

“ $\Omega > 1$ ”

Monthly “Sky-Notes” of the Open University Astronomy Club.

November 2021.

Recent Events.

If you have any images and/or reports of recent events please contact Sheridan so that he can put them on the OUAC website.

If you wish to present them at a “Clubnight” meeting please contact Adrian or myself in advance or before the meeting starts.

OUAC Clubnight.

We are delighted to announce that “Clubnights” will recommence on Tuesday 2nd November. Meeting starts at 19:30.

The **New Venue** is the **Pavilion Activity Room** which is next to the Pavilion bar (above the changing rooms!) facing the cricket pitch, on the north side of the campus ring road.

The room can accommodate up to 24 people in a socially distanced manner.

Highlights of the Month.

1st to 10th. Dwarf planet **Ceres** tracks in front of “The Hyades” star cluster in Taurus.

5th Guy Fawkes Night!

5th Peak of the **Taurids** (Southern component) meteor shower.

12th Peak of the **Taurids** (Northern component) meteor shower.

18th Peak of **Leonids** meteor shower. Moonlight interferes.

27th Ceres is at Opposition. See notes below.

29th Mercury at Superior Conjunction.

Mercury completes a favourable morning apparition in the first 10 days.

Venus is a prominent object low in the SW evening sky.

Mars is slowly emerging into the ESE morning twilight.

Jupiter is low in the S to SW evening sky.

Saturn is low in SW early evening sky.

Uranus is at **Opposition on 5th** and is well placed for long hours of observation and imaging.

Neptune is well placed for evening observation.

Software.

A very useful item of Planetarium software is “Stellarium” and it’s **FREE!**

Go to their website and download it and the associated user manual.

1. The Solar system.

Note all times shown are UT.

Add one hour when British Summer Time is in operation.

Earth.

Aurora.

Long hours of darkness improve the opportunity for observing potential aurora.

Keep tuned to the www.spaceweather.com site for updates.

Subscribe (free!) to the UK AuroraWatch website to receive alerts.

ISS.

The ISS completes a series of morning passes during the first ten days of the month.

It commences a series of evening passes at the end of the third week of the month.

Details of this and other “bright” satellites are available on the “Heavens above” website.

Go to the “Heavens Above” website and set-up for your location. Add to your “favourites”.

Alternatively go to the “spaceweather” website and click the “Flybys” button and follow the instructions to set-up forecasts for your location. Add to your “favourites”.

Sunrise and Sunset.

Bedford.

Latitude 52° 6.9’N Longitude 0° 28.1’W

Date.	Rise.	Transit.	Set.
01	06 ^h 57 ^m	11 ^h 45 ^m	16 ^h 33 ^m
08	07 ^h 10 ^m	11 ^h 45 ^m	16 ^h 21 ^m
15	07 ^h 22 ^m	11 ^h 46 ^m	16 ^h 10 ^m
22	07 ^h 34 ^m	11 ^h 48 ^m	16 ^h 01 ^m
29	07 ^h 45 ^m	11 ^h 50 ^m	15 ^h 55 ^m

Produced using “Starry Night Pro”.

The Sun.

Observing.

To prevent permanent damage to your eyes avoid looking at the Sun directly and never with binoculars or a telescope unless special (expensive!) filters are used. The safest way is the simplest – project the image of the Sun onto grey or white card.

Take care if your telescope has any plastic components in its optical path. Plastic melts!

If you have or have access to observe in h-alpha the rewards are much greater.

Solar Cycle 25 is gathering pace. Activity is ahead of predictions.

Add the “Spaceweather”, the “Soho” and the “Solar Dynamics Observatory” satellite websites to your “favourite” websites.

The Moon.

Phases:



Produced using "LunarPhase Pro".

New	04 ^d 21 ^h 15 ^m	
First quarter	11 ^d 12 ^h 46 ^m	
Full	19 ^d 08 ^h 57 ^m	Partial Eclipse begins as the Moon sets from UK.
Last quarter	27 ^d 12 ^h 28 ^m	

Apsides:

Perigee	05 ^d 22 ^h	Diameter. 33' 48"	Distance. 358,843km.
Apogee	21 ^d 02 ^h	Diameter. 29' 55"	Distance. 406,278km.

Observing.

Observe the regions along the terminator (sunrise and sunset on the Moon) where the low angle of the Sun highlights lunar topography. A basic lunar map is all you need to get started. *Sky & Telescopes* "Lunar 100 Card" is another good starting point. The Moon provides an excellent target if you are starting out on astronomical photography and/or imaging.

The Moon cont.

For northern observers:

- The waxing crescent Moon is not well placed.
- The waxing gibbous Moon is becoming well placed.
- The Full Moon is well placed.
- The waning gibbous Moon is very well placed.
- The waning crescent Moon is well placed.

Imaging and Observing Opportunities.

Predawn observation and/or imaging will be well rewarded when the waning gibbous Moon and the waning crescent Moon are well placed.

On 3rd and 4th try locating the very thin crescent Moon very low in the E dawn skies **before sunrise**.

On 5th and 6th try locating the very thin crescent Moon very low in SW evening twilight **after sunset**.

Favourable Lunar Libration at the end of the month gives the opportunity to observe “The Mare Orientale” and other detail on the SW limb.

If you can take images of the above so much the better.

Lunar Occultations.

Unlike the gradual disappearance of a planet (small disc) a star vanishes instantly demonstrating that it is a point source of light as viewed from the earth. For all occultation events start observing 10 to 15 minutes before the predicted time to identify the required star and to allow for slightly different time if you are not at Greenwich. Use an accurate watch to record the time that *you* observe the occultation remembering that times are UT not BST. Enter details in your observing log.

Details of occultations can be found in current *BAA Handbook* and monthly periodicals such as *Astronomy Now* and *Sky at Night*.

The Planets.

At the end of the month Jupiter, Saturn and Venus present a line in the S to SW early evening sky. Worth a widefield image.

Mercury.

Completes a reasonable favourable morning apparition in the first ten days low in ESE dawn sky for Northern Observers.

Close (4° N) to Spica (alpha Virginis) (+1.0.) in the first few days.

Close (1° N) to Mars on 10th and 11th.

Superior Conjunction on 29th.

Moon close on 3rd.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-0.8	5.8''	0.80	05 ^h 18 ^m	10 ^h 46 ^m	16 ^h 13 ^m
08	-0.9	5.2''	0.92	05 ^h 55 ^m	10 ^h 59 ^m	16 ^h 03 ^m
15	-0.94	4.90''	0.97	06 ^h 35 ^m	11 ^h 15 ^m	15 ^h 56 ^m

Venus.

Prominent object low in the SW early evening sky.

Waning crescent with increase in apparent diameter.

Moon close on 8th.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
01	-4.4	26''	0.48	11 ^h 40 ^m	15 ^h 01 ^m	18 ^h 22 ^m
30	-4.7	29''	0.38	11 ^h 14 ^m	14 ^h 53 ^m	18 ^h 32 ^m

Mars.

Emerging low in the ESE dawn sky during the month.

Close (1° S) to Mercury on 10th and 11th.

Moon close on 4th.

Date.	Mag.	Dia.	Phase.	Rise.	Transit.	Set.
10	+1.6	3.7''	1.00	06 ^h 11 ^m	11 ^h 03 ^m	15 ^h 54 ^m
30	+1.6	3.6''	0.99	06 ^h 12 ^m	10 ^h 38 ^m	15 ^h 04 ^m

Mission details and progress of Orbiters and Landers are on the appropriate websites.

Jupiter.

Low in the S to SW evening sky.

Moon close on 11th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	-2.5	42''	14 ^h 16 ^m	18 ^h 58 ^m	23 ^h 41 ^m
30	-2.3	38''	12 ^h 26 ^m	17 ^h 15 ^m	22 ^h 03 ^m

Saturn.

Low in SW evening sky west of Jupiter.
Moon close on 10th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+0.6	17''	13 ^h 39 ^m	17 ^h 56 ^m	22 ^h 14 ^m
30	+0.7	16''	11 ^h 49 ^m	16 ^h 09 ^m	20 ^h 29 ^m

Uranus.

At Opposition on 5th.

Located in Aries and well placed for long hours of observation.
Moon close on 18th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+5.7	3.8''	16 ^h 33 ^m	23 ^h 58 ^m	07 ^h 28 ^m
30	+5.7	3.7''	14 ^h 37 ^m	22 ^h 00 ^m	05 ^h 27 ^m

Neptune.

Well placed in the SW for early to mid evening observation.
Moon close on 13th.

Date.	Mag.	Dia.	Rise.	Transit.	Set.
01	+7.8	2.3''	15 ^h 06 ^m	20 ^h 44 ^m	02 ^h 26 ^m
30	+7.9	2.3''	13 ^h 11 ^m	18 ^h 49 ^m	00 ^h 31 ^m

Triton.

At mag +13.5 Neptune's largest satellite provides a good challenge for 8" telescopes under favourable sky conditions and when Triton is at max elongation E or W of Neptune.

Use "Stellarium" (Freeware) or similar software to determine favourable E and W elongations.

Use a high magnification e.g. x200 or greater.

Dwarf Planets.

Ceres. Very well placed in Taurus, tracking in front of "The Hyades" during the month.

**Very close to Aldebaran on 1st to 5th. Mag +7.0 at Opposition on 27th.
Great observing/imaging opportunities!**

Eris. A mag +18.7 target located in Cetus.

Haumea. A mag +17.3 CCD target located in Bootes, about 5° W of Arcturus. becoming lost in WNW evening twilight.

MakeMake. A mag +17 CCD target in Coma Berenices. Low in the E predawn skies.

Pluto. Mag +14.5 object located in Sagittarius. Sinking into the early evening SW sky.

Asteroids. (Approx mag +10.5 or brighter).

Vesta (4)	Not observable. Solar Conjunction on 28th.
Nysa (44).	A 9 th mag object located on the border of Orion and Taurus heading towards Opposition in early December.

Charts and details of asteroids one month either side of opposition are available at:

http://britastro.org/computing/charts_asteroid.html

See also the *BAA Handbook*, monthly periodicals and the “Heavens above” website.

Comets.

Two moderately bright comets to attract your attention. Both are “morning” objects in the NE sky.

Comet **67P/Churyumov-Gerasimenko** (remember Rosetta!) tracks from Gemini into Cancer during the month. Closest to the Earth on 12th November when it may be mag +9 to +10.

Comet **2021 A1 (Leonard)** tracks from Ursa Major into Canes Venatici during the month. Closest approach to the Earth on 12th December when it may be mag +7, possibly brighter so worth following.

Charts and details of selected comets are available at:

http://britastro.org/computing/charts_comet.html

See also the *BAA Handbook*, monthly periodicals and the “Heavens above” website.

Meteor Showers.

The **Taurids** continue activity during November. Double radiant with two peaks on 5th (S component) - ZHR = 5, and 12th (N component) - ZHR = 5. Slow meteors with “bright events” possible.

The **Leonids** are active from the 15th to 20th with narrow peak activity on 18th 05^h, ZHR = 15. Moonlight interferes!

There are always **Sporadic** events and the chance of a brilliant fireball. The latter should be recorded and reported.

Near Earth Objects.

Please refer to www.spaceweather.com for updates.

Eclipses.

A Partial Lunar Eclipse occurs on 19th. The Umbral Eclipse begins as the Moon sets.

2. Deep Sky.

Abbreviations used.

M = Messier object. (Shown in **bold**).

NGC = New General Catalogue. IC = Index Catalogue. (Extension of the NGC).

ds = double star.

ts = triple star. ms = multiple star.

vs = variable star.

gc = globular cluster.

oc = open cluster.

pn = planetary nebula.

en = emission nebula.

rn = reflection nebula.

sg = spiral galaxy.

eg = elliptical galaxy .

lg = lenticular galaxy.

ir = irregular galaxy.

pg = peculiar galaxy.

snr = super nova remnant.

ly = light year.

The magnitude of an object, excluding double, triple, multiple and variable stars, is shown in brackets e.g. (+6.5).

2.1 Variable Stars of the month.

Beta (β) Persei, Algol. Range +2.2 to +3.4, period 2.7 days. Well placed for evening observation. Minima at “social hours” occur on 03^d 18.3^h, 20^d 23.2^h and 23^d 20.1^h.

Delta (δ) Cephei. Range +3.5 to +4.4, period 5.37 days. The prototype for the Cepheid class of variable stars. Their period-luminosity relationship has led them to being used as “standard candles” in measuring distances to nearby galaxies.

Mu (μ) Cephei. Range +3.7 to +5.0, approximate period 755 days. A semi-regular variable star famous for its striking red colour being fittingly called “Herschel’s Garnet Star”. It is the reddest naked eye star visible from the northern hemisphere. Its colour may show signs of variability.

Omicron (\omicron) Cet, “Mira”. At maximum approx mag +3.5 in September/October and now fading. Worth observing and/or imaging for the next few months to plot its gradual fade.

2.2 Double Stars of the month.

Gamma And. See notes below.

Gamma Ari. See notes below.

Struve (Σ) 326 Ari. See notes below.

Alpha Cas. See notes below.

Iota Cas. See notes below.

Eta Cas. See notes below.

Sigma Cas. See notes below.

Delta Cep. See notes below.

Struve (Σ) 2816 & 2819 Cep. See notes below.

Struve (Σ) 2840 Cep. See notes below.

8 Lac. Quadruple system. See notes below.

Eta Peg. See notes below.

Pi^{1&2} Peg. See notes below.

57 Peg. See notes below.

Zeta Psc. See notes below.

35 Psc. See notes below.

51Psc. See notes below.

Iota Tri. See notes below.

Struve (Σ) 239 Tri. See notes below.

2.3 This Month's Constellations - Double Stars/Star Clusters/Nebulae/Galaxies.

Andromeda (And).

Gamma (γ) Almach (+2.2/+5.1) is a fine double star. The brighter component is golden-yellow with its companion a greenish-blue. Arguably second only to Albirio in Cygnus.

NGC205 (**M110**) (+8.0) eg. A satellite galaxy of M31 visible as an elongated "smudge" in small telescopes.

NGC221 (**M32**) (+8.2) eg. A satellite galaxy of M31. Visible as a fuzzy star in small telescopes.

NGC224 (**M31**) (+3.5) sg. "The Great Andromeda Spiral Nebula". Increasing aperture reveals more and more detail although increasingly smaller areas of the galaxy fill the eyepiece. 8" telescopes should reveal NGC206 as a hazy patch. It is a large area of star formation. 12" scopes will reveal one or two of M31's large population of globular clusters.

NGC404 (+11.9) lg. "The Ghost of Mirach". Located 6' NW of β And (Mirach). The 2nd magnitude star tends to drown the faint glow of the galaxy. Use high power to push the star out of the field of view for best results.

NGC752 (+5.7) oc This large open cluster is located about 4 degrees south of γ .

NGC891 (+10.1) sg. Located about 3 degrees east of γ is seen almost edge on. Bright central bulge. Moderate apertures will reveal a narrow dust lane bisecting the long axis. A fine object.

NGC7640 (+12.5) sg. Seen nearly edge-on.

NGC7662 (+8.6) pn. "The Blue Snowball". Rather small making it difficult to distinguish from nearby faint stars. High magnification on an 8" telescope will reveal an elliptical ring with a dark centre. Large apertures will show a faint second outer ring of nebulosity and the 13th magnitude central star.

Aries (Ari).

Gamma (γ) (+4.8/+4.8 separation 7.7") ds. Fine equally bright bluish-white pair of stars. Accidentally discovered by Robert Hooke in 1664 while searching for a comet.

Lambda (λ) (+4.9/+7.7 sep. 37.4") ds. Wide pair of pale yellow and pale blue stars.

Struve (Σ)326. (+7.6/+9.8 sep. 5.9") ds. Beautiful orange and dull red pair of stars.

NGC772 (10.3) sg. Located almost 2° ESE of γ .

NGC877 (+11.9) sg.

NGC972 (+11.4) sg.

Cassiopeia (Cas).

Alpha (α) (+2.2/+8.9 sep. 64.4") ds. Fine orange and blue pair. Part of a multiple system.

Iota (ι) (+4.6/+6.9/+8.4 sep. AB 2.5", AC 7.2") ts. Beautiful white, yellow and blue triple system.

Eta (η) (+3.4/+7.5 sep. 12.9") ds. Superb gold and garnet pair. What do you see?

Sigma (σ) (+5.0/+7.1 sep. 3.0") ds. Bluish white and yellow pair in a superb field.

NGC129 (+6.5) oc.

NGC147 (+9.3) eg. A satellite galaxy of M31.

NGC185 (+9.2) eg. A satellite galaxy of M31.

NGC278 (+10.9) eg. Located a few degrees SE of NGC185.

NGC457 (+6.4) oc.

NGC581 (**M103**) (+7.4) oc. Fine object.

NGC7654 (**M52**) (+6.9) oc. Fine rich cluster.

NGC7789 (+6.7) oc.

IC1805 (+6.5) oc.

IC1848 (+6.5) oc.

Cepheus (Cep).

Delta (δ) Cephei, +3.5 to +4.4 over a period 5.37 days, is the prototype for the Cepheid class of variable stars which because of their period-luminosity relationship has led them to being used as "standard candles" in measuring distances to nearby galaxies. Pale blue +6.1 companion.

Mu (μ) Cephei +3.7 to +5.0 approximate period 755 days is a semi-regular variable star. It is more famous for its striking red colour being fittingly called "Herschel's Garnet Star". It is the reddest naked eye star visible from the northern hemisphere. Its colour may show signs of variability.

Struve (Σ) 2816 ts (+5.7/+7.5/+7.5, sep 12"/20"). Fine triple with Struve (Σ) 2819 ds (+7.4/+8.6, sep 13") in same field. All contained in the large, sparse and nebulous open cluster IC 1396!

Struve (Σ) 2840 ds (+5.6/+6.4, sep 18"). Very fine greenish/bluish pair.

Open clusters - NGC188 (+8.1), NGC6939 (+7.8), NGC7510 (+7.9), NGC7762 (+10.0). Planetary Nebula NGC40 (10.7).

Spiral galaxy NGC6946 (+8.9) in the same 1° field as oc NGC6939. Two types of object for the price of one!

The faint reflection nebula NGC7023 and emission nebula IC 1396 provide a challenge to the observer. A dark clear sky is essential.

Lacerta (Lac).

Struve (Σ) 2876 (+7.8/+9.3 sep 11.8") ds. Fine blue and white double.

Struve (Σ) 2894 (+6.1/+8.3 sep. 15.6") ds. Yellow primary, blue secondary.

Struve (Σ) 2902 (+7.6/+8.5 sep. 6.4") ds. Yellow and white double.

8 Lacertae = Struve (Σ) 2922 (+5.7/+6.5 sep. 22.4") Multiple star. Brightest four components are white/blueish white. Has been described as a poor open cluster.

O Struve (Σ) 475 (+6.8/+10.8 sep. 15.5") ds. White primary with faint blue companion.

BL Lacertae (+14 to +17). Prototype for class of quasi-stellar object (QSO).

Pegasus (Peg).

Eta (η) +2.9/+9.9 separation 90.4". Binocular object. Yellow and blue components but telescope required to see colour of secondary. Herschel's "Pendulum Star" - tap telescope gently for the effect.

π^{-1}/π^{-2} (π^{-1}/π^{-2}) +5.6/+4.3 separation 7"). Fine binocular object. π^{-1} is a multiple system with 4 companions of 10th to 12th magnitude.

51 Pegasi (+5.5). Identify this star for interest as the first sun-like star discovered in October 1995 to have an "exoplanet". The planet was originally named "51 Pegasi b" but in December 2015 following a process of public nomination the IAU announced the winning name was **Dimidium**.

57 Pegasi. +5.1/+9.7 separation 32.6". Beautiful orange primary with blue companion.

NGC7078 (**M15**) (+6.3) gc superb object.

NGC7331 (+9.5) sg. Seen almost edge on.

About half a degree south is the fascinating group of galaxies "Stephan's Quintet". The brightest member of the group is NGC7320 (+12.7).

Many happy hours can be spent wandering around "The Square" to locate many moderately bright galaxies. Use a star atlas such as the excellent "Sky Atlas 2000" to plan your journey.

Pisces (Psc).

Alpha (α) (+4.2/+5.1 sep.1.5") ds. Requires a large aperture telescope using high magnification to split this pair of bluish-white stars.

Zeta (ζ) (+5.6/+6.2 sep. 23") ds. Fine white and yellow pair of stars.

35 (+6.0/+7.6 sep 7.6") ds. Fine yellow and blue pair.

51 (+5.7/+9.5 sep.27.5") ds. Glorious bluish and greenish pair of stars.

65 (+6.3/+6.3 sep 4.4") ds. Fine matched pair of pale yellow stars.

Wolf 28 (+12.3). Van Maanen's Star. One of the few white dwarf stars visible in amateur telescopes.

NGC128 (+11.8) sg. Brightest of a group of five galaxies.

NGC488 (+10.3) sg. Elongated halo with brighter core.

NGC628 (**M74**) (+9.4) sg. Seen face on and hence low surface brightness.

NGC7541 (+11.7) sg. Elongated oval with bright core. 3' to the SW is NGC7537 (+13.0)

Sculptor (Scl).

Unfortunately this constellation never rises very high for UK observers so that only brief opportunities are presented to track down some deep-sky gems which unfortunately are not seen at their best even from a dark site. I have taken declination -30° as the southern limit for objects. This is almost the declination of the first magnitude star Fomalhaut (+1.16) which will give you a marker as to how low these objects are even at their highest when due south. The suitable observation window is thus fairly restricted!

NGC24 (+11.5) sg. Located about two-thirds the way between NGC253 and β Cet.

NGC253(+7.1) sg. Seen highly inclined to our line of sight. Increasing magnification reveals mottling due to dust lanes. Head south for the best view of this gem.

NGC288 (+8.1) gc. A loose globular which resolves readily with high power. The South Galactic Pole is about a 1° to the SW.

NGC613 (+10.0) sg. Elongated and fairly bright.

Triangulum (Tri).

Iota (ι) (+5.3/+6.9 sep. 3.9") ds. Fine contrasting yellow and blue pair of stars.

Struve (Σ)239 (+7.0/+8.0 sep. 13.8") ds. Fine pale yellow and pale blue pair of stars.

NGC598 (**M33**) (+5.7) sg. Viewed face-on and hence has a low surface brightness making it an elusive object. Its visibility provides a good test for sky conditions using binoculars.

From dark sites and under good seeing conditions it is just visible to the naked eye and vies with M31 as the most distant object visible to the naked eye. With 8"+ telescopes try to locate the vast star cloud NGC604. Good target for imaging.

NGC672 (+11.6) sg. A bright barred spiral galaxy seen somewhat edge-on.

NGC925 (+12.0) sg. Steeply inclined to our line of sight makes it fairly bright. NGC598