

ECLIPSES OF THE SUN AND MOON

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Did you see the recent lunar eclipse? Here in BC a tiny sliver of the lunar disc stayed out of the Earth's shadow. The shadowed part was dull grey. You might have expected that portion of the disc to be dark, but some sunlight was refracted as it passed through our atmosphere, casting a little light on that part of the lunar disc. If we had been standing on the shadowed portion of the Moon, we would have seen the dark disc of the Earth surrounded by a thin, glowing ring - our atmosphere.

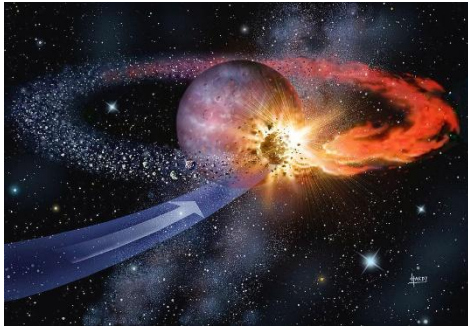


On Earth we enjoy two sorts of eclipses: eclipses of the Sun and Moon. Solar eclipses happen when the Moon passes between the Sun and us, so that it casts its shadow on the Earth. A lunar eclipse happens when the Moon passes through the Earth's shadow. The Earth has a diameter of 12,756 km, compared with the Moon's 3,475, so it casts a much bigger shadow. This makes lunar eclipses more common than solar eclipses, longer lasting, and observable over large areas of the Earth. To see solar eclipses you have to be at the right place at the right time, to see an event mere minutes in duration.

However, solar eclipses are among the most spectacular events in nature.

Solar eclipses occur at the time of the New Moon, when the Moon is between us and the Sun, and lunar eclipses at Full Moon, when the Earth passes between the Moon and the Sun. A Full Moon occurs every 29.53 days, with New Moons exactly between the Full

Moons. However, we don't get solar or lunar eclipses every 29.53 days. The reason for this is really interesting.



The Sun and all the planets coalesced some 4.5 billion years ago from the collapse of a cloud of cosmic gas and dust. It formed a huge disc from which all the planets formed. Therefore, they all orbit in the plane of that primordial disc, like marbles rolling around a plate, in concentric orbits. It is proposed that the Moon has a slightly different history. At some point the body that would become

the Earth was hit by something about the size of Mars. A load of material was thrown off into space, and eventually coalesced to form the Moon. It is likely the collision was a bit oblique, so that this material, and consequently the Moon, ended up in an inclined orbit, taking it above and below the plane in which the Earth and other planets orbit the Sun. This means eclipses only occur when the Moon is passing through the orbital plane of the planets when it is Full or New. This is rare; usually the Sun, Earth and Moon don't fully line up, and we get the familiar New and Full Moons.

My favourite memory of a lunar eclipse is when I was at the Algonquin Radio Observatory, a 46m-diameter dish in the depths of the Algonquin Provincial Park. I was not there to study the eclipse, so I used the opportunity to just enjoy it. It was summer, and the mosquitoes were horrible, so I drove to a really dark place on the outskirts of the observatory, and stayed in the stifling car. The eclipsed Moon was so dark it looked like a hole in the Milky Way. With the dark sky, Milky Way and lots of stars, it was a stunning experience. This became even more magical when a female fox and her two cubs came out to play directly in front of me. I enjoyed both the eclipse and the foxes.

My least enjoyable eclipse experience also happened in Algonquin Park. I was using the big dish to measure the precise sizes and positions of regions of enhanced solar radio emission by measuring the times the Moon covered them up. At the same time the Ottawa River Solar Observatory was making optical observations. The radio telescope developed a technical problem, so there was no radio data. At the optical observatory the sky clouded up and it started to snow, so we got nothing. Astronomy can be frustrating.

Venus lies very low in the sunset glow. Saturn rises soon after dark and Mars around midnight. Jupiter rises just before the dawn twilight. The Moon will be New on the 10th.

Ken Tapping, 8th September, 2026

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