

Aspects of Saturn

I can recall as a young, junior schoolboy looking at pictures of "the planet with the rings" and not really taking it in: what I mean is, I could not believe that out in space somewhere there was a body which looked like the picture - a beautiful pale yellow ball encircled by rings. I suppose the residue of disbelief lingered on until much later

(I was fourteen by then) when, equipped with a small but very fine quality telescope, I happened to point the instrument at a bright star in Virgo only to be confronted by a very small replica of the picture of Saturn from all those years back. So, the thing existed after all!

But, without prior knowledge, would I have known from my observations that this peculiar object was in fact the planet with the rings? The power of x20 was really too low to reveal the rings as such. Galileo, in July 1610, when he first observed Saturn, had at his disposal telescopes quite inferior to my 2 inch Watson achromatic. (Galileo's largest telescope had a power of x32 but suffered from chromatic aberration.)

Galileo was puzzled by what he saw. We know now that the rings at the time offered to Earth an ellipse whose axes were in the ratio 1:4. Galileo interpreted what he saw as a planet attended by two companions which appeared to be attached to the disc. But this defied all rational explanation attributable to satellites, since these two bodies retained the same aspect hour after hour, day after day.

In a little under two years later, Galileo was again examining Saturn in his telescope and was surprised to find no trace of the two bodies. Having ascertained that his telescope was unlikely to be at fault, Galileo began to question his own reason. (It has to be remembered that the great Italian scientist was persistently hounded by the "establishment of the church", his scientific pronouncements being treated as heresy.) In July, 1612, the rings were edge on as seen from Earth and would have taxed even the best telescopes of the 19th century let alone Galileo's feeble glass. Subsequent observations throughout 1613 and 1614 indicated at times the re-emergence of the "demons" until by 1615 there could be no doubt as to their permanence.

Galileo became blind in 1637 and was never able to give a satisfactory explanation for the changing aspects of Saturn. The planet continued to tease astronomers using much larger telescopes. Hevelius (Johann Hewel 1611- 1687) with his ungainly aerial telescopes (Fig. 3) using powers in excess of x100 made little progress; likewise Huygens (Christian Huygens 1629 -1695). It was not until 1659 that Huygens himself announced that "Saturn is girdled about by a thin flat ring inclined to the ecliptic and not touching the body of the planet". And indeed the rings are very thin (around 150 kilometers), which accounts for why they become invisible seen edge-on except in the finest telescopes.

To the naked eye Saturn appears like a bright star of the first magnitude very similar in colour to Capella (see Fig. 2). At opposition, with the rings open, the planet will outshine all our northern hemisphere stars. At the other extreme, with the rings closed, Saturn is less than half as bright resembling the star Pollux in Gemini. In this sense Saturn is the most "stellar-like" of all the naked eye planets since it can never reach the extremes of brightness shown by the others (nor does it become as faint as Mercury and Mars can at times).

Saturn is still regarded by many as the most beautiful astronomical spectacle offered by the telescope. In addition to the rings there are five satellites bright enough to be seen with a telescope of six inches aperture. Titan, the largest and brightest satellite, may be seen in a 2 inch telescope. Unlike Jupiter, however, we seldom get the opportunity to see Saturn's satellites in transit or eclipse as we regularly do with the four large satellites of Jupiter.

At this opposition* on December 17th, the planet will have an apparent equatorial diameter of a little over 20 arc seconds: the rings will be 46.4 arc seconds across, almost identical to the apparent diameter of Jupiter at opposition next February.

Saturn has a sidereal period of approximately 29.5 years. Fig. 1 demonstrates how Saturn's appearance from Earth alters over the course of the next eight years. The ring system is open to its fullest extent in 2002/03. Not only that, but the planet is in high declination in the constellation Taurus (moving into Gemini next year). This makes Saturn ideally suited for observation in the northern hemisphere. The rings will again be wide open in 2017, but then the planet will be coming to opposition in June within the constellation Ophiuchus where it will be very low in our northern skies. We shall have to wait until the year 2030 before we again enjoy Saturn high in the sky with the rings fully open.

* Opposition - literally, opposite the Sun, when a superior planet (see previous notes) culminates (on the southern meridian) at approximately midnight. Then, for planets with orbits of low eccentricity, the distance between the Earth and the planet will be at a minimum for that year.

Venus and Mars.

Venus is already a conspicuous object in the morning sky rising at 04 41 on December 1st. By then it will be about four apparent Moon diameters from the much fainter Mars (right). Also on the 1st, the old Moon will be in close attendance forming an interesting grouping.

Venus will remain close to Mars in the sky up to the 15th December, after which it starts to draw away in an easterly direction. However, the two planets will remain relatively close to give another conjunction with the Moon on the 30th.

The following morning (31st), the Moon will be in Scorpius above and to the right of the bright, red star **Antares** (rival of Mars). Antares is another of the first magnitude stars that we normally associate with summer (it is due south at midnight on June 1st) but which from high latitudes may be seen in winter. Using the Moon as your guide, try looking close to the southern horizon at around 8 am. The sky should be dark enough to see the star without optical aid. Antares will remain visible well into January.

Next feature: Jupiter at opposition 2003. Stellar Magnitudes.

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