 0.5° N of Moon
<b>Mar 24th</b>	<b>10:26</b>	<b>Venus Occulted by Moon **</b>
Mar 28th	13:16	Mars 2.3° S of Moon

*Barry Pickup* was able to view the lunar occultation of Mars on the morning of December 8th last, despite thin cloud.

An hour earlier the sky was clear but at least I managed to view the event in my 60mm refractor at 22x.

I attempted a few pictures at the eyepiece with my Canon 500D and 50mm lens. This image was taken at 04.45 UT, ten minutes before the predicted disappearance. The air temperature was just 2C at the time.

*The next occultation of Mars visible from Ireland will not be until Dec 18th 2024 but it is a daytime (morning) event. There is a very narrow miss on the evening of Feb 9th 2025 (occulted from Scotland) and then the next reasonable opportunity from here falls on Dec 4th 2039 (morning twilight event).*





# 90 with the C-90

by Kevin Berwick

*As you know, I own a small 3.5 inch Maksutov Cassegrain telescope, the Celestron C90. Here, I will continue my series on documenting my deep sky experiences from the Dublin suburbs with this tiny telescope.*

I discuss a fairly short list of objects on this occasion. My observing recently has been dominated by planetary viewing, mainly Jupiter and, more recently, Mars. The Jupiter viewing season comes round once a year and Jupiter is particularly well placed at this apparition. Mars is only well placed every two years, so I've been trying to make the most of any observing opportunities that present themselves to view the Red Planet. Of course, this has reduced the amount of time I have available to view deep sky objects, so my C90 project has had to take a back seat.

In this article I look at Stephenson 1, an object in Lyra. It is now gone from the sky, but the article will hopefully serve as a reminder of summer days when Lyra is high in the sky, injecting some heat into our chilly bones as we head into deep winter. The remaining two objects are easily observable at present. Enjoy!

## Stephenson 1

Stephenson 1 is a delightful cluster beautifully framed in the low power 32 mm eyepiece. The cluster is dominated by  $\delta^1$  Lyrae and  $\delta^2$  Lyrae - one orange, one blue white, with a pretty smattering of faint stars to the South.  $\delta^1$  Lyrae and  $\delta^2$  Lyrae are a visual double star, not a true binary, that is, they do not orbit each other. They are separated by almost 200 light years.  $\delta^1$  Lyrae is probably a member of Stephenson 1, lying right at the core of this open cluster, while  $\delta^2$  Lyrae lies much closer to us, about 160 light years away.

$\delta^1$  Lyrae is a hot main sequence dwarf, which explains the blue-white colour at the eyepiece. Conversely,  $\delta^2$  Lyrae is a bright red giant, which looks orange visually. While observing the cluster it is worth looking for four stars arranged in a little chain extending south, beginning between  $\delta^1$  and  $\delta^2$ .

## $\eta$ Cassiopeiae

Also called Achird,  $\eta$  Cassiopeiae (Eta Cas) is located about 19.4 light-years from our Sun. This well-known binary star system was discovered in 1779 by Sir William Herschel. The star has been an object of intense interest among astronomers due to its closeness and similarity to our Sun.

Visually, it is a fairly tight double star yet a definite split with the 32mm eyepiece. The primary is yellow white, and the companion is much fainter. The companion's colour is an intense but faint red, with hints of purple. A short scan in any direction from  $\eta$  Cass is

a visual treat, as the star fields in its vicinity are spectacular.

In 1984, a video game named Elite, created by David Braben and Ian Bell, was released to the public and quickly became one of the most successful and influential space simulator games of all time. It is the ancestor of the game Elite Dangerous (ED) in 2012 in which  $\eta$  Cass is the home of the main Federal Navy Base following terraforming in the 2970s. It is described as being an excellent training ground for planetary assault troops whose motto is "Always Faithful, Always Forward."

Finally, the fictional reference book Star Trek Star Charts (2002) identifies Terra Nova as "Eta Cassiopeia III" and is the home of the first extra-solar human colony.

## Capella

Auriga, the charioteer, is a very distinctive constellation, with the magnificent golden star Capella, the third brightest in the Northern night sky, lying within its boundaries. Like many constellations, its name doesn't help when trying to find it in the night sky.

To me, it looks like a crooked house, rather than a charioteer. It must be said that I have far more experience of dodgy builders than ancient Greek transportation methods, so this might be more of a reflection on me than the constellation.

Visually, through the Mak, Capella appears as a straw white Star, so bright it literally lights up the whole field. It is like turning on a bulb in the eyepiece!

The seminal sci-fi novel Starship Troopers (1959) by Robert A. Heinlein describes one of the spacecraft as operating under the "Cherenkov drive", and can travel "Sol to Capella, forty-six light years, in under six weeks". The film adaptation Starship Troopers, by Paul Verhoeven, is an amusing satire utilising fascist imagery throughout, including portraying the troopers wearing uniforms strongly reminiscent of those worn by the SS, the Nazi paramilitary. Paul Verhoeven stated in 1997 that the hilarious first scene of the film—an advertisement for the Mobile Infantry—was adapted shot-for-shot from a scene in Leni Riefenstahl's Triumph of the Will (1935), specifically an outdoor rally for the Reichsarbeitsdienst.

Thanks for reading. More next time.



*We have a great selection of observations, sketches, and images this time in the Observer's Corner. Quite clearly IAS members have been busy. John O'Neill and James O'Connor have been observing Jupiter, as have I. Darren and Deirdre have produced exciting sketches for us. Who could forget we have also had a partial solar eclipse? We have images and reports. Michael Murphy has imaged the Bubble Nebula. Some of us even successfully observed the lunar occultation of Mars at an unearthly hour. Pun intended! I have been busy seeking out some tight doubles in Cassiopeia.*

*I wish you all a healthy and peaceful Christmas and clear skies for 2023!*

*from James O'Connor*

**An interesting evening on Jupiter:** (10 cm. reflector x160, seeing: very good). October 26 was an interesting evening on Jupiter - and I would have found it even more so if a nearby tree had not blocked my view early on. Prior to 20:20 U.T., there would have been only one satellite (Callisto) visible outside the disc and I could have observed the Red Spot near the meridian rather than half-way to the limb as it was when I commenced observing. I did get a good view of the Spot - looking much as it did last year - but could not detect any red colour.

When I commenced observing at c. 21h, Europa and Ganymede had emerged from transiting the disc and were within a few seconds of arc of each other near the limb. Their proximity to each other allowed a scrutiny of the relative appearances of their discs, which I could see clearly defined. Europa was small and intensely white, while Ganymede looked brownish and comparatively dull. However, Ganymede made up for its dullness by having a much larger disc, nearly twice as wide as Europa. Io was in eclipse throughout this time.

**Sun and sunspots:** Conditions were generally cloudy during the partial eclipse of October 25 but I got one or two glimpses of the event near maximum phase.

Sunspot activity was rather low as compared to the previous quarter but there were three moderately big spots on view in the first half of November and some more sizeable ones in early December

**Occultation of Mars by the full moon, Dec 8:** Occultations like this one must be extremely rare. Occultations of the three bright outer planets don't happen very often anyway - but to have one happen precisely at opposition of the planet and by a full moon! Whew! There was a lot of cloud around on the critical morning but it was mostly fairly light and there were a few windows here and there.

I used a 30 cm. reflecting telescope, mostly with a power of x60 but with x160 to view the disc of Mars. I availed of a "window" in the clouds to observe the

disc. I could just make out the South Polar Cap remnant but a large dark area (made up mainly of Syrtis Major and Terra Tyrrhena) dominated most of the disc. The orangey-yellow of the Martian disc contrasted strongly with the pure white of the lunar limb.

Disappearance was due to commence at 4h 55.6m. About 5 minutes beforehand, the performing orbs passed through a cloud "window" and I made an attempt to see Mars without optical aid. I failed due to the glare of the moon but when I positioned myself to have the lunar disc shut off behind a wall, Mars became visible - even conspicuous.

I observed the disappearance through what, thankfully, were only light clouds. It wasn't spectacular in the normal sense of the word but the rarity of such an event means that I will remember those 20 seconds forever. (20 seconds was my timing of how long the planet took to disappear.)

The cloud was somewhat denser at reappearance (at 5: 56.5) and I didn't know where exactly along the moon limb to expect it. Consequently Mars was almost completely out before I spotted it. The increased cloud made it look a bit hazy. But I had already had the phenomenon essentially bagged!

My only other successful observation of an occultation of Mars was on 1999 December.

*from John O'Neill*

**Sunspot counts:** September - November 2022: Counts were conducted on 36 days during this period. The maximum count I observed was on 10th September when the Wolf Number was  $W = 82$ . I observed no spotless days. All observations were reported to the AAVSO Solar Section. I used 70 mm and 85 mm refractors equipped with Thousand Oaks Type 2+ solar filters.

**365 Corduba 29-30 October 2022:** An easy object in Cetus. At 02:25 UT I estimated the magnitude of this asteroid as 11.9. 28 cm SCT at 117x. Clear sky with good transparency.

**Total Lunar Eclipse 7-8 November 2022:** This was a morning event for Topsfield, MA, USA. As the

partial phase progressed, the dark umbra gradually turned orange. During totality the Moon had a pale orange tint and the Mare were indistinct to the naked-eye. The time was 20:22 UT. Danjon = 2. As totality progressed, the Moon was getting lower into the trees and set while still in the total phase.

**Two Asteroids in Pisces 14-15 November 2022:** 8 Doris easily found just 4.5' from 20 Piscium. 00:37 UT. Predicted magnitude 12.0.

804 Hispania appears faint but definite. Lies 30' WSW of 7 Piscium. 00:42 UT. Predicted mag 12.2. Both objects observed with a 28 cm SCT at 117x. Clear sky with good transparency.

**Two bright asteroids in the late evening sky 23-24 November 2022:** 27 Euterpe appeared bright and fawn in colour. 03:15 UT. Predicted mag 9.1.

30 Urania appears slightly fainter than mag 9.7 field star TYC 1890 136 in Taurus.

Both objects observed with a 28 cm SCT at 117x.

---

### *from Aubrey Glazier*

*I own a William Optics 158 mm f/7 apo refractor supported by a Berlebach Planet alt-az mount and a William Optics 70 mm f/6 small apo refractor with mirror diagonals fitted at all times on both scopes.*

I continued to observe some doubles in Cassiopeia.

**Sept 10:** H 5 82 is an optical double. Magnitudes: A = 8. B = 8.4. Sep = 56.8". PA = 75°. My 70mm apo was sufficient to split it at 11x. But at 112x in the main scope I could see that both stars are K2 orange stars. The W designation stands for William Herschel (1738-1822).

STF 59 is an uncertain double. Magnitudes: A = 7.2. B = 8.1. Sep = 2.3". PA = 149°. Beautiful tight split at 112x. I increased the magnification to 225x to admire its beauty even more. STF stands for F G W Struve (1793-1864).

The two closest stars of BU 232 are a true binary. But the C star is optical. Magnitudes: A = 8.5. B = 8.8. C = 10.1. Sep = 0.85" & 24.5". PA = 258° & 300°. Of course there was no problem splitting A & C at 40x. But to see a black gap between the F class yellow-white A & B stars I needed 280x. In my diary I described the view as stunningly beautiful! BU stands for Sherburne Burnham (1838-1921).

**Oct 7:** BU 1096 is an uncertain double. Magnitudes: A = 8.8. C = 9.7. B is too close for my scope. Sep = 35.5". PA = 241°. A is orange. B is white. In the same field of view is the true binary STF 38. Magnitudes: A = 8.7. B = 9. Sep = 17.1". PA = 144°. Both these doubles were split at 40x.

V749 Cas is a K7 single star whose magnitude is

Clear sky with good transparency.

**115 Thyra and 101 Helena 28-29 November 2022:** Thyra was at perihelic opposition. It appeared yellowish and I estimated the magnitude as 9.7 at 00:15 UT. It lies 36' SW of Pi Persei. Helena appears faint, but definite, 2' W of HIP 10731. 00:22 UT. Both asteroids observed with a 28 cm SCT at 80x. Clear sky with good transparency. 5-day moon low.

**Conjunction of Mars and the Moon 7-8 Dec 2022:** The sight of Mars skimming very near (11 arcsec) to the southern limb of the Moon was more impressive, in a way, than if an occultation itself had occurred.

In the 20 cm SCT at 117x the contrast between the silver lunar limb and the ochre disc of Mars with its dark markings (particularly the Mare Cimmerium) was stunning. In my 12x36 IS binoculars Mars was looked like a tiny dot on the southern edge of the Moon. Time 04:12 UT. Gaps in cloud. Site: Topsfield, MA, USA.

8.7. I increased the magnification to 225x and became very fond of its almond brown colour.

STI 1385 is an optical double star. Magnitudes: A = 10.9. B = 11. Sep = 4.7". PA = 341°. At 225x I could see these faint stars separated. I also used my 280x and 320x eyepieces. STI stands for Johan Stein (1871-1951).

Close by is my only carbon star of this article. V382 Cas is extremely faint - about magnitude 12. So faint I required 320x to catch a glimpse of it. Its spectral class is C5. I hardly saw any orange colour at all. It's my 24th carbon star in Cassiopeia and my 113th overall.

**Oct 17:** One of our church staff called Leanne joined Valerie and I for an amazing night in our back garden with the planet Jupiter. IAS member Darren Devereux joined us by phone too. We all observed two spectacular occultations of the moons Europa and Io. Both moons were disappearing behind the -2.9 magnitude planet. Europa took 3 minutes to disappear starting at 22.28UT. Then at 23.54UT it was Io's turn. That occultation took a full 5 minutes! I don't believe I have ever observed a double occultation involving Jupiter before. The only moons left visible were Callisto and Ganymede.

**Oct 25:** How amazing! It is the second year in a row that we have had a partial solar eclipse. Valerie and I had the refractor set up in the same place, i.e. in front of our house. A friend of Valerie's also enjoyed the eclipse with us. We had eclipse glasses for our eyes plus Baader AstroSolar Safety Film on our 10x50 binoculars. The binoculars were placed on a tripod. Darren and a group of his students were on the phone.

Our Moonlight enthusiast Donnacha O’Driscoll had given IAS members a talk the night before about this solar eclipse in Ely House. He told us that the Moon was going to cover 10% of the Sun’s disc. There was a lot of cloud of course over Dublin, but eventually some nice blue sky arrived at 10:58UT. The Moon was then covering 10% of the Sun.

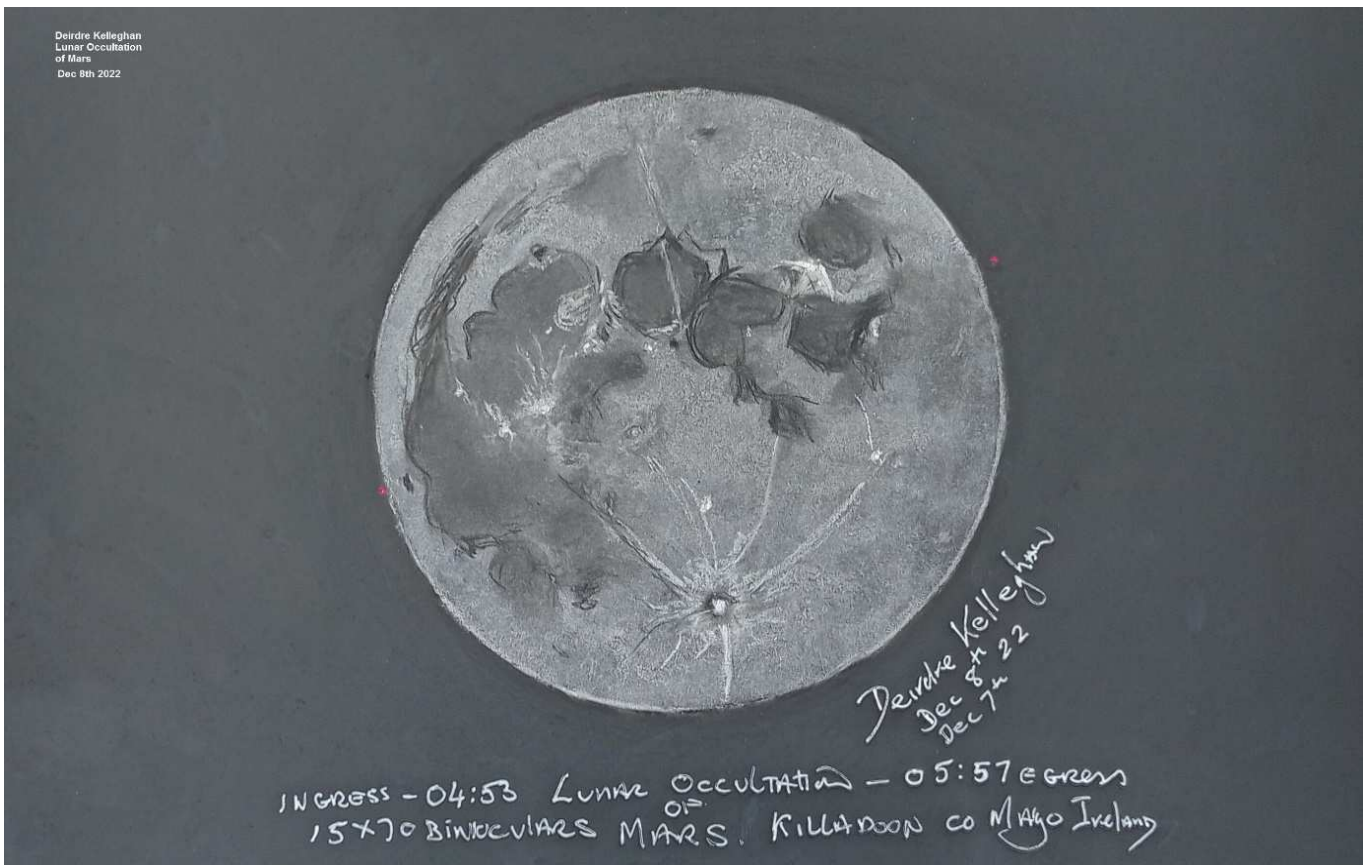
As before, we used image projection with my refractor. All our equipment worked a treat. There were two small sunspots and one tiny one visible with the scope. Two of these formed a pair. Our view of the eclipse ended at 11:36UT when the clouds returned but we were all extremely happy by the whole experience.

**Nov 18:** I spent two hours in freezing conditions in the Sugarloaf car park - despite wearing seven layers of clothing. I was not too bad, but other friends were feeling the chill and went home. However I was delighted to have the IAS president Mick McCreary staying till the very end. Thank you, Mick! Top of the bill was Jupiter. I used 167x on the great planet. There were two moons visible at 40x. Io and Europa were invisible. Europa was behind the planet. Ganymede was easily seen on the western side. But Callisto was a mere 9.5” from the North Polar Region. A full 4 minutes before its time, Io appeared behind Jupiter at 22:14UT. At first it was seriously faint, but it in-

creased in magnitude after a few seconds. Magnificent!

**Nov 20:** Having successfully observed the reappearance of the moon Io from behind Jupiter, it was Ganymede’s turn on this Sunday night. At 20:23UT it took a whole two minutes to appear. You see, Ganymede is the largest moon in our solar system, and so it takes more time than Io to fully appear. Other cloud features I observed on the same night were the North Equatorial Belt (NEB) which is darker than the South Equatorial Belt (SEB). There were two dark disturbances visible in the NEB. I also saw the thin South Temperate Belt, the South South Temperate Belt, the North Polar and the South Polar Regions on the same night.

**Nov 27:** There is a multiple star in Cassiopeia I had been keen to have a go at. But some of its doubles have complex designations. So I’ve decided to share its most difficult double with you: DA 2. The C and D stars are very tight. Magnitudes: C = 7.2. D = 9.1. Sep = 1.3”. PA = 214°. I had no split at 280x, but at 320x and 374x I could see the two stars with the slenderest black gap between them. Success! DA stands for William Rutter Dawes who lived from 1799 to 1868. He was a pastor of an evangelical church and a philanthropist. I would have been delighted to have met him as I have met many evangelical pastors.



Deirdre Kelleghan made this wonderful sketch of the Dec 8th lunar occultation of Mars as seen in Celestron 15x70 binoculars. Ingress was 04:53 UT (as I viewed directly in the binoculars) and egress 05:57 (viewed via a gap in the clouds). Moon drawn over two hours on Dec 7th due to clouds in the way. The forecast was poor but I got up anyway at occultation time. Glad I did! Pastels & Conte on black paper - Killadoon, Co Mayo, Ireland.

*Top left:* **Darren Devereux** sent in this magnificent sketch of Jupiter and three of its moons using his f/5 250mm Newtonian reflector. South is down. He says: “Earlier in the evening Aubrey had mentioned that Io and Ganymede would look like a double star through a telescope. And true to his word they did. As you can see from the sketch both these Moons were east of the gas giant - Ganymede is further north than Io. The other moon in the sketch is Europa.”

Over the course of about 40-minutes I used several coloured filters to help bring out additional details on Jupiter. I found, the blue, and orange filters worked particularly well. For example, the blue filter showed me that the NEB was larger and darker towards the Eastern limb, whereas the Orange filter brought out more of Jupiter's Barges in the Equatorial Zones. The South Equatorial Belt looked wider on the Eastern limb, and I felt it wasn't as dark as the NEB, and there was some of South Temperate Belt (STB) visible too. The Southern Polar Region was darker than its Northern counterpart.

*Top right:* **John O'Neill's** pic of the 2022 Nov 7-8 TLE at 10:20 UT. 200 mm telephoto. Not tracked. Cropped.

*Bottom right:* **Michael Murphy** took this image of the partial eclipse from Dublin through cloud. It was taken with a smart phone held to the eyepiece of his Skywatcher ST80 fitted with a black polymer filter.

*Bottom left:* **Michael McCreary** held his iPhone up to the eyepiece of his Dobsonian telescope to get this image of the October 25th partial solar eclipse at a public observing event at the Phoenix Park Visitors Centre.

