



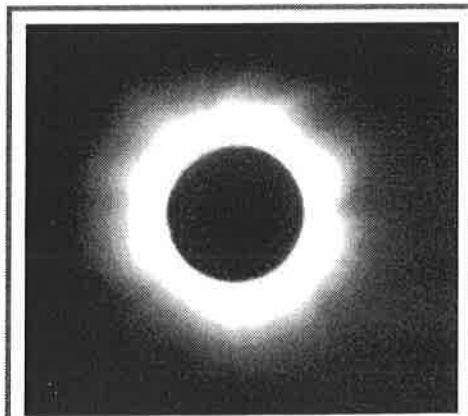
## BACKGROUND

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## Solar and Lunar Eclipses

The Sun is 400 times larger than our Moon, and it is also 400 times farther away. This coincidence makes the Sun and the Moon look to be the same size in the sky. Thus, if circumstances are just right, the Moon can appear to block the Sun for brief periods of time.

A solar eclipse occurs when the Moon's shadow falls on the earth. A *total eclipse*—when the Moon completely blocks the photosphere of the Sun—occurs when the Moon is lined up perfectly with the Sun and Earth. Solar eclipses can only occur when the Moon is new. Total eclipses are unusual events that people often travel many miles to see. More frequent are partial eclipses, in which the Moon blocks part of the Sun's light. Even if the eclipse is total, only the photosphere is blocked out. The chromosphere and the corona can still be seen. As a solar eclipse progresses, the rays begin to dim as the Moon moves slowly across the face of the Sun. This period before and after maximum is called the **penumbra**. At maximum, the shadow is called the **umbra**. *Totality* lasts only a couple of minutes during a solar eclipse. When the Moon is as far from the Earth as it can get, the Moon's face creates a dark hole in the center of the Sun, but some of the photosphere can still be seen. Such an unusual eclipse is called an *annular eclipse*.



Total solar eclipse, 1999  
Courtesy NASA

A lunar eclipse, on the other hand, is a completely visible event. During a total lunar eclipse, Earth passes directly between the Sun and the Moon, casting Earth's shadow on the Moon. Lunar eclipses, unlike solar eclipses, involve a full moon. They usually occur during the same lunar cycle as a solar eclipse. While total solar eclipses can be seen by a small number of people who happen to be in the path of totality, lunar eclipses can be seen by everyone on the side of Earth facing the Moon at that time. When the moon is fully eclipsed, it appears almost a ruby-red color. Earth's atmosphere refracts the Sun's light enough to illuminate the shadowed Moon. Because the path the light must take is considerably longer, the wavelengths are longer, and therefore, on the reddish side. The reason Earth enjoys reddish sunsets is the same reason the Moon appears to be red in eclipse. Lunar eclipses, like solar eclipses, can be total or partial, but the rich red color is normally seen only during total eclipses.

