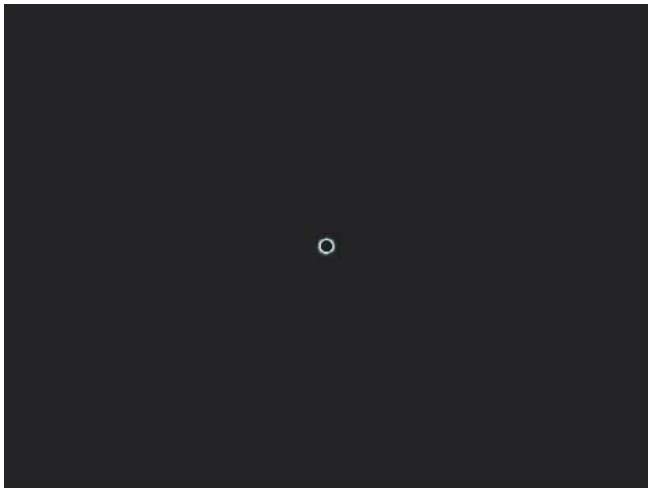
Discovery: Solar Structure

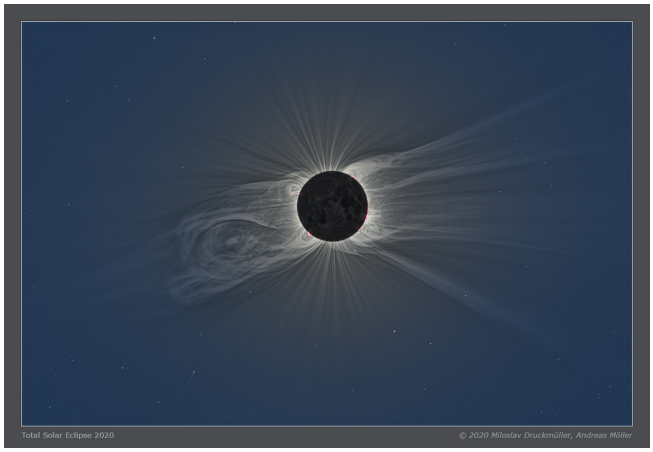


If you sit at a normal reading distance of 20 inches from the computer screen, this image of a total solar eclipse is about the size it would appear to you in the sky. This is what Diaconus would have observed in 968. *Credit: NASA/SunEarthDay*

Total Solar Eclipse, 968

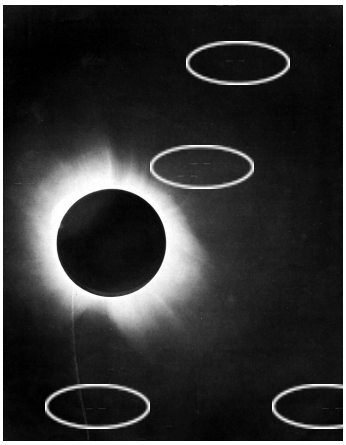
The first recorded observations of the **solar corona** occurred during the total eclipse of Dec. 22, 968. Byzantine historian **Leo Diaconus** observed the event from Constantinople, he wrote: *"...at the fourth hour of the day ... darkness covered the Earth and all the brightest stars shone forth. And it was possible to see the disk of the Sun, dull and unlit, and a dim and feeble glow like a narrow band shining in a circle around the edge of the disk."*

NASA Data



This 2020 image of a total solar eclipse is a processed composite of 55 calibrated exposures ranging from 1/640 to 3 seconds. That means lots of different photos layered on top of one another. This image reveals a lot of information about the Sun's corona, including planet-sized prominences at the Sun's edge, an enormous coronal mass ejection, and other coronal structures normally hidden in the Sun's glare. You can also see the dim lunar surface and faint background stars.

Credit: Miloslav Druckmuller, Andreas Moller, NASA/APOD



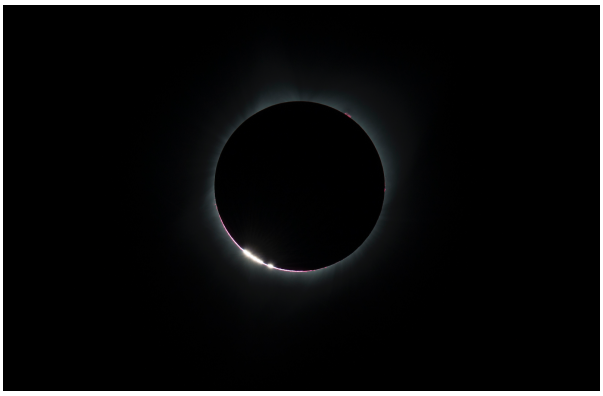
Eddington photo of the 1919 total solar eclipse for testing general relativity
Credit: Philosophical Transactions of the Royal Society of London

In 1919, **Eddington** selected two sites to observe the total solar eclipse: Brazil and Principe Island, off the western coast of Africa. The eclipse pictures showed an offset in the positions of stars due to solar gravitational bending of light that confirmed Einstein's theory exactly.

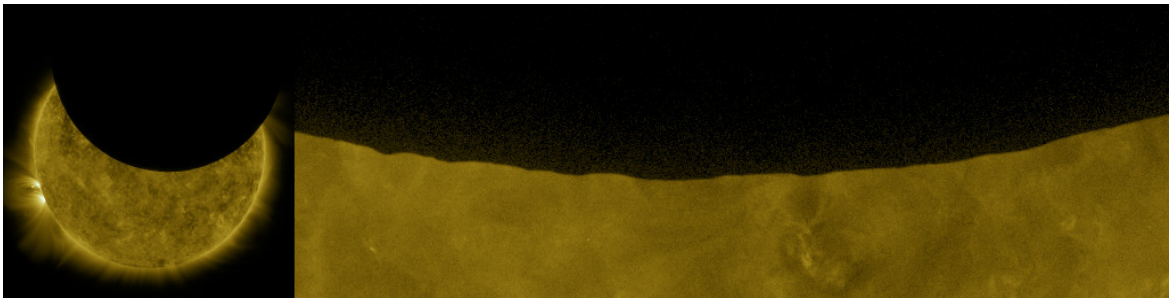
The tick marks show the stars and their relative shifts.

NASA Data

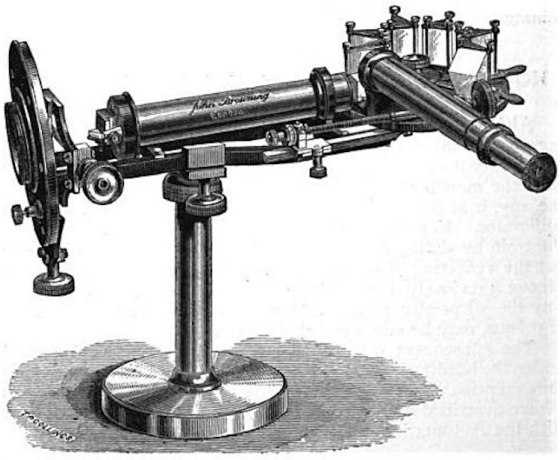
General Relativity predicts how the mass of an object will bend light. Called 'gravitational lensing' it has been detected on the cosmological scale as the gravity from entire clusters of galaxies distorts the light from even more distant galaxies behind them. *Credit: NASA Hubble*

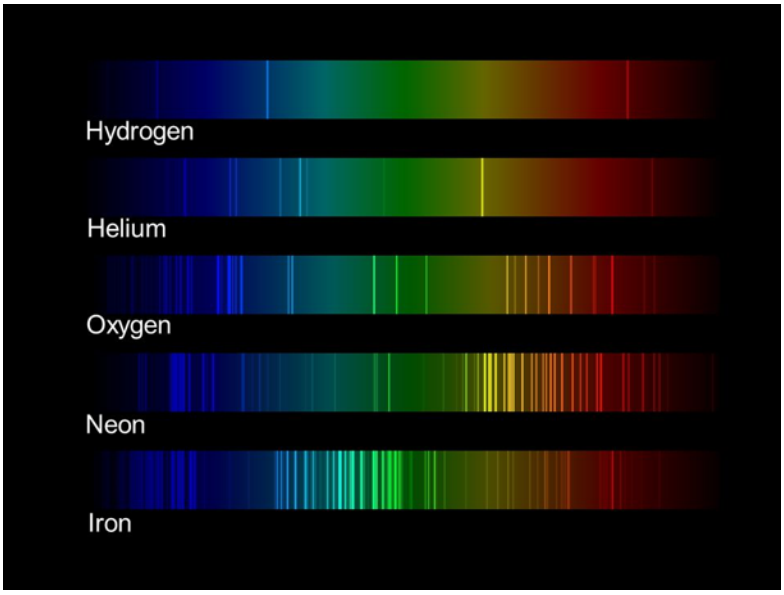
Moon Topography (lunar limb)	Annular Solar Eclipse, 1836
 **Image Credit:** NASA/Aubrey Gemignani The Bailey's Beads effect is seen as the Moon makes its final move over the Sun during the total solar eclipse. This effect occurs when gaps in the Moon's rugged terrain allow sunlight to pass through in some places just before the total phase of the eclipse.	The British amateur astronomer **Francis Baily** observed the irregularities of the lunar limb from the 1836 annular eclipse.

NASA Data



Mountains and valleys near the south pole of the Moon are visible in this image of a partial solar eclipse taken from space by the Solar Dynamics Observatory spacecraft on October 7, 2010. Credit: NASA/SDO

Discovery of Helium	Total Solar Eclipse, 1868
 *Image Credit: Wikimedia Commons* An early spectroscope designed to look at the Sun.	Spectroscopes, developed in 1842, allowed the analysis of light from distant objects, giving scientists information about the composition of the object. **Pierre Janssen** observed an unknown element in the Sun's corona during the 1868 eclipse from India. The element was identified later, in 1900, by **William Ramsey,** as 'helium.' Despite being the second most abundant element in the universe, helium (He) is relatively rare on Earth, which made its discovery elusive for so long.



An **emission spectrum** occurs when the atoms and molecules in a hot gas emit light at certain wavelengths, causing bright lines to appear in a spectrum. The pattern of these lines is unique for each element. Spectroscopy is used by almost every NASA mission to learn about the composition of distant objects in the universe. *Credit: NASA JPL*