

The December night sky now sees the late autumn constellations prominent early evening and heralds some familiar winter constellations. Astronomical winter in the northern hemisphere begins at the winter solstice on Dec 21<sup>st</sup>. The late autumn / winter night sky contains many fine objects to view with both binocular and small telescopes. Jupiter and Saturn are visible low in the SW aspect with Venus and Mercury (late December) in evening twilight some forty minutes after sunset. Also visible in mid evening are Uranus and Neptune, so around December 28<sup>th</sup> it is possible to observe 6 planets from twilight through mid evening – enthusiastic observers may also observe Mars in dawn twilight. Binoculars will show the planets nicely, but telescopes show detail Venus thin crescent phase, Saturn's rings and its bright moon Titan, Jupiter's characteristic cloud belts and its four bright Galilean moons.

Uranus and Neptune can be located using the finder charts (see notes) and are noted for the characteristic colours blue and green respectively – these two planets appear as tiny disks compared with the pin sharp field stars. Uranus in the constellation of Aries is visible early evening and can be located using binoculars and a suitable finder chart. There are no green stars, so Neptune is relatively easy to spot with binoculars. Neptune is located in the constellation of Aquarius and is also visible in binoculars a star like point, the planet is located close to the star phi Aquarii

Of special interest is Comet C/2021 A1 Leonard is currently a binocular / telescopic 'fuzzy patch' at 8.5m magnitude moving position night to night against the star fields of Canes Venatici/ Bootes as a background requiring binoculars to see it visually although imaging techniques may prove more effective. [LAS Newsletter No 308A]. However the enthusiastic observer may well be rewarded for setting the alarm clock and venturing out at 5am during early December. Comet C/2021 A1 Leonard is heading southward into the dawn skies as it approaches Perihelion (early Jan 2022). Crossing Earth's orbital plane on Dec 8<sup>th</sup> may produce an enhanced brightening of the comet due to forward scattering, with a prospect of an anti tail or forward spike. The comet makes a close approach to Earth (0.23AU 34 million km) on Dec 12<sup>th</sup> and comes within 0.029AU, just 4.3 million km of Venus on Dec 18<sup>th</sup>. Maximum brightness (estimated at 4m magnitude 'may' occur around Dec 11<sup>th</sup> by which time the comet is placed both low in dawn twilight and very low just 10° elevation in the west in evening twilight (4.30pm). It is probable that the evening visibility of the comet in bright twilight may be extremely challenging – the best chance to briefly catch the comet is around 5.30am the first / second week in December in moonless conditions in pre dawn skies when the comet will be close to the bright star Arcturus (Dec 5<sup>th</sup>). (See notes). Prospects are that the comet will be a nice binocular comet and may be bright enough to see with the unaided eye (3.0 m to 4.6m by Dec 11<sup>th</sup>)

Look to the east mid evening to see the seven sisters' (Pleiades, M45) star cluster and constellation Taurus which heralds the autumn skies. The Hyades star cluster makes the characteristic 'V' shaped asterism in the constellation of Taurus and is noted for the bright, red foreground star Aldebaran in Arabic Al Dabaran is 'The follower' of the Pleiades across the skies', in old English colloquially known as 'the eye of the bull'.

The constellations of Cygnus and Lyra can be seen slipping into the west early evening; these are noted for the bright stars of Deneb and Vega. The Milky Way stretches from the constellation of Auriga, marked by the bright star Capella in the east up into Perseus and through the 'W' shaped constellation of Cassiopeia high overhead and down along the cross shaped constellation of Cygnus low in the west. The Milky Way is seen as a faint band of stars best seen on dark moonless evenings away from artificial lights; binoculars easily show the rich star fields.

Auriga has the bright star Capella, which is circumpolar from UK latitudes and so is always visible. The constellation of Auriga contains some nice star fields and open star clusters visible in binoculars, notably M36, M37 and M38.

The constellation of Perseus is well placed in December skies, high overhead. The constellation is noted for the group of stars (The Mirphak Association) a moving star cluster associated with the star  $\alpha$  Persei. Also in Perseus is the famous 'Demon star' Algol ( $\beta$  Persei) – an eclipsing binary star with a dramatic dimming of brightness for 9.6 hours every 2.86 days, Algol dims from 2.1m to its minima 3.4m on the evening of Dec 13<sup>th</sup> 21:48 GMT.

High in the south the constellation of Pegasus, noted for its 'Square' shape and the adjacent constellation of Andromeda noted for The Andromeda Galaxy (M31), visible to the unaided eye as a faint fuzzy patch on moonless

evening can now be seen mid evening . The Square of Pegasus is a useful sign post constellation and also is a good test for sky conditions, (how many faint stars you see within the square indicates just how good your seeing conditions are). Another fine globular cluster is M15 in the constellation, best seen telescopically.

In the north Ursa Major or The Great Bear, known for The Plough asterism is seen low with its handle parallel to the horizon mid evening. Use the right hand pair of stars Dubhe and Merak (The pointers) to find the faint pole star Polaris currently marking a position close to the north celestial pole.( useful when polar aligning your equatorial telescope mount)

By late evening the familiar winter constellations of Orion (The Hunter) with bright red star Betelgeuse (top left), white star Rigel (bottom right ) and the three stars of Orion's belt Mintaka , Alnilam and Alnitak . Below Orion's belt can be seen the misty patch that is M42 / M43, visible to the unaided eye, it is one of the gem's of the winter skies when seen with a telescope. This nebula some 30 light years across is illuminated by a group of four hot young stars that is known as the `Trapezium` asterism, visible under moderate magnification.

There are two meteor showers observable this month, the Geminids (range December 4<sup>th</sup> to 17<sup>th</sup>, maxima December 13<sup>th</sup>, pre dawn Dec 14<sup>th</sup> with a corrected hourly rate in excess of 70+ meteors per hour (possible). This year moonlit waxing gibbous moon conditions make late evening observation unfavourable. Observe after moonset Dec 13<sup>th</sup> 01:44 GMT and Dec 14<sup>th</sup> 02:55 GMT.

The second meteor shower is the Ursid meteor shower, range December 17<sup>th</sup> to 26<sup>th</sup>, maxima occurring on December 22<sup>nd</sup> rates are low (typically 10/hour. With Full Moon on Dec 19<sup>th</sup> the Ursid meteor shower is moonlit and so is unfavourable.

There are three more comets in our evening skies , all these are however `faint fuzzies` best observed /imaged in dark / moonless conditions

a) Comet 67P Churyumov-Gerasimenko 8.5m [Cancer] – LAS newsletter No 311A -Telescopic,

b) C/2019 L3 ATLAS 9.5m [Lynx]- Telescopic, LAS Newsletter No 312

c) Comet 4P Faye 11.0m [Monoceros] – larger Telescopes.

Lunar observers may like to observe the Clair Obscur feature `The Eyes of Clavius` shadow effects within the crater Clavius from 22:20 GMT on Dec 12<sup>th</sup>

To round off the December sky notes – the LAS Festive Five - Objects and celestial events to look at during the festive season.

1/ Six planets visible in a single evening from twilight to mid evening – Dec 28<sup>th</sup> (Binocular).

2/ The constellation of Orion - The Belt stars (Collinder 70) star fields (Binocular).

3/ Orion - The sword of Orion – the Orion Nebula M42 and also M43 - Binocular / telescopic.

4/ Taurus - The Hyades and Pleiades (seven Sisters) star clusters unaided eye /binocular

5/ Andromeda Galaxy M31 / M32 – Binocular

## Planets in December 2021

Mercury is visible in evening twilight skies later in the month – *Watch Venus and Mercury low in SW 4.30pm Dec 28th*

Venus is visible low in evening twilight skies shining brightly at -4.0m; telescopes show a thin crescent phase. *Comet C/2021 A1 Leonard located south of Venus low in evening twilight Dec 16<sup>th</sup> to Dec 19<sup>th</sup> 4:30pm - Binocular challenge*

Mars rises in dawn twilight, close to the star Antares (*also red in colour - 'The Rival of Mars'* )

Jupiter is low in twilight 5pm visible low in SW

Saturn is low in SW 5pm - *located midway between Jupiter and Venus in evening twilight*

Uranus is an evening object in the constellation of Aries; the planet shows a tiny blue disc telescopically.

Neptune is located in the constellation of Aquarius the planet shows a tiny green disc telescopically.

### Moons phases in December 2021

New Moon	Dec 4 <sup>th</sup>	Moonless, best time for deep sky and comet observing. <i>Total solar eclipse visible from Antarctica</i>
First Quarter	Dec 11 <sup>th</sup>	Best days to see shadow details in lunar craters (early evening)
Full Moon	Dec 19 <sup>th</sup>	Best days to see bright ray craters like Copernicus / Tycho.
Last Quarter	Dec 27 <sup>th</sup>	Moon visible in daytime skies. Do not look directly at the Sun.

Winter solstice Dec 21<sup>st</sup> (15:59 GMT) - Shortest day / winter starts in Northern Hemisphere.

### Meteor showers

Geminid range December 8<sup>th</sup> to 17<sup>th</sup>, maxima pre dawn 14<sup>th</sup> Dec – 70+ /hr slow, bright meteors unfavourable

Ursid range December 17<sup>th</sup> to 25<sup>th</sup> maxima Dec 22<sup>nd</sup> – low rates ZHR just 10/ hour – unfavourable

Quadrantid range December 28<sup>th</sup> to January 12<sup>th</sup> - , maxima Jan 4<sup>th</sup> ZHR 80/Hr bright with trails - favourable

### The highlights of the month.

Comet C/2021 A1 Leonard – Early December pre dawn 5.30am / (Binocular) – see notes Dec 11<sup>th</sup>, 4.30pm evening

December skies, Milky Way visible high overhead on moonless evenings in darker skies.

M31 the Andromeda Galaxy is visible on moonless evenings, best seen in binoculars.

Double cluster, on the Perseus / Cassiopeia border, nice pair of star clusters.

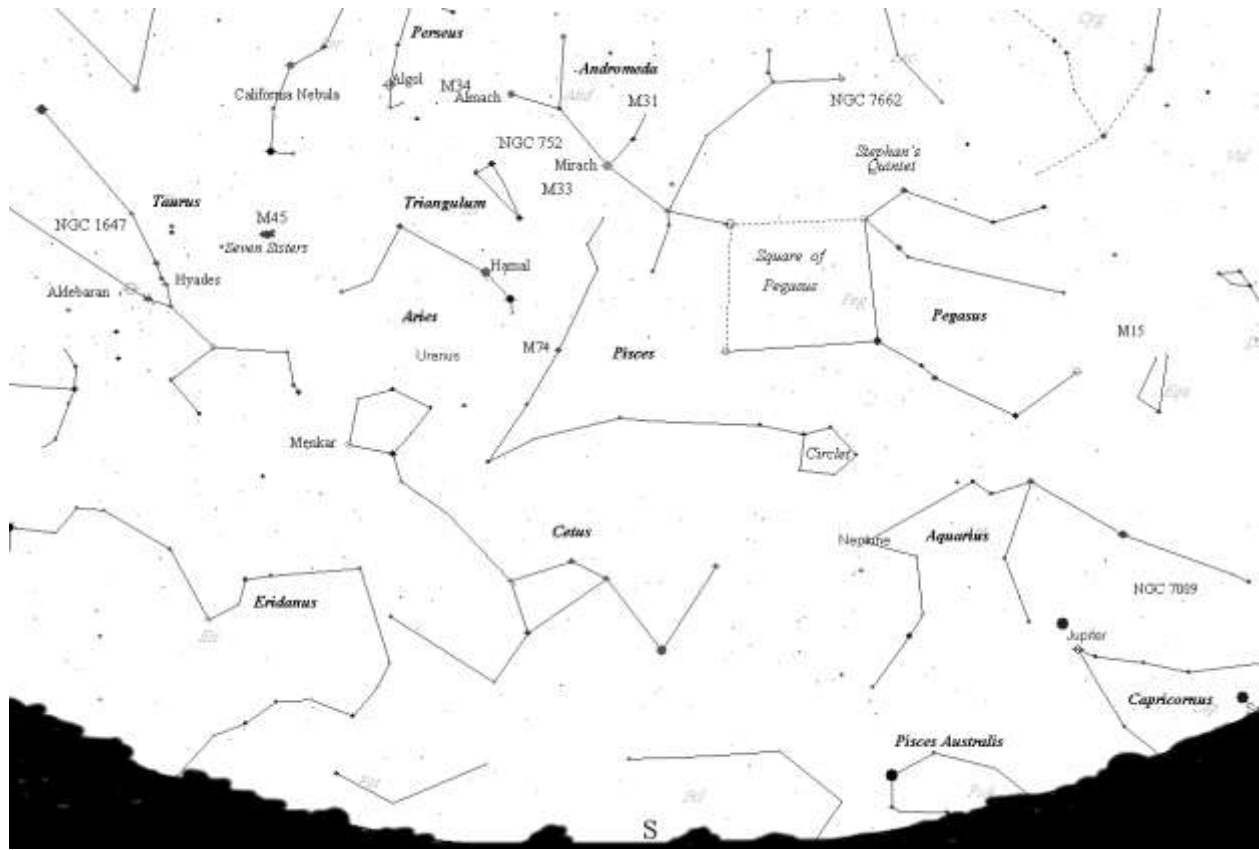
Pleiades (Seven Sister's) star cluster (M45) rising in the east best seen with binoculars.

Orion Nebula (M42) is a beautiful sight seen telescopically.

Crescent Moon visibility, a 2.7% waxing crescent moon is visible in twilight in the south west from around 20 minutes **after sunset** (from 16:10) with moonset by 16:40 on December 5<sup>th</sup>.

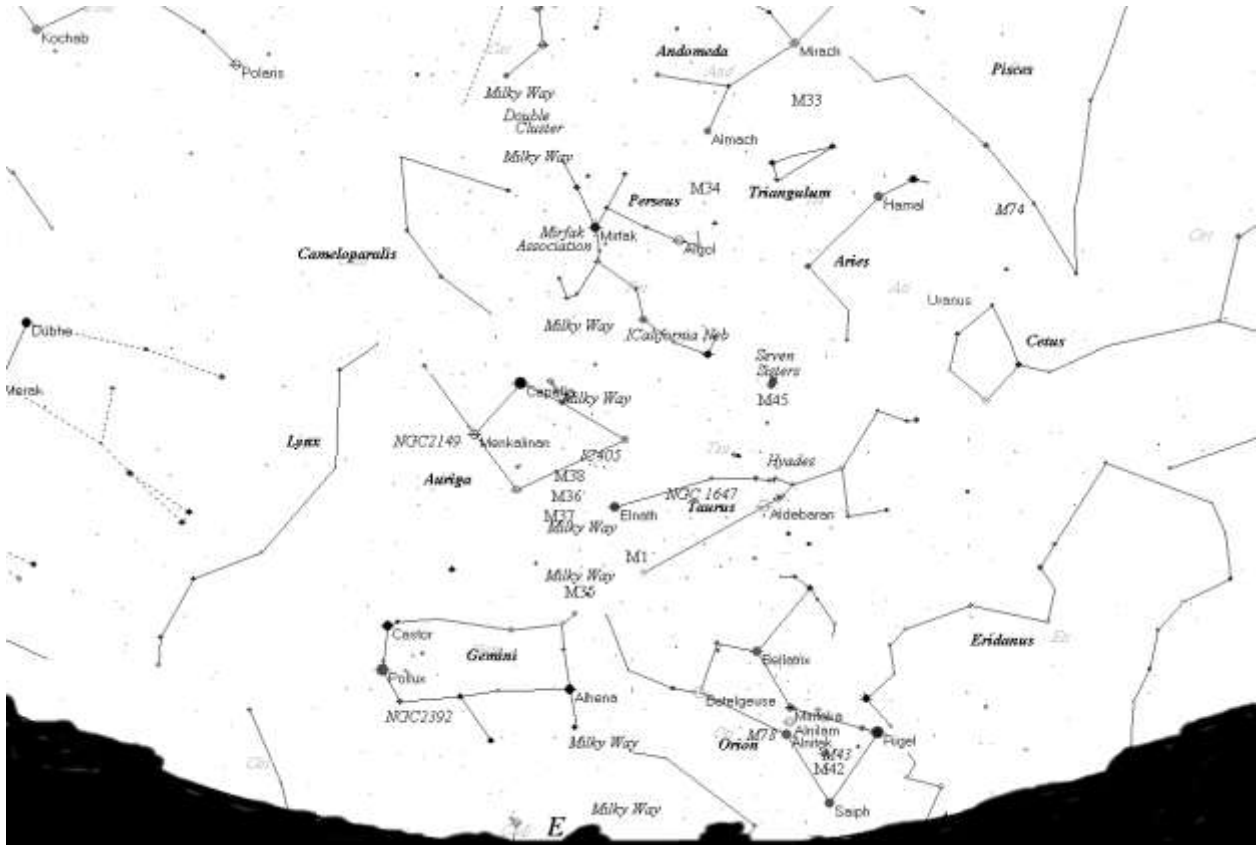
More detailed sky notes and LAS Newsletters, Finder charts are available to LAS members via the Members' page on the LAS Website [www.lutonastrolink.org.uk](http://www.lutonastrolink.org.uk)

Sky looking south 8pm in early December



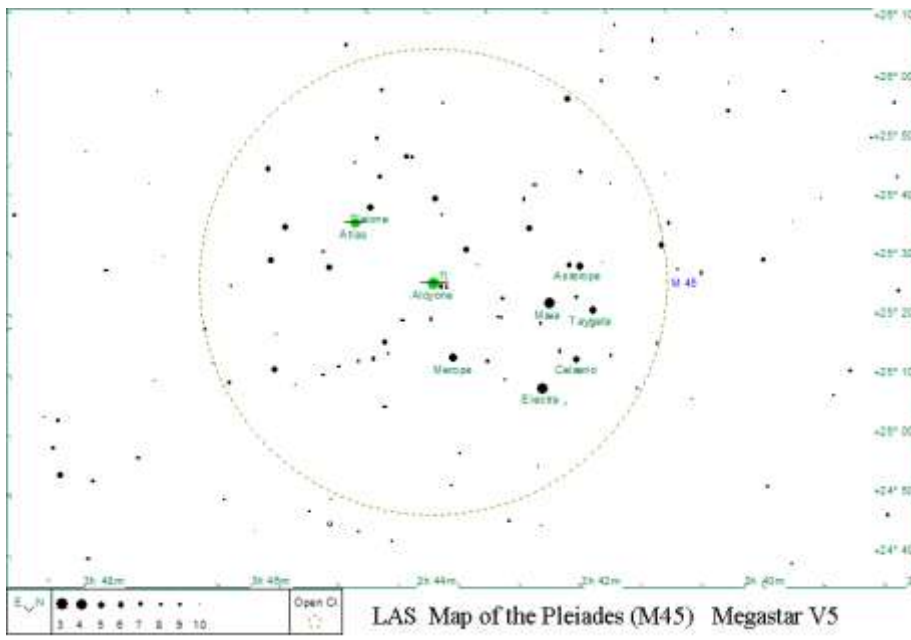
Saturn sets by around 8pm, so catch it early – Uranus and Neptune well placed early evening (see finder charts)

Sky looking east at 8pm early December

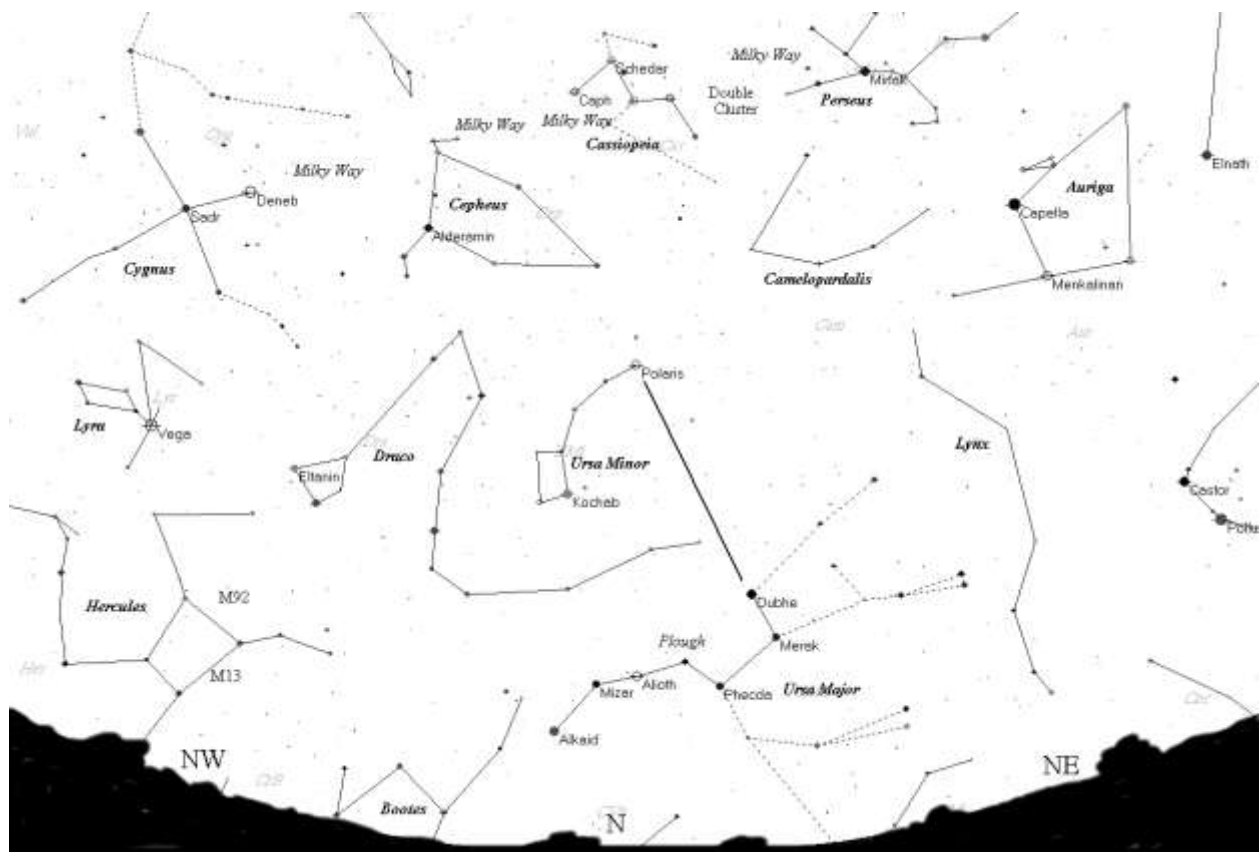


The constellations of Taurus, Auriga, Gemini and Orion can be seen rising mid evening in December.

The Seven Sister’s cluster (M45, Pleiades) is an easily identified star cluster. Some people with keen eyesight may see up to 13 stars, but a telescope will show over 200 faint stars in the cluster.

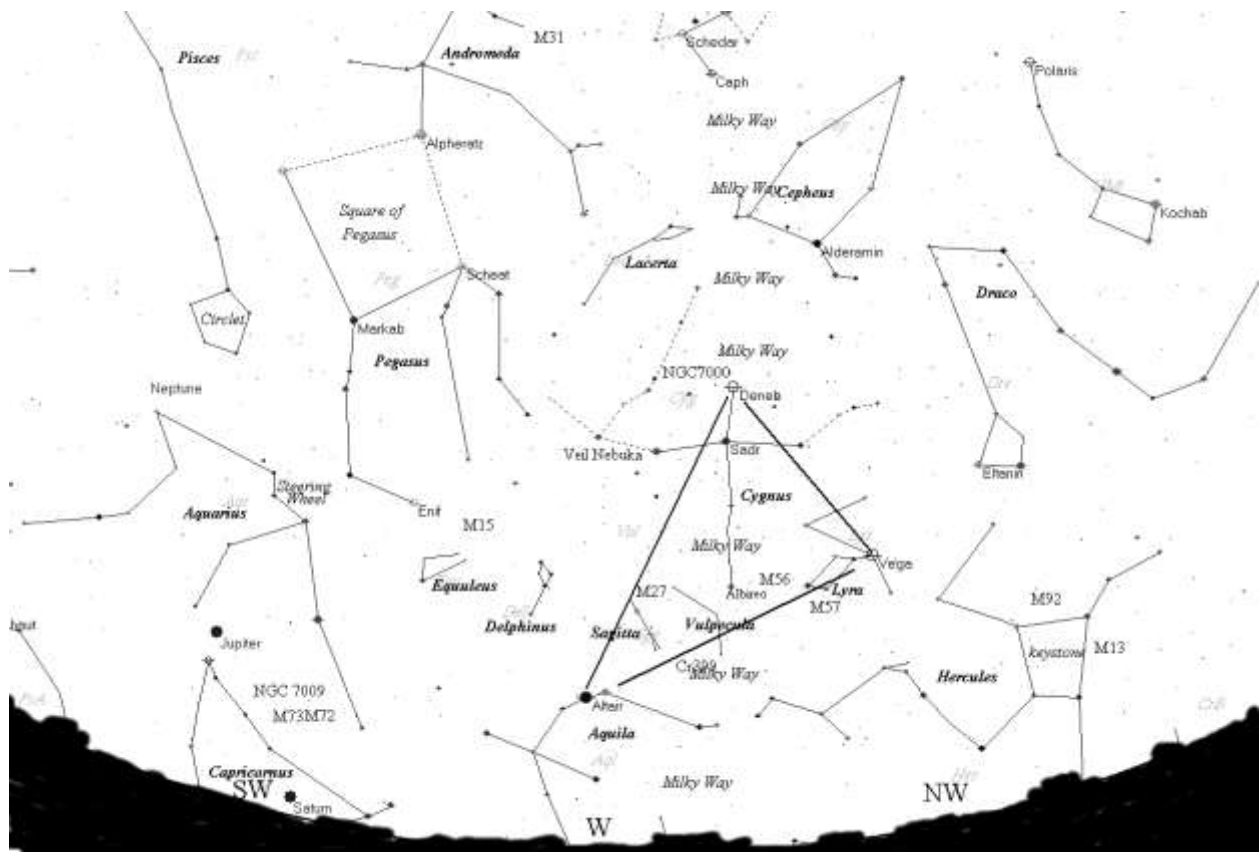


Sky looking north at 8pm early December



Follow the pointer's Dubhe and Merak to find the polestar Polaris

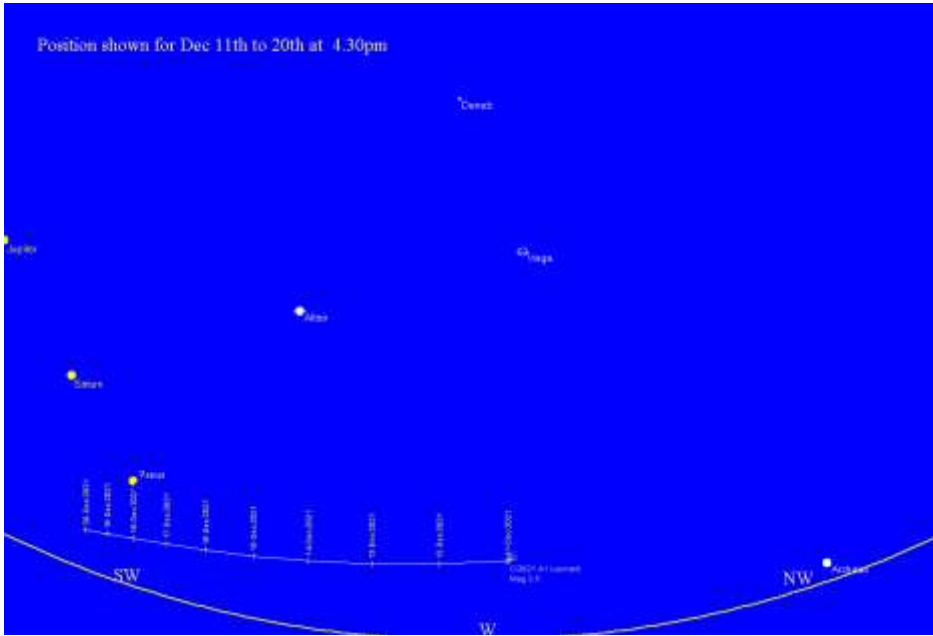
Sky looking west at 8pm early December



Familiar summer constellations slip towards the western horizon – Saturn sets by around 8pm

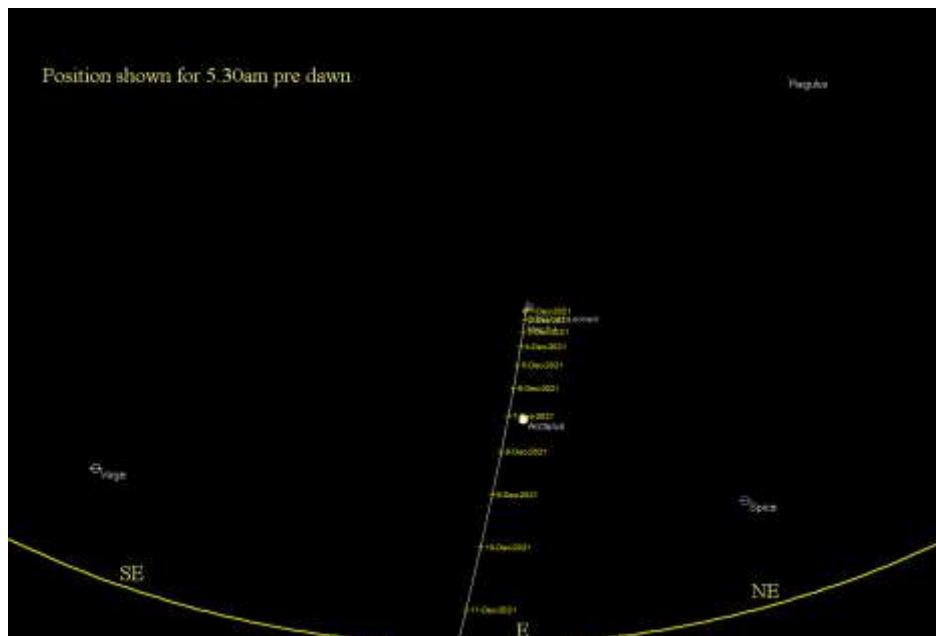
Comet C/2021 A1 Leonard - Sky looking west 11th December at 4.30pm **\*\* after sunset**

Approximate position at 4.30pm Dec 11<sup>th</sup> to 20<sup>th</sup> – Comet Leonard may however be difficult to spot in bright twilight. maximum brightness around 4<sup>th</sup> magnitude Dec 11<sup>th</sup> **Binoculars required – Only sweep for the comet after the Sun has completely set** - A good western horizon is required elevation around 10° or 2 FOV of 10x50 finder / binoculars



Approx position shown for 4.30pm Dec 11<sup>th</sup> -20<sup>th</sup> in evening twilight – Binoculars required

Better prospects for viewing the comet in pre dawn looking east at 5.30am Binoculars required

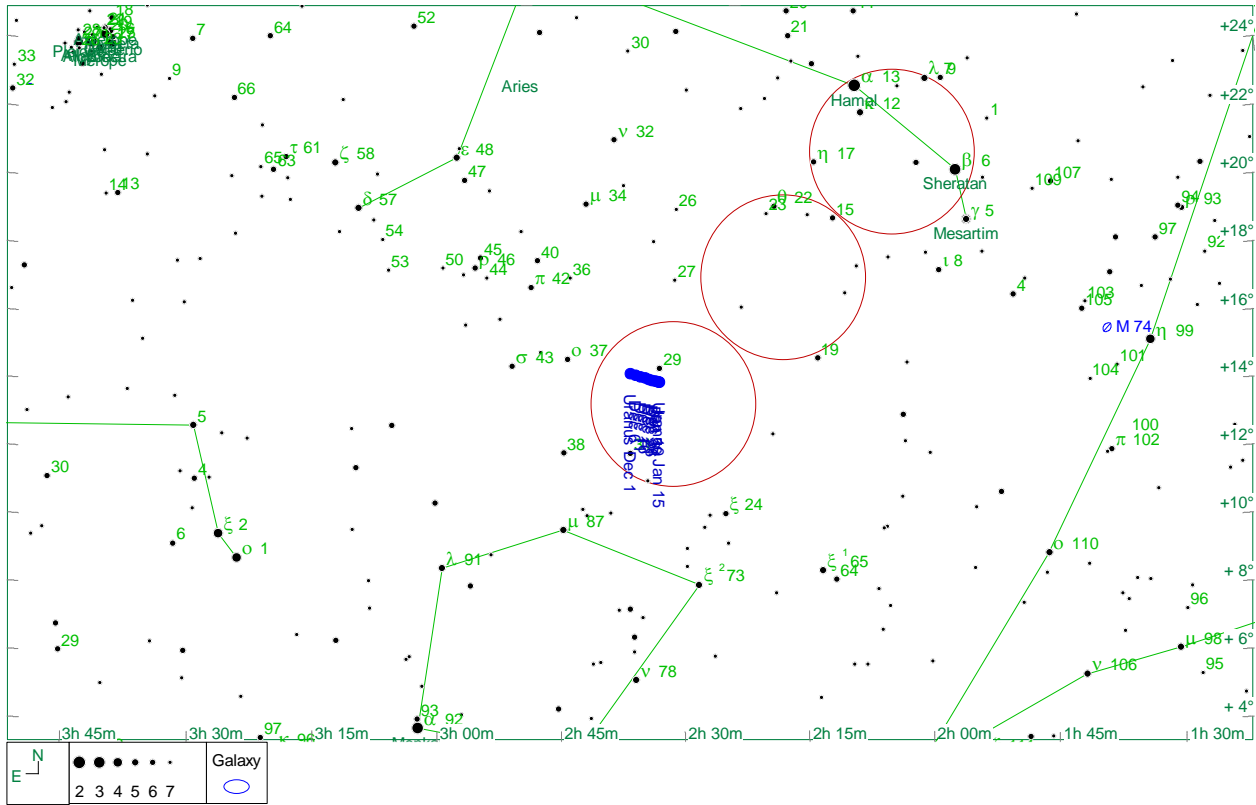


Locate the bright star Arcturus in the east - optimum dates Dec 1<sup>st</sup> to Dec 11<sup>th</sup> at 5.30 am

**Binoculars required – Only sweep for the comet with the Sun completely below the horizon**



LAS general finder chart for Uranus for Dec 2021



Uranus now past opposition is around 5.7 magnitudes positioned in the south early evening, visible in binoculars or small telescope as a blue coloured star like point approx 2½ finder FOV below the star Hamal in Aries

General finder map Neptune, Mag 7.9 Neptune is close to Phi Aquarii

