

2007 December & 2008 January

Sun, Moon and Earth

The Sun's gradual eastwards progress (by about a degree per day, roughly twice its apparent diameter) takes it to the most southerly point on the great circle of the ecliptic at 06h 08m Universal Time (UT; equivalent to GMT) on December 22 – the moment of the northern hemisphere Winter Solstice. For a few days around this date, the Sun rises as far south of east, and sets as far south of west, as it can, resulting in short days during which it describes a low arc across the southern sky. The hours of darkness are at their maximum for the year, and it won't be until late January that observers at the latitude of the British Isles begin to notice a slight increase in the amount of daylight.

Solar observing, best carried out by the safe method of projection, is rendered difficult by the Sun's low elevation and comparatively brief daily period of visibility. The sunspot minimum between cycles 23 and 24 has proved a lengthy one: in 2007 September, for example, there was a three-week stretch during which no spots at all were visible in amateur telescopes. Cycle 24 is expected to kick into action during 2008 and the coming year should surely present a lot more of interest for regular observers.



The Whirlpool Galaxy M51 imaged from southern Spain by Paul Downing (see previous page). 355mm SCT with SBIG ST10XME CCD

New Moon occurs on December 9 and January 8, placing the darkest evening skies in the middle fortnight of each month. The Moon is Full on Christmas Eve, December 24, and January 22.

Earth is at perihelion, closest in its elliptical orbit to the Sun, on January 2.

The planets

Mercury is at superior conjunction beyond the Sun on December 17. It then emerges into the evening sky where it will be a tricky object to locate, best seen around greatest elongation (19° east from the Sun) on January 22. At this time, the innermost planet will be close to magnitude -0.5 , setting about 90 minutes after the Sun.

Much more readily visible, in the morning sky, is Venus, a brilliant mag -4 beacon in the predawn throughout December and January. Around Christmas, Venus – now several weeks past greatest elongation west of the Sun – rises some three hours before sunrise, and on a clear winter morning can be followed well into the daylight by a watchful observer. As January advances Venus begins to draw closer towards the Sun: by the end of the month it rises a couple of hours before the Sun and will become lost from view in early February. Telescopically, Venus shows an increasing gibbous phase (similar to that of the Moon a few days after Full) but decreasing apparent diameter as it pulls away from Earth.

Mars is at its best during this interval, reaching opposition (180° from the Sun in Earth's sky) on the night of December 24, when the Full Moon will be close by to its north. The Red Planet shows an apparent disk of 16 arcseconds' diameter – sufficient to reveal surface detail in telescopes of 100mm and greater aperture – for a few weeks close to opposition, and shines at mag -1.6 (a



Mars sketched during its previous apparition, on 2005 November 22 at 19:20 UT. Central meridian longitude = 301.3° . Syrtis Major is close to the central meridian, with light Hellas to its south (uppermost in this telescopic view). Seeing II. 102mm refractor $\times 200$. Neil Bone.

touch brighter than Sirius). The major dust storms seen in mid-2007 have now subsided, and telescopic observers can hope to resolve some of Mars' landmark features. The prominent, dark wedge-shaped Syrtis Major is presented close to the apparent disk centre on evenings in the week leading up to Christmas for observers at UK longitudes.

By late January, Mars is receding from Earth and presents a smaller, 13 arcsecond disk of mag -0.8 among the stars of western Gemini. Make the most of December's favourable viewing conditions – Mars won't be this good again until 2016!

Magnitude -2 Jupiter emerges from conjunction with the Sun during January, and is close to Venus at the very beginning of February. Low against the stars of Sagittarius, the giant planet is poorly-placed for UK-based observers in 2008.

Saturn, in Leo, is a good late-evening target, rising around 21h UT as 2007 draws to a close. The presentation of the rings towards Earth is now rather narrow but they should still be comfortably resolved in small telescopes. With less reflective ring-surface angled towards us, Saturn appears comparatively dim – around mag $+0.6$ – but is still twice as bright as Leo's principal star Regulus (mag $+1.3$).

Saturn's largest and brightest satellite Titan is readily visible in a small telescope at mag 8 and can be found about four ring-spans due east of the planet around December 2 and 18 and January 11 and 27; the satellite will be due west of Saturn about eight days later.



M1, the Crab Nebula, imaged by Peter Carson.

Comets

Originally discovered by Messier's observing colleague Pierre Mechain in 1790, and re-discovered in 1858 by American astronomer Horace Tuttle for whom it is named, 8P/Tuttle reaches perihelion in its 13.6-year orbit late on January 26. In mid-December, while around magnitude +7, the comet travels south-eastwards through Cassiopeia and should be visible in large binoculars and medium-aperture telescopes. By late December into early January, the comet is heading rapidly southwards but is a favourable evening object, moving in the direction of Cetus and possibly by then as bright as 5th magnitude. At perihelion, 8P/Tuttle is too far south for observation from the British Isles. The comet is the parent of the Ursid meteor stream.

Meteors

The Geminids are favourably-placed with respect to moonlight throughout their December 7–16 activity period, but a near-Full Moon will swamp the Ursids close to their peak on December 22. Conditions will be very favourable for the Quadrantids at their sharp January 3–4 maximum. Further details on the Geminids and Quadrantids can be found on page 291.

Variable stars

Long period variable Chi Cygni continues its slow fade from mid-September's maximum, and will probably be lost from binocular view

during December; at this time, Cygnus is still reasonably high in the western sky as dusk ends.

The prototype of the class, Mira (Omicron Ceti) should be an increasingly easy binocular object during December as it rises to-

wards maximum light expected in early February. By the end of 2007, and through 2008 January, Mira will probably be a naked eye object, west of the triangle of Delta, Alpha and Gamma Ceti marking the Sea Monster's head. Like Chi Cygni, Mira had an unusually bright maximum in 2006; it will be interesting to see if it parallels the former by being relatively faint this time around.

Eclipsing binary Algol (Beta Persei) has favourably-timed minima – dropping from mag +2.1 to +3.4 – on the nights of December 3–4, 6, 24–25, 26 and 29 and January 15–16 and 18.

Deep sky

Bright Mars will draw the attention of many towards Gemini as 2007 closes and 2008 begins. The constellation is one of several where the Alpha star (Castor) is actually fainter than its Beta (Pollux) – respective magnitudes +1.59 and +1.15. Careful examination also reveals that these 'twins' are far from identical with respect to colour: Pollux is a subtly orange K-class star, while Castor appears white (class A). A similar disparity is evident between the 'Pointers' in the Plough – climbing in the northeast late on a December night.

The northern 'twin', Castor, is a celebrated

double star, regarded as quite testing for smaller amateur telescopes in the 60–80mm aperture range. The components have respective magnitude +1.9 and +2.9 and lie about 3 arcseconds apart, aligned roughly north-south. Further components build this up to a sextuplet star system.

Near Gemini's northwest corner, M35 (NGC 2168) is one of several excellent open star clusters strung out along the length of the winter Milky Way streaming to Orion's east from Auriga to Puppis. Close to third-magnitude Eta Geminorum, M35 is 28 arcminutes (slightly less than a Moon-width) in diameter and at mag +5.1 is just about detectable with the naked eye from a dark location. Binoculars clearly show it as a circular haze, which is resolved with any small telescope into a mass of around 150 faint stars, filling the field at $\times 50$. Telescopes of 150mm and greater aperture reveal the 'knot' of NGC 2158 – a more distant cluster in the same line of sight – at the southwest of M35.

Across the border in Taurus is one of winter's 'must-see' objects, M1 (NGC 1952), the Crab Nebula – just north of third-magnitude Zeta Tauri, the Bull's southern 'horn'. The celebrated supernova remnant is a testing binocular target but quite easy on a reasonable night in a telescope of 80mm or greater aperture, which will show its hazy mag +8.4 'S'-shape.

Neil Bone

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