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SKY GUIDE

Astronomical guide for
March 2025

The most up-to-date guide to planetary and lunar activity, comet news and space wonders.

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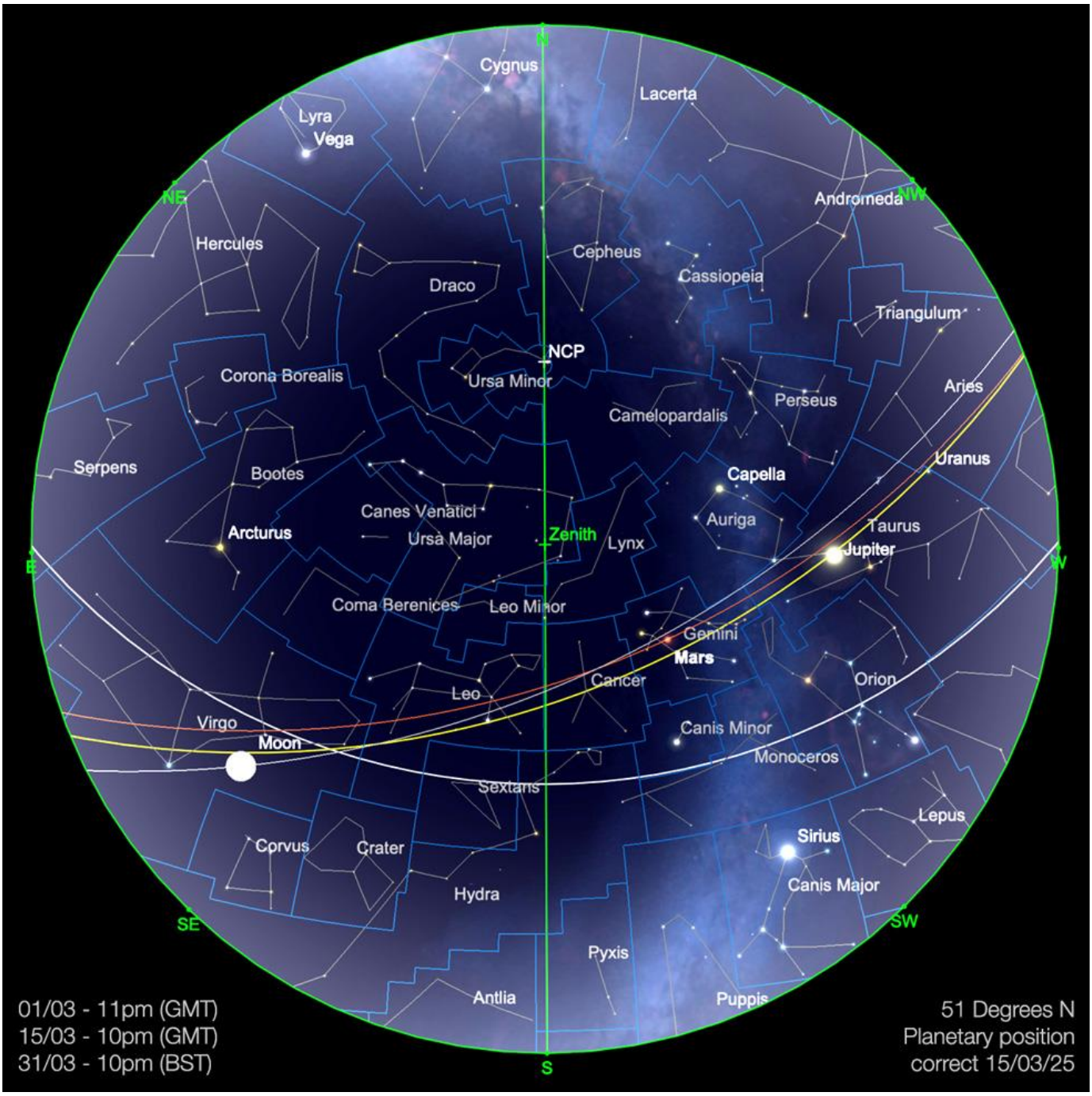
Expand your horizon

Telescope House Hosted By Bresser UK March Sky Guide



March is a transitional month in terms of the sky, as the Sun moves from the southern celestial hemisphere to the northern. This marks the annual Spring Equinox, which this year takes place on Thursday, 20th March 2025. It is the official start of spring, though the way the seasons gradually unfold is a complex matter, with many interlinked (and occasionally contradictory) signifiers. However, from an astronomical perspective, beyond this point, those in the mid-northern hemisphere begin to experience more daylight hours than hours of night. Conversely, those in the southern hemisphere experience the opposite, with the arrival of autumn.

Those of us in mid-northern latitudes who are often outdoors during the crepuscular hours of the day will have undoubtedly noticed the increasing daylight in the mornings and evenings recently. The clocks will move forward on Sunday, 31st March for much of Europe, bringing lighter evenings for many. The European Union had planned to abolish the practice of changing the clocks twice a year, with legislation

passed in 2019 to end it. However, these plans appear to have been put on hold for now. The USA and Canada will adjust their clocks a little earlier this year, on 9th March, while Australia and New Zealand will wait until early April for their autumnal reset. Not all countries observe time changes. Those closer to the equator experience much smaller seasonal variations in day length, so the practice is rarely considered necessary.

The Solar System

The Sun

Our parent star continues on with activity outstripping predictions. Sunspot numbers during January were again significantly greater than those predicted and at time of writing, February's activity is also showing signs of similar behaviour. Websites such as www.spaceweather.com and Michel Deconinck's monthly newsletter (Aquarellia Observatory Forecasts) cover differing aspects of solar observations and provide valuable insights into the current state of our parent star. Signing up for the AuroraWatch app, developed by Lancaster University in the UK, is also highly recommended for those seeking advance warnings of impending auroral events. While there have been no really large auroral displays in recent months, current peak activity means further displays could be just around the corner.

The Solar highlight of the month is undoubtedly the partial solar eclipse that will take place towards the end of the month. On 29th March 2025, a partial solar eclipse will be visible across the partial eclipse will be visible for parts of the northeastern United States, eastern Canada, Greenland, Europe, Northwest Africa, and northwestern Russia, offering observers a chance to witness this event. During a partial solar eclipse, the Moon covers a portion of the Sun, creating a noticeable dimming of daylight.

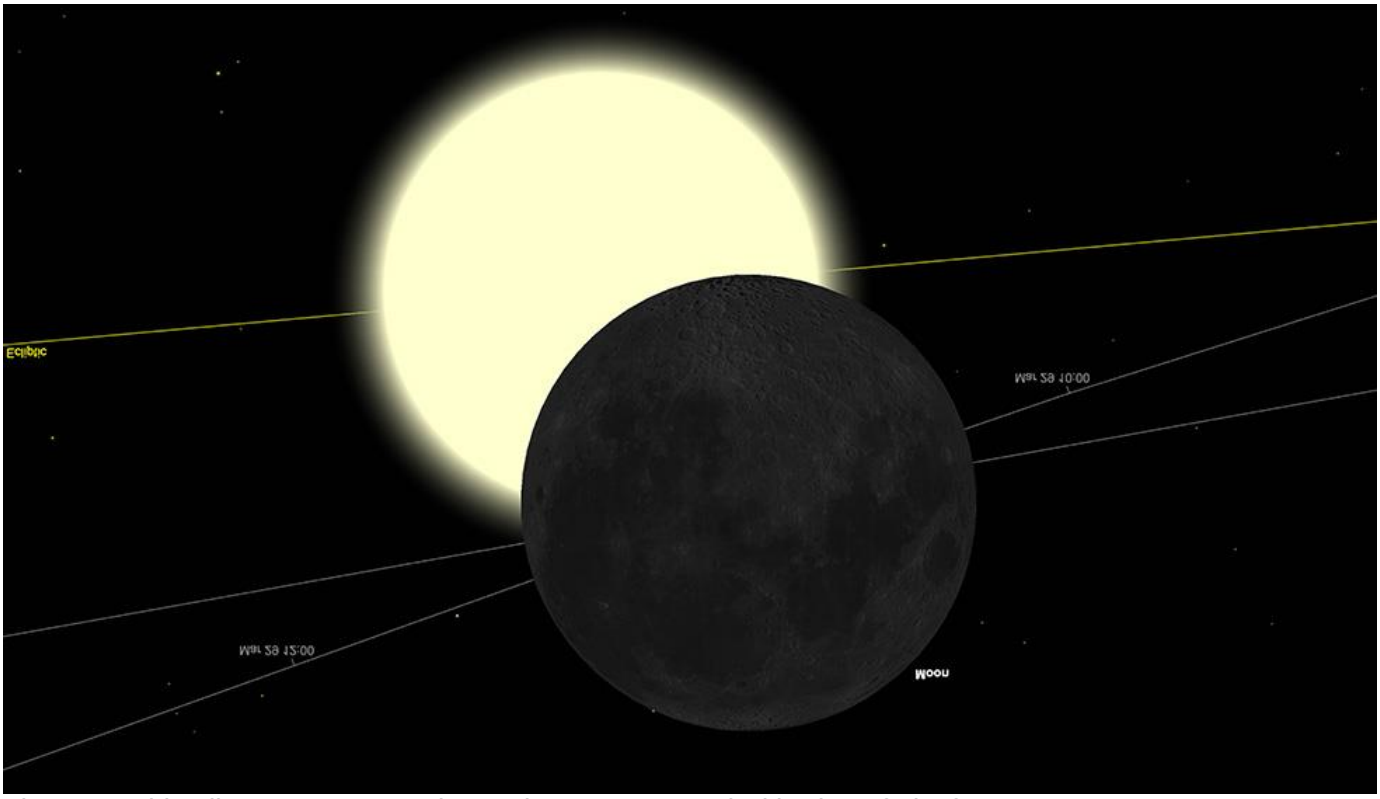
In the Southern UK, the eclipse will commence at approximately 10:00 am GMT, reaching its maximum coverage at a little before 11am GMT, with about 41.7% of the Sun's diameter obscured by the Moon. The event will conclude by a little before 12:00 noon GMT, resulting in a total duration of 1 hour and 53 minutes. Observers in other parts of the UK will experience slight variations in timing and the extent of the eclipse. For instance, in northern regions, a marginally greater portion of the Sun will be obscured compared to southern areas. Likewise those further north in the Eclipse's wider catchment area will see more of the Sun covered by the Moon.

Observing a solar eclipse requires strict adherence to safety measures to protect your eyesight. Looking directly at the Sun without appropriate protection can cause serious and permanent eye damage. Standard sunglasses are insufficient for this purpose. To view the eclipse safely, use specialised eclipse glasses or filters that meet the ISO 12312-2 international safety standard. These glasses are designed to filter out harmful solar radiation. Ensure that the glasses and filters are free from scratches or damage before use.

Alternatively, indirect viewing methods, such as pinhole projectors can be employed. This technique involves projecting the Sun's image onto a surface, allowing you to observe the eclipse without looking directly at the Sun. Various online guides provide instructions on constructing simple pinhole projectors using household materials. It's crucial to avoid using unapproved filters or optical devices like cameras,

telescopes, or binoculars without proper solar filters, as they can intensify sunlight and cause severe eye injuries. Always supervise children and others during eclipse viewing to ensure they follow safety protocols. Naturally, dedicated Solar Telescopes, such as H-Alpha and Calcium-K instruments and refractors with Herschel Wedges will be perfectly safe to use for eclipse observing

The visibility of the eclipse is contingent on local weather conditions. Cloud cover can obstruct the view of the Sun, so it's advisable to check the weather forecast as the date approaches. In case of unfavourable weather, live streams of the eclipse may be available from various astronomical organisations, allowing you to experience the event virtually. By following these guidelines and taking necessary precautions, we hope that you can safely enjoy the partial solar eclipse of 29th March.



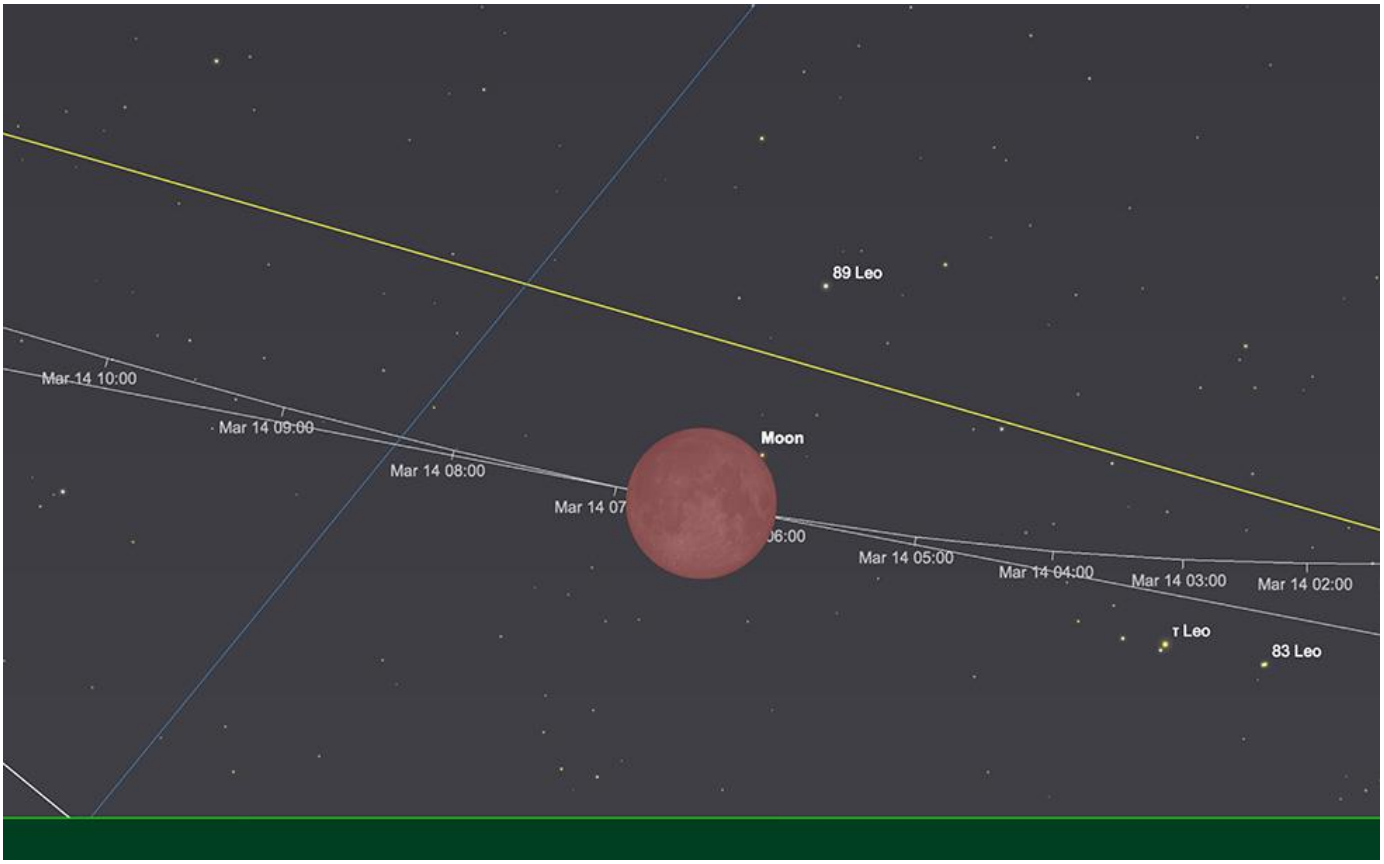
The Sun, mid-eclipse 10:48 am 29th March. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

The Moon

March commences with the Moon as a waxing crescent, approximately one day old, positioned in the constellation Pisces on the 1st - found in between Mercury and Venus.

As the evenings progress, during the first part of the month, the Moon's crescent becomes more prominent, ascending higher in sky above the horizon as the days go by. The Moon is currently in one of the previously-mentioned "High Spring Crescent" phases, for observers in the Northern Hemisphere. This affords observers in temperate northern latitudes and above some excellent conditions to observe the Moon telescopically. By the 5th March, the Moon draws alongside the Pleiades (Messier 45) in Taurus, while the next night reaches its First Quarter phase, also in the constellation Taurus, while alongside the brilliant Jupiter - the two very different worlds presenting a delightful spectacle, high in the evening sky.

Continuing its path around the ecliptic plane, the Moon then traverses through Gemini and Cancer, passing very close to the fading Mars in Gemini on the night of the 8th/9th. The Moon culminates as Full on the 14th of March, situated in the constellation Leo. This Full Moon will undergo a total lunar eclipse during the early morning of the 14th. The Moon makes 1st Penumbral contact at around 4 am (GMT) and the Umbral phase starts just over an hour later at around 5.11am (GMT). The eclipse will reach full Umbral phase at 6.27am, while just above the horizon for those in the west of Europe and Africa. This eclipse will be visible from various regions, including the Americas, Western Europe and Africa. Those in the Americas will see it best, but the first half of the eclipse will be visible from most of Europe - rewarding the early riser.



The Moon at mid-eclipse, 6:27 am 14th March. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

During a Total Lunar Eclipse, the Moon will pass through Earth's shadow, causing it to adopt a deep red or orange hue—a phenomenon commonly known as a "Blood Moon." Different depths. A lunar eclipse occurs when the Earth passes directly between the Sun and the Moon, casting a shadow that darkens the lunar surface. This can only take place during a Full Moon, when the Moon is on the opposite side of the Earth from the Sun. However, a lunar eclipse does not happen every month because the Moon's orbit is slightly tilted relative to the Earth's orbital plane around the Sun. As a result, the Moon usually passes above or below the Earth's shadow rather than directly through it.

When conditions align, and the three celestial bodies form a perfect or near-perfect straight line, the Earth's shadow falls upon the Moon, leading to an eclipse. The shadow is divided into two distinct parts: the penumbra and the umbra. The penumbral shadow is the outer, lighter region where only a portion of the Sun's light is blocked, causing a subtle dimming of the Moon's brightness. The umbra, however, is the central, darker part of the shadow, where the Earth completely blocks direct sunlight from reaching the Moon. It is when the Moon enters this umbra that the most striking effects of the eclipse occur.

There are three main types of lunar eclipses: penumbral, partial, and total. A penumbral eclipse happens when the Moon passes only through the Earth's penumbral shadow, resulting in a slight shading that can be difficult to detect with the naked eye. A partial eclipse occurs when a portion of the Moon moves into the umbra, creating a noticeable darkening across part of its surface. The most dramatic type is a total lunar eclipse, where the entire Moon becomes engulfed in the Earth's umbral shadow. During this phase, rather than disappearing completely, the Moon often takes on a deep red or copper hue due to sunlight being refracted and scattered through the Earth's atmosphere. This effect, known as Rayleigh scattering, is the same phenomenon that makes the sky appear blue during the day and sunsets red in the evening. The more dust, pollution, or volcanic ash in the atmosphere, the deeper and richer the red hue can become.

Lunar eclipses are visible from anywhere on Earth where the Moon is above the horizon at the time of the event, making them far more accessible to observers than solar eclipses, which are only visible from specific locations. Unlike solar eclipses, they are also completely safe to observe with the naked eye, binoculars, or telescopes, offering a spectacular and eerie transformation of the Moon for all who take the time to observe.

As the month advances, the Moon continues its path, moving through Virgo, Libra and Scorpius and reaches its Last Quarter phase on the 22nd March in the constellation Sagittarius. During this phase, the Moon rises later each night, providing darker skies in the early evening, which are ideal for deep-sky observations.

In the final week of March, the Moon descends through Capricornus and Aquarius, eventually arriving back at the constellation Pisces. Here, it aligns with the Sun as a partial eclipse on the 29th March, marking New Moon phase. The last few days of the month finds the Moon a slender waxing crescent, becoming visible in the western sky during twilight, gradually ascending, as it embarks on the next lunar cycle.

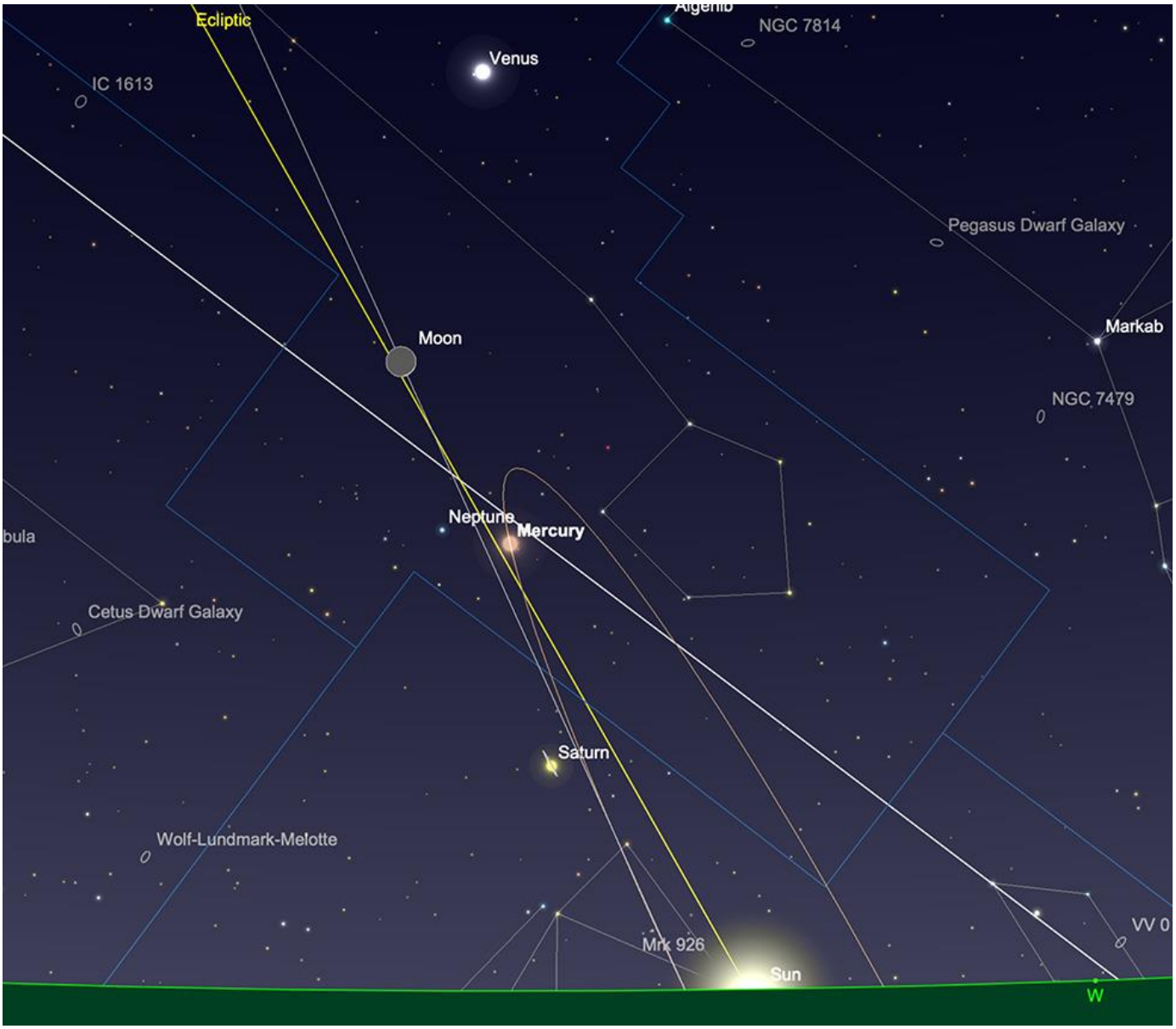
Mercury

Observing Mercury in March 2025 presents a favourable opportunity for observers in the Northern Hemisphere. Following its superior conjunction in early February, Mercury has been gradually emerging from the Sun's glare, becoming visible in the western sky after sunset in early March.

During early March, Mercury can be seen approximately 30 minutes after sunset as a bright star-like point of light just above the western horizon. At this stage, it shines at around magnitude -1.0, standing 13 1/2degrees above the western horizon at sunset (as observed from 51 degrees N). AT this point in time Mercury displays a disc of just over 6 arc seconds diameter and a 73% illuminated phase. The best viewing occurs around Mercury's greatest eastern elongation on 8th March, when it reaches 18 degrees east of the Sun. At this point it will stand 16 degrees high in the west after sunset (from 51 degrees N), with the brighter Venus acting as a helpful waypoint, just under 7 degrees to the NW. Venus remains flanking Mercury to the west by a similar distance over the next week

By mid-March, the planet becomes fainter, dimming to around magnitude -0.4 before disappearing back into the twilight by the final week of the month. Mercury's angular size grows slightly from 6 arc seconds at

the start of March to 10+ arc seconds towards the end, though its illuminated phase reduces significantly, leading to its rapid drop in brightness as it dips towards the Sun. On 24th March, Mercury reaches inferior conjunction - in between Earth and the Sun - and will be unobservable, until it re-emerges as a morning target.



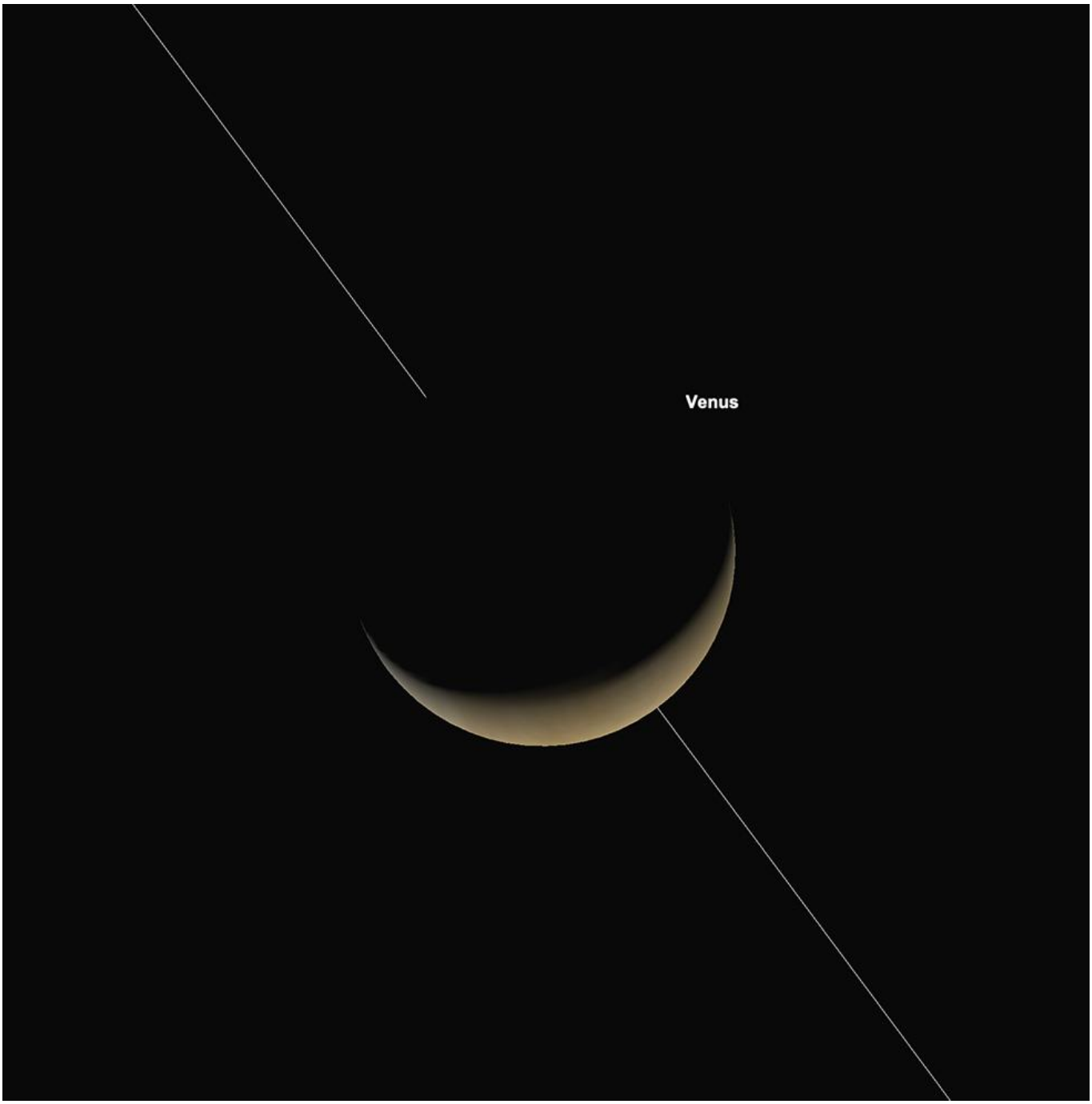
Venus

Venus remains a brilliant beacon in the evening sky throughout March 2025 - though its observability begins to suffer as it dips back down towards the Sun as time progresses.

At the beginning of the month, it shines at magnitude -4.6 in the constellation of Pisces, standing about 28 degrees above the western horizon at sunset (from 51° north). Its slim crescent-shaped illuminated disc spans approximately 49 arc seconds across, with only 13% of its surface illuminated.

By mid-month, Venus stands lower in the sky, sitting at around 13 degrees above the horizon (again, as observed from 51° north). The planet maintains its intense brightness, while its phase diminishes to about 3% illumination - the cause of which is its apparent size, which has expanded further to around 58 arc seconds diameter.

Towards the end of March, Venus meets the Sun in Pisces, coming to inferior conjunction (between the Earth and the Sun). Past this point, Venus becomes a morning object and ends the month at -4.2 magnitude and 57.3 arc seconds diameter, showing an extremely thin, 3.2% illuminated crescent phase. The planet will rise just over an hour before the Sun on the morning of the 31st.

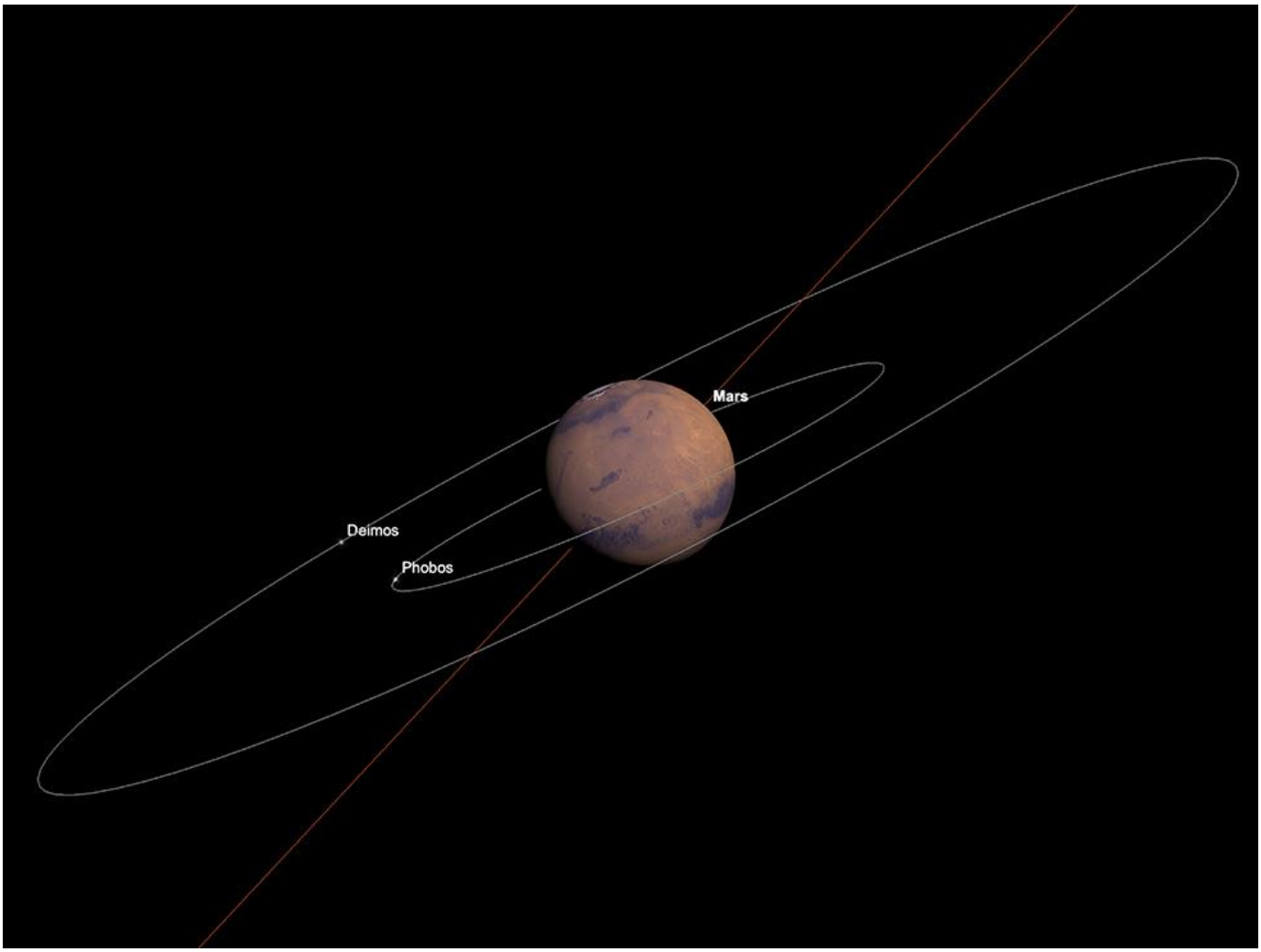


Venus at sunset, 1st March. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Mars

Mars continues its slow retreat from the prominence it enjoyed during its recent opposition. At the beginning of March, it shines at magnitude -0.3 in the constellation of Gemini, displaying an angular diameter of around 10.8 arc seconds. As the month progresses, Mars dims significantly to magnitude -+0.4 by the end of March - with its disc shrinking from 10.8 arc seconds diameter and the month's beginning, down to approximately 8 arc seconds across.

The Red Planet transits close to the meridian at around 9:00 pm GMT at the start of the month and at 8:00 pm BST (with suitable adjustment for our transition to Summer Time in Europe), by the end of March, remaining well-placed for evening observation - though in truth, by the end of March, Mars is significantly smaller and is emphatically not what it was at the beginning of the year. Surface details may require a moderate-sized telescope to discern, but keen-eyed observers should still be able to glimpse its characteristic reddish hue and polar caps.



Mars, early evening, 1st March. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

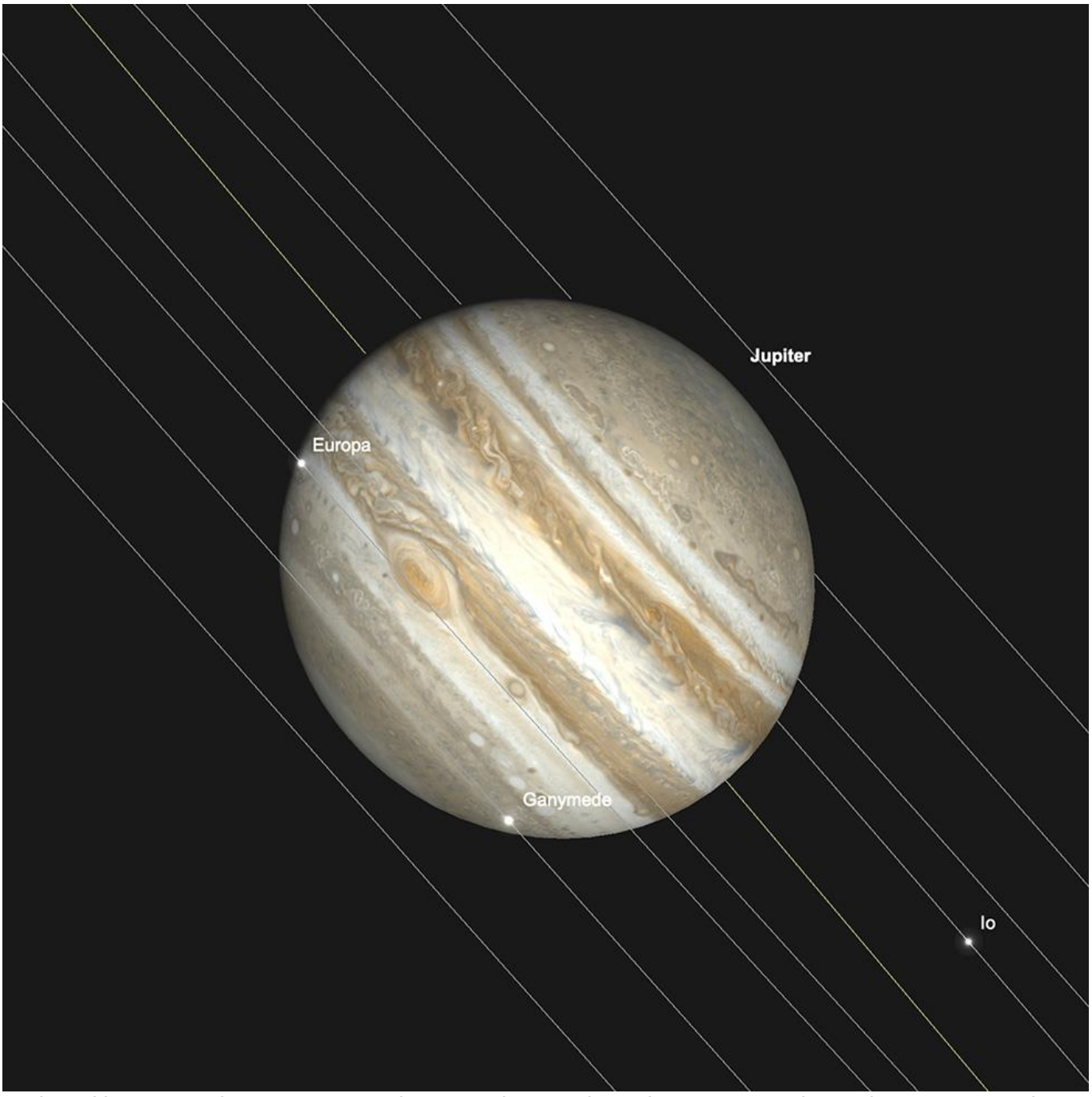
Jupiter

Jupiter remains a commanding presence in the evening sky throughout March 2025. Situated in Taurus, it shines at magnitude -2.3 at the start of the month, with an angular diameter of approximately 39.5 arc seconds. The giant planet remains well-placed in the evening, transiting the meridian at a little before 6:30 pm GMT, before setting in the early hours.

By mid-March, Jupiter's brightness decreases slightly to magnitude -2.2, with its apparent size reducing marginally to around 38 arc seconds. Observers with telescopes can enjoy views of its dynamic cloud bands and the ever-changing positions of its four Galilean moons.

At the end of the month, Jupiter will have reduced in brightness very slightly to 2.1 magnitude and now shows a 36 arc 2nd diameter disc.

Several transits involving the Galilean moons, provide additional highlights throughout the month. There is a good early evening Ganymede transit on the evening of the 4th, which is followed a couple of hours later by a Europa/Europa shadow transit and a GRS transit, later still. The following evening on the 5th, finds a mutual Io/Io shadow transit and GRS transit starting around 8pm (GMT). There is a great GRS, Ganymede and Europa mutual transit, that reaches a peak at around 11.40pm (GMT) on the 11th March. There's a nice early evening GRS/Europa/Europa shadow transit, which starts around 5pm on the evening of the 22nd March. There's an evening GRS/Io/Io shadow transit, which starts around 9pm on the evening of the 28th March. This followed on the 30th by another GRS/Io/Io shadow transit, which starts around 4pm (BST), on the evening of the 28th March.

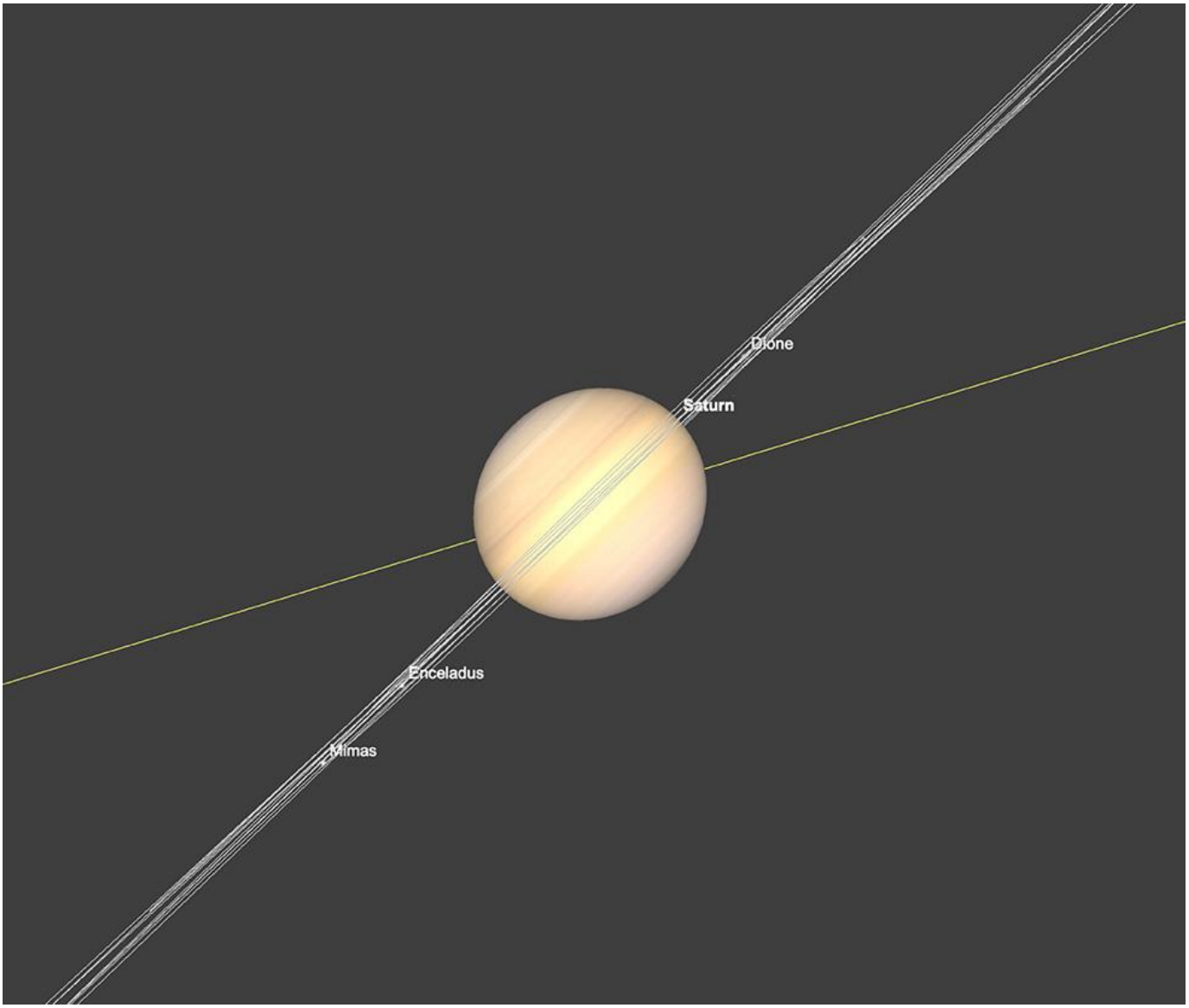


Jupiter with Great Red Spot, Europa and Ganymede mutual transit, 11:41pm, 11th March. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Saturn

Saturn is found very low in the evening sky in the very beginning of March and reaches superior conjunction - the opposite side of the Sun from Earth - on March 12th. Saturn then gradually becomes a morning object - though a very difficult to observe one. At magnitude +1.1 and presenting a disc of around 15.7 arc seconds, the Ringed Planet will remain challenging to observe until later in the year, when it rises higher before dawn.

Saturn's rings continue to appear increasingly edge-on, at the beginning of the month, offering a strikingly thin appearance ahead of the ring-plane crossing on the 23rd March 2025. Sadly, this ring-plane crossing will be a nigh-on impossible event to observe, with Saturn so close to the Sun. At sunrise on the morning of the 23rd, Saturn will only just have risen itself, in a very shallow-rising part of the ecliptic as seen from higher northern latitudes. This is a great pity, as a ring plane crossing is quite a remarkable event to witness - with just the thinest of shadows bisecting Saturn, giving us a clue that it is even a ringed planet at all. Some observers have reported that quite close to ring plane crossing that the extremely fine plane of the ring appears to brighten somewhat. Debate continues as to whether or not this is a genuine phenomenon. This could be down to line-of-sight effects, or a similar brightening to the "Seeliger effect", which is seen around opposition, when Saturn's rings are wider open - or simply wishful thinking on the part of the observer. We will have to wait until January 2039 for the next ring plane crossing - and a little later in 2025 for Saturn to be significantly higher in the sky again.



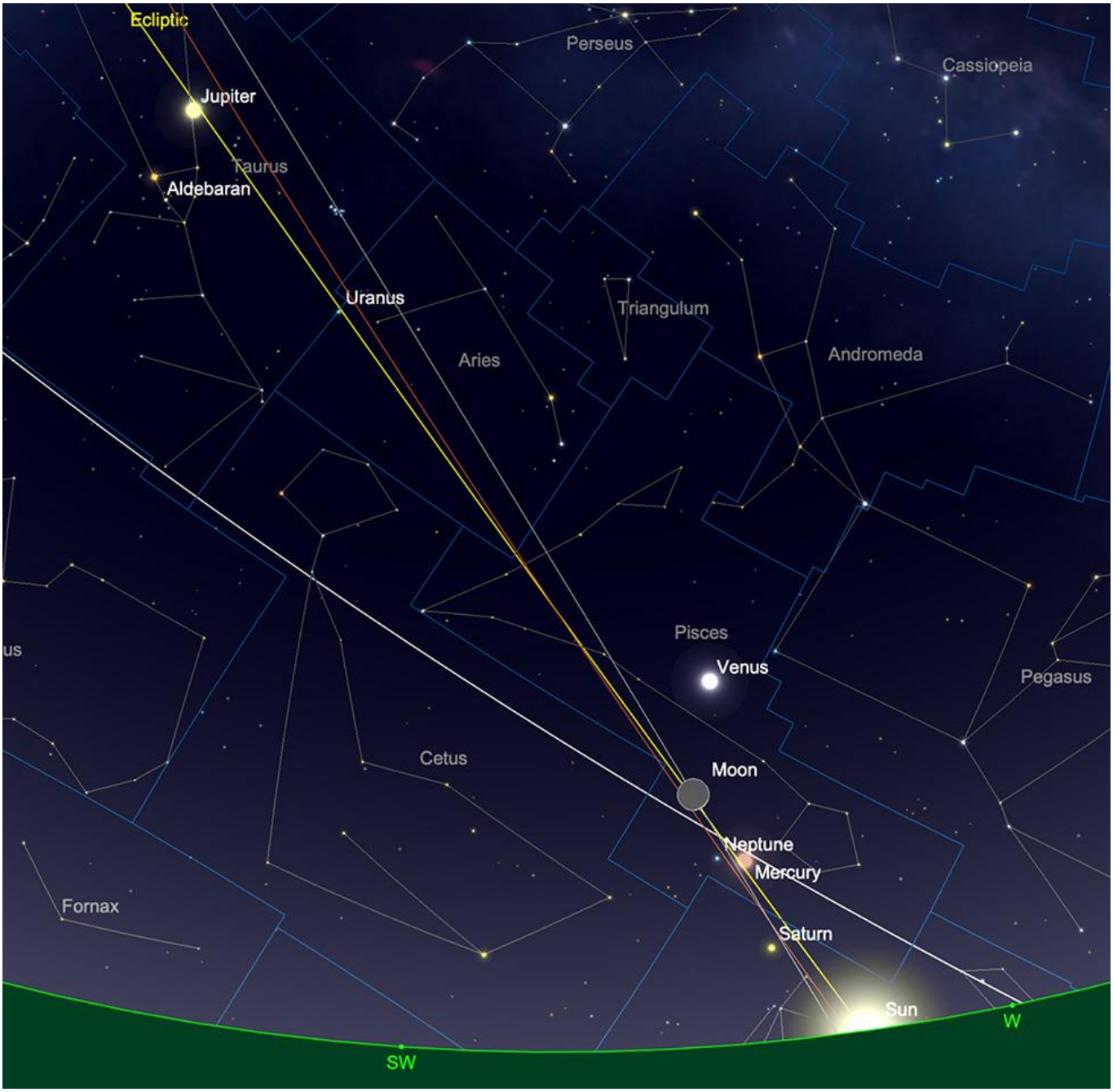
Saturn at ring plane crossing, sunrise, 23rd March. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Uranus and Neptune

Uranus, located in Aries, remains well-placed for evening observation at magnitude +5.8. Its small 3.5 arcsecond disc can be discerned through binoculars or a small telescope. The planet's apparent motion

gradually carries it towards the western horizon as the month progresses, making early evening the best time to observe it, before it sets later in the night.

Neptune, on the other hand, has become increasingly difficult to observe as it approaches superior conjunction, which it reaches on March 19th. Shining at magnitude +8, it resides in Pisces, but is completely lost in the evening twilight during early March. Neptune will return to visibility in the morning sky later in the year.



Uranus and Neptune relative positions, sunset, 1st March. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Comets

After the excitement of 2024 G3 (ATLAS) and 2023 A3 (Tsuchinshan-ATLAS), both of which are now a long way past their best (and in the case of 2024 G3 (ATLAS) not observable at all in the northern hemisphere and a “tail-only” object after an unfortunate post-perihelion disintegration), it is all fairly quiet on the cometary front. There are few recently discovered and periodical comets brighter than 12th magnitude at present.

Meteors

There are no major meteor showers predicted in March. It will be the latter part of April until we welcome the Lyrids and the first part of the Eta Aquariids.

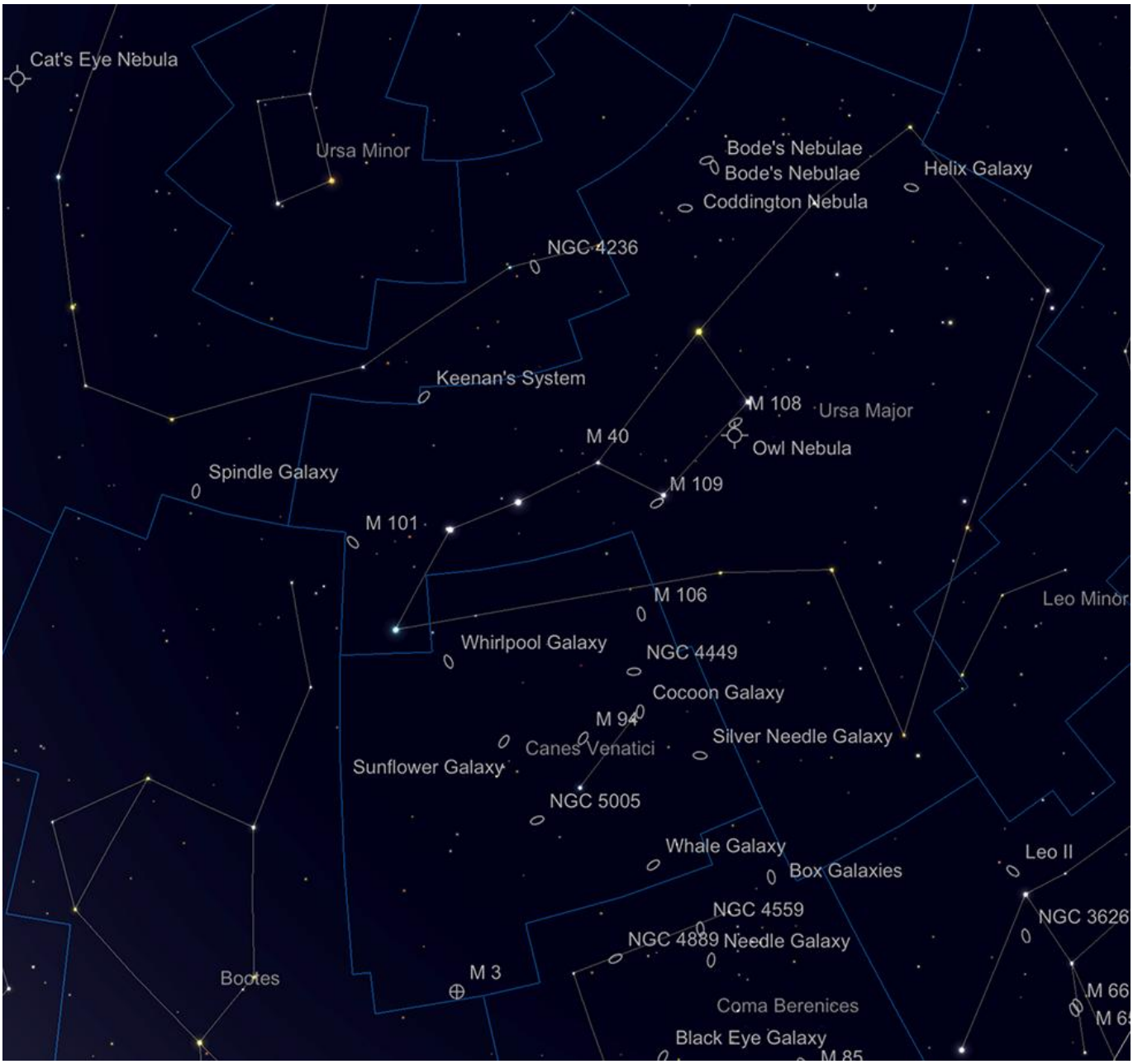
Deep Sky Observation - Welcome to Galaxy Season

Part 1: Ursa Major and Canes Venatici

Springtime is traditionally seen as Galaxy Season, so for the next three months, we'll be concentrating on the rich area of the heavens that runs from Ursa Major and Canes Venatici in the North, through Coma Berenices, on into the Zodiacal constellations of Leo and Virgo. This area of sky is well removed from the sweep of our Milky Way's axis and is a major "window" from our perspective out into extra-galactic space. The arc we will be covering, from M81 and M82 in the North of Ursa Major to M104, the Sombrero Galaxy in the South of Virgo takes in 90 degrees of sky and is full of easily-found and observed galaxies.

We start in the far Northern part of this arc (with suitable apologies to readers in the Southern Hemisphere), in the large and imposing constellation of Ursa Major, the Great Bear.

Known the world over for the distinctive question mark-shaped asterism of the Plough or the Big Dipper, Ursa Major actually extends over a much larger area. As such, it is actually the third largest constellation of all, after Hydra and Virgo.



Ursa Major and Canes Venatici. Image created with SkySafari 5 for Mac OS X, ©2010-2016 Simulation Curriculum Corp., skysafariastronomy.com.

Ursa Major is rich with deep sky objects, the first of which we shall cover is one of the fainter members of this group, NGC2685, the Helix Galaxy. At +11.30 mag and 4.6 x2.5 arc minutes across, the Helix Galaxy is hardly bright or indeed large, but still worth searching out. It can be found in the extreme west of Ursa Major, some 3 3/4 degrees SE of Muscida, Omicron Ursae Majoris - the star that marks the Great Bear's nose. NGC2685 is what's known as a Polar Ring Galaxy, a curious formation caused by the collision and/or interaction between two large galaxies. This causes great loops and rings of stars to form around the exterior of a central galaxy complex. These filament-like structures of gas and star material are often extremely attractive and NGC2685 is a prime example of this. This galaxy is also of the Seifert type, meaning it is energetically emitting radiation, probably as a result of the collision which formed its outer Helix-like structure. It is only in very large telescopes that it is possible to see the delicate ring structures, but they appear as very evident in long duration astrophotographs. The Helix is thought to lie around 42 million light years from Earth.

NGC2685 by Ken Crawford http://www.imagingdeepsky.com/Galaxies/NGC2685/NGC2685.htm - Creative Commons

12 degrees or so to the NE of the Helix lie two of the most celebrated objects in the sky and one of the great astronomical "odd couples" (another of which later): M81 and M82. These two galaxies are separated by just over half a degree, but are quite different-looking objects. Of the two, M81 is the dominant - a marvellous sweeping spiral, almost perfectly presented to our perspective, with two major arms, surrounding a large, bright core. At +6.90 mag and 24.9 x 11.5 arc minutes dimensions, M81 can easily be seen in telescopes and binoculars of all sizes - some keen eyed observers have even reported being able to see it with the naked eye under perfect conditions. If this is the case, at 12 million light years distance, it must be the most distant object visible to humans unaided. The M81 group of galaxies are thought to be the nearest collection of galaxies to our own local group. Indeed, some sources suggest that we should actually see our local group of galaxies and the M81 group as a larger collective, as there is some evidence of gravitational interaction between the two.

M81 was discovered by Johann Bode in 1774, along with neighbouring M82. As such both objects are often rather confusingly known as Bode's Nebula. Pierre Mechain independently discovered it in 1779 and Messier added both M81 and M82 to his catalogue two years later. In a telescope of 8-inch aperture and above, the true Spiral nature of M81 really begins to reveal itself - indeed it is one of the few spirals that show real evidence of its shape at such apertures. In long duration images, M81 practically leaps out of the darkness and given it and M82's proximity to one another, it is hardly surprising that these two objects are amongst the most photographed in the entire sky.

M82 by contrast is a very unusual object - otherwise known as the Cigar Galaxy (for very obvious reasons). This galaxy is somewhat fainter than its neighbour at +8.39 mag, but is also considerably smaller in area at 11.2 x 4.3 arc minutes dimensions. Subsequently, the surface brightness of M82 is not dissimilar to M81's. M82 is thought to have been somewhat deformed from a regular spiral structure by interaction with M81 and is bisected by a deep red lane of heavy star forming material. This bisection is clearly visible in telescopes and spectacularly revealed in even modest length exposures . This region looks almost organic in images, with feathery, root like structures shooting in both directions perpendicular to the galaxy's major axis. The power behind this structure seems to be Supernovae, which have been thought to have occurred in M82 with almost metronomic regularity - estimates put the figure at once every decade, though not all of these have been directly observed. The last Supernova event, a type Ia, in M82 was observed in January 2014 and brightened to +8 mag - it was the closest and brightest observed Supernova since the LMC Supernova in 1987.

M81 and 82 by Mark Blundell. Image used with kind permission.

In addition to M81 and M82, a smaller outlying galaxy, NGC 3077, which is a 5.2 x 4.7 arc minute +9.89 mag object, forms a sort of equilateral triangle with its two more dominant neighbours. This is a little more difficult from a visual perspective, though shows up well in images.

You don't need a large telescope to observe these galaxies, binoculars and a reasonable sky will show them, but the beauty of M81 and the mysterious nature of M82 are a joy to behold in a medium to large-sized telescope.

The curious Coddington's Nebula, IC 2574, lies around 3 degrees to the E of M81 and M82 in the direction of Dubhe, Alpha Ursae Majoris. This galaxy is an outlying member of the M81 group too. At +10.39 mag and 13.2 x 5.4 arc minutes area, it is somewhat low in surface brightness and not nearly as conspicuous as its neighbours - subsequently it was overlooked until Edwin Foster Coddington discovered it in 1898.

Follow Duhbe down the "Bowl" of the Big Dipper to Merak, or Beta Ursae Majoris. A degree and a half E of Merak lies another "odd couple" - the galaxy M108 and the planetary nebula, M97, otherwise known as the Owl Nebula. Both were discovered by Pierre Mechain in the early 1780s, though M108 was not officially added to the Messier list until the 1950s. M108 is a fine spiral galaxy, viewed nearly edge on and showing a distinct mottling in its texture. At +10 mag and 8.6 x 2.4 arc minutes, M108 can be seen fairly easily in most small telescopes and shows some notable H II nebulous regions with a UHC filter or similar in larger scopes. This galaxy is thought to be an outlying member of the M81 group and lies some 35 million light years away.

M97, or the Owl, is much closer at 1900 light years away and is very much a part of our galactic neighbourhood - its association with its neighbour is merely a lucky line of sight event and has no further significance than that. Unlike M108, the Owl was originally classified by Messier in 1781. When one observes the Owl through a reasonable sized telescope, most successfully when using an OIII filter, the reason for its nickname become apparent. This Planetary shows two distinct dark "eyes" like the face of an owl looking out through the cosmic gloom. These eyes are simply regions in the toroidal structure of the nebula where there are voids of gas - these are quite common features of many Planetary nebulae - the less material in these sections leads to a lower contrast area. The Owl has a central star, which is difficult to observe in smaller telescopes.

M97 and 108 by Mark Blundell. Image used with kind permission.

This pair of lovely objects, much like M81 and M82 is understandably a perennial subject for imagers.

Moving East along the bowl of the Dipper, or the blade of the Plough, we come to Phecda, or Gamma Ursae Majoris. Some 38 arc minutes to the E of Phecda is the stunning galaxy M109. Like M108, this is a latter addition to the Messier list, though discovered by Mechain in 1781. M109 is a +9.80 mag, 7.5 x 4.4 arc second target and one of the most beautiful Barred Spiral Galaxies in the entire sky. It can be spotted in binoculars under good conditions, though larger telescopes are needed to show evidence of its spiral arms and prominent central bar. M109 has three major arms which become evident under higher magnification in larger telescopes, though suffered the indignity of being incorrectly classified as a Planetary nebula by Sir William Herschel. Under lower magnification, M109 looks distinctly egg-shaped, so this might go some way to explaining the great Astronomer's error! Lying around 75 million light years away, M109 is the most prominent member of the larger Ursa Major group of galaxies, which are distinct from the closer M81 group.

M109 by Mark Blundell. Image used with kind permission.

From M109, we now travel up the bowl of the Big Dipper, along the handle, passing Megrez, Alioth and the double star Mizar and Alcor. If we continue to trace a line from Alioth, through Mizar, to the point where this line would be bisected by a perpendicular line moving up Northward from the last star in the handle, Alkiad, we come to the location of the last of the galaxies in Ursa Major we will cover this month: the face-on spiral M101.

M101 is a large galaxy, taking up an area 28.8 x 26.9 arc minutes across - much larger than even M81. Although its brightness is listed as around +7.9 mag, due to its face-on presentation, this brightness is spread over a very wide area, leading to quite a dim overall target. This galaxy was discovered by Mechain in 1781 and is one of the final original Messier objects, as it was added to the list by Messier later in the same year. Although studied by many astronomers in the interim period, it was only when Lord Rosse turned his 72-inch Leviathan of Parsonstown Reflector towards it in 1851 that its true spiral nature was revealed. Although some observers claim to have seen the first suggestion of spiral structure with instruments as small as 4 inches aperture, it will take exceptional sky conditions to be able to achieve this - or a much larger telescope. Larger telescopes, when combined with UHC, or similar Hydrogen-responsive filters, will start to reveal some of M101's remarkably rich HII regions, where star formation is rife. Indeed, M101 is somewhat of a monster in size, as it is estimated to be twice the diameter of our own Milky Way. It lies around 22 million light years away.

M101 by Mark Blundell. Image used with kind permission.

Somewhat confusingly, M101 is one of the three galaxies in the sky known by the nickname "The Pinwheel" - M33 in Triangulum and M99 in Coma Berenices also share this title.

Moving on from Ursa Major, we dive South into neighbouring Canes Venatici - the hunting dogs. Whereas Ursa Major is a large constellation with prominent stars, Canes Venatici is exactly the opposite - but what it lack is bright stars, it certainly makes up for in galaxies!

The first and best-known of all these is the remarkable M51 - the Whirlpool Galaxy. The Whirlpool is possibly the archetypal face-on spiral galaxy. Whereas M101 is large and relatively faint, M51 at +8.39 mag and 11.2 x 6.9 arc minutes area is more compact and brighter. This galaxy has two massive spiral arms, bound around one another. On the tip of the Northern arm, is a companion galaxy, NGC5195, which is in the process of heavy tidal interaction with M51.

M51 is a true Messier object - it was discovered by him in 1773, though Pierre Mechain discovered NGC5195 later in 1781. Lord Rosse made a famous sketch of M51 through is 72 inch reflector in 1845, which clearly showed M51's Spiral and its satellite - it is this sketch that gave rise to the nickname "Rosse's Question Mark" - for obvious reasons.

Although M51 can be found relatively easily in binoculars, a dark sky will be needed to active this. Small telescopes will show M51's core easily and the first suggestion of a halo surrounding this. However, once the 12-inch barrier is broken in terms of aperture, then M51, really begins to come into its own. This aperture and above will show the Whirlpool in all its glory - and notable features such as the bridge between M51 and NGC5195 and M51's numerous H II regions really begin to stand out. However, it is in long duration images that M51 really reveals all - and in this respect is a constant source of inspiration to astrophotographers.

M51 by Mark Blundell. Image used with kind permission.

M51 is thought to be of a similar size to both our galaxy and M31, the Andromeda Galaxy, and lies around 27 million light years away.

Just under 40 arc minutes to the S of M51 lies the elliptical galaxy NGC5173, otherwise known as the Southern Integral Sign. Although +12.19 mag in brightness, it is relatively compact at just 1 x 0.9 arc minutes dimensions and is thus quite evident in small telescopes, though rather disappointingly bland in relation to the many spirals that surround it.

Just under 6 degrees to the South of M51 lies the lovely M63, the Sunflower Galaxy. This is a truly beautiful object - a tightly packed spiral with a bright core and fainter outlying arms. It certainly does look distinctly flower-like in long duration images.

The Sunflower has the distinction of being the first discovery made by Pierre Mechain - Charles Messier's partner and major contributor to his list. At +8.6 mag and 12.6 x 7.2 arc minutes across, M63 makes for a relatively straightforward target in most small telescopes, though larger instruments will be needed to make out the spiral structure. This was first noted by Lord Rosse during his survey of spiral nebulae during the 1840s.

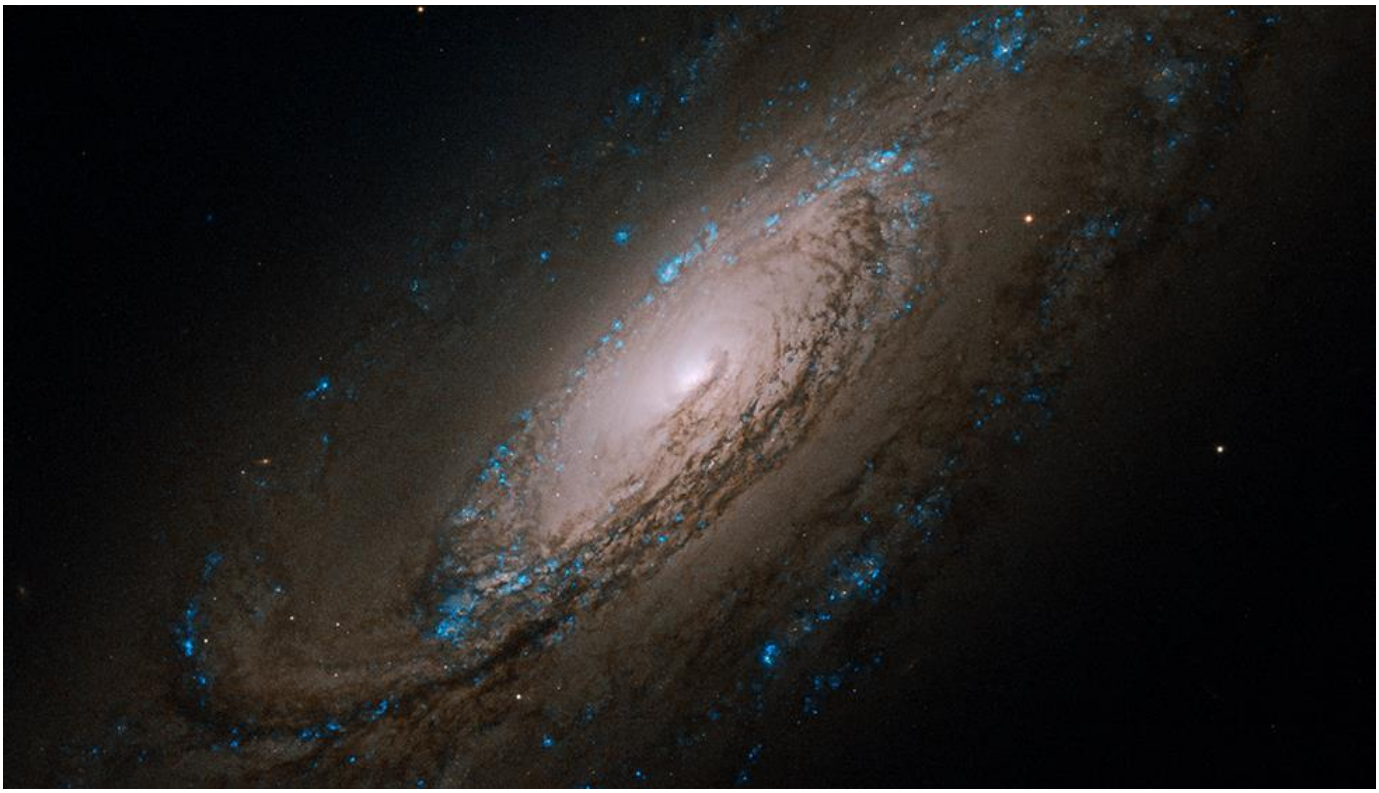
M63 by Mark Blundell. Image used with kind permission.

M63 is thought to lie around 34 million light years from us and is part of the group of galaxies in this area of sky of which M51 is the dominant gravitational member.

4 and 3/4 degrees to the W of M63, we find the distinct galaxy M94, which was another discovery of Mechain in 1781 - and was added to the Messier list in the same year. M94 is, like its major neighbours, a spiral galaxy - albeit a rather unusual one. At +8.19 mag and 14.1 x 12.1 arc minutes area, M94 lies about half the distance from us - 14 million light years - than either M51 and M63. Its structure is notable - a tight compact, very bright spiral core, surrounded by two concentric fainter rings of stars. It is due to this structure that it has gained the nickname in some circles of the Cat's Eye Galaxy. This suggestion of spiral structure shows up well in even small telescopes, though instruments of 8-inches aperture + are needed in order to see much of the outer rings. M94 can be found in binoculars, if sky conditions are kind though a telescope is definitely needed to see anything more than a faint smudge. When imaged, M94 gives up considerable detail, especially in its outer ring.

M94 by Mark Blundell. Image used with kind permission.

Just over 5 1/2 degrees further S from M94, lies NGC5005 - yet another spiral galaxy. At +9.80 mag and 5.8 x 2.9 arc seconds area, this object has a really bright nucleus, surrounded by a much darker, almost sooty-looking outer arms. In larger telescopes, the elongated aspect of NGC5005 really begins to reveal itself, though in truth, this galaxy is a rather disappointing object in smaller instruments and binoculars.

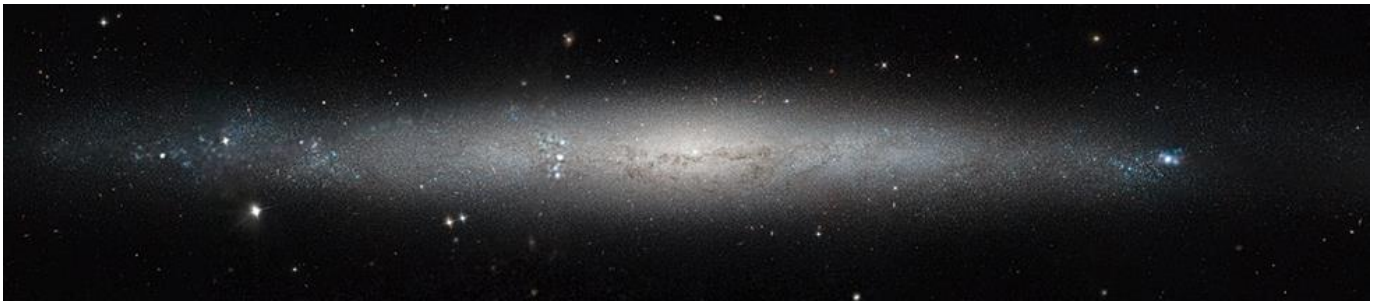


NGC5005 - HST Image. Public Domain.

Under 7 1/2 degrees to the SW of NGC5005, sits the slightly easier to observe NGC4631, otherwise known as the Whale Galaxy. This +9.19 edge-on spiral galaxy does indeed resemble a galactic whale swimming through the cosmos. At 15.2 arc minutes long by just 2.8 arc minutes wide, the Whale has quite high surface brightness and is therefore a relatively easy object in most large binoculars and small telescopes. A companion galaxy, NGC4657, sits to the N of the Whale and is thought to be responsible for some of the larger galaxy's elongation. Both objects lie around 25 million light years away and were discovered by Sir William Herschel in 1787. To the SE of the Whale, by around half a degree, sits another spiral galaxy, NGC4656, otherwise known as the Hockey Stick. Photographic evidence reveals why, as one edge of NGC4656 appears bent - just like a hockey stick. Just like NGC4631, the Hockey Stick was discovered by Herschel, though lies a little further from us than its neighbour, at 30 million light years away.

NGC4631 and 4656 by Mark Blundell. Image used with kind permission

Under 8 degrees to the NW of the Whale, lies the superficially very similar NGC4244 - the Silver Needle Galaxy. This is another spiral which lies edge-on to our perspective and although a little fainter at +10.6 mag than its neighbour is well worth seeking out. At 16.6 x 1.9 arc minutes in area, the Silver Needle has a somewhat lower surface brightness that the Whale, but is impressive enough in larger telescopes. Although difficult to see from our point of view, NGC4244 is thought to be a barred spiral structure with two wide arms. Sources differ as to the distance this galaxy lies from us, with most seeming to favour the 14 million light years mark, though some putting it as close as 6.5 million light years away. If the latter is closer to the truth, NGC4244 is possibly an outer member of our own local group rather than a galaxy belonging to the Canes Venatici family.


NGC4244 - HST Image. Public Domain.

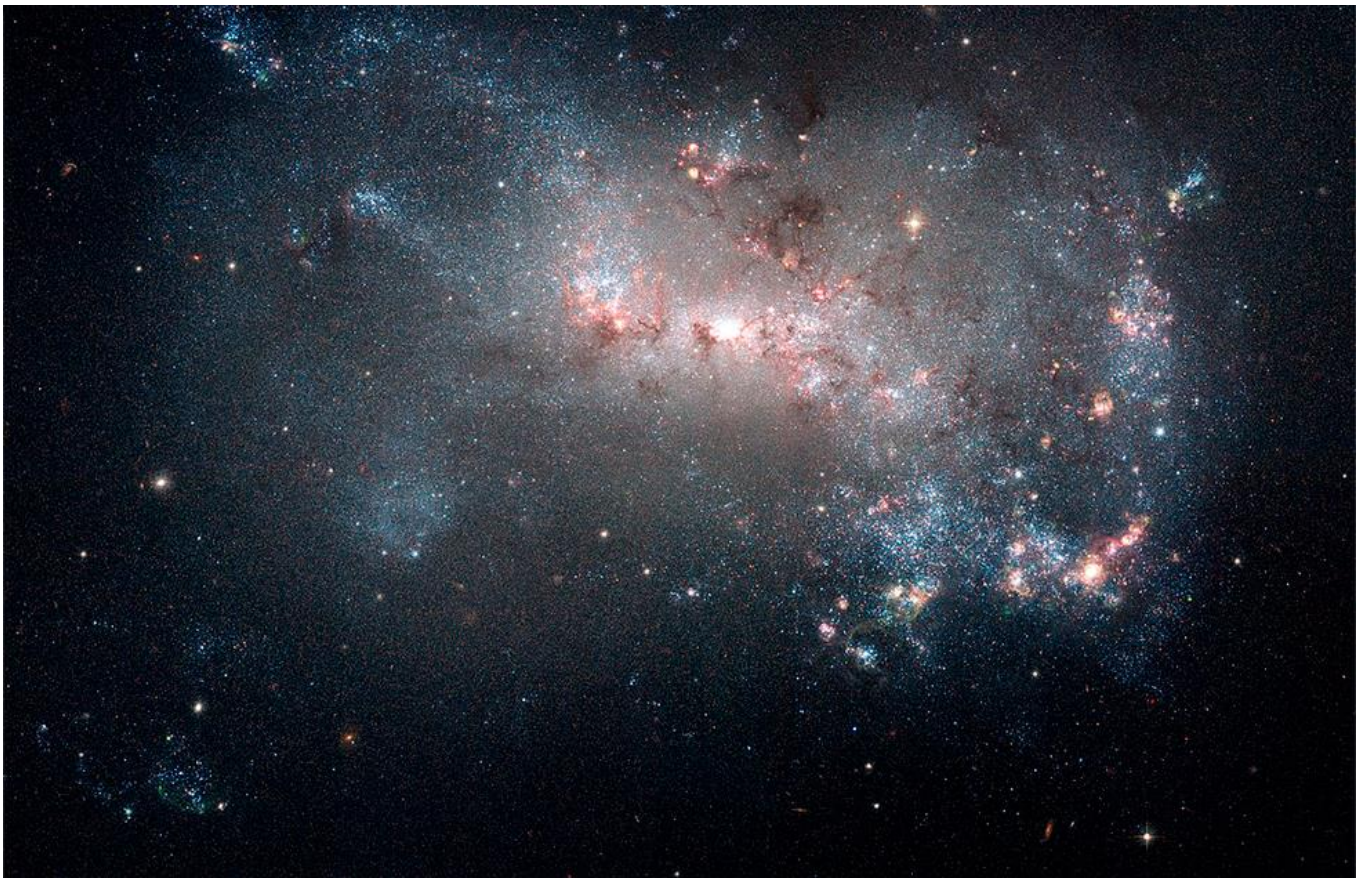
4 1/2 degrees to the NE of NGC4244 sits two interaction galaxies, NGCs 4485 and 4490 - otherwise known as the Cocoon. These 6.4 x 3.2 arc minute objects have a cumulative magnitude of +9.80 and have undergone a catastrophic interaction with each other - much as the Milky Way and M31 are thought to

experience in the far future. Although both galaxies are now moving away from each other, there are some remnants of spiral structure left in a massive arc of stars and material stretching 24000 light years in length between both objects. This seemingly destructive interaction, as it often does, has sparked a huge amount of star formation in this region. Both galaxies - or what's left of them - are thought to lie some 31-50 million light years away from us.

NGC4485 and 4490 - HST Image. Public Domain.

2 1/2 degrees to the N of the Cocoon, sits NGC4449. This galaxy is something of a rarity in this part of the sky, being of an irregular, rather than a spiral structure.

NGC4449 was discovered by Sir William Herschel in 1788 and is +9.6 mag in brightness and 6.4 x 4.4 arc minutes in size. NGC4449 is superficially very similar to the larger of our two satellite galaxies, the Large Magellanic Cloud, though observations of this diminutive galaxies in radio wavelengths have revealed that the visible part of NGC4449 is dwarfed by a huge, optically invisible halo of gas, which is 14 times its diameter. NGC4449 is easily enough found in larger telescopes, and the mottling of its HII regions is impressive if enough aperture is directed its way - though admittedly this galaxy does lack some of the glamour of its neighbours.



NGC4449 - HST Image. Public Domain.

Just over 3 1/2 degree to the N of NGC4449, lies the last galaxy in our epic jaunt around this area of sky - M106. This +8.39 mag spiral galaxy was discovered by Mechain in 1781, but was not added to the catalogue by Messier at the time. M106 is, like some previously mentioned galaxies, a later, 20th century addition to the original list. M106 is a fine galaxy - well presented from our perspective and bright enough to be seen in diminutive telescopes. However, a 12-inch + class of telescope will really start to reveal the two massive bound spiral structure of the arms and the darker material that lies between. At 18.6 x 7.2 arc minutes, M106 is a healthy size for a galaxy - larger than M51 and as such, should probably get a little more attention than often does.

M106 by Mark Blundell. Image used with kind permission.