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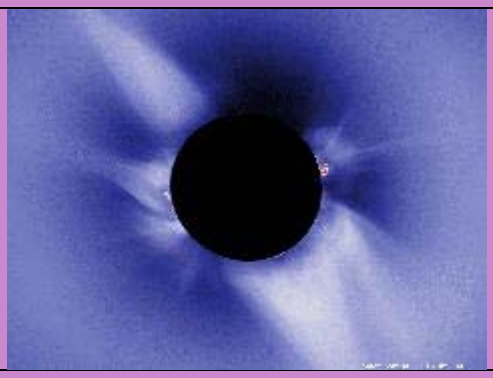
The sun, the corona and ultra violet



The surface of the sun appears to be hotter than its core, says S.Ananthanaryanan.

Normally, the surface of a hot object is cooler than the center. In the case of a boiled potato, for instance, the surface could be cool enough to hold, but the center still too hot to bite. In the case of the sun, though the source of energy itself is in the center, due to a complex lot of reasons, it is the outer region, called the corona, which gets really hot.

The sun and sunlight

The core is at about 6000˚ C while the corona is hotter than a million ˚C. Now, hot objects radiate energy in the form of heat and light and the frequency at which they radiate the most gets higher and higher with the temperature. For instance, a kettle at 100˚C radiates entirely in the invisible infrared region, but a heater coil at 1000˚C radiates in the region of visible red light. And a still hotter filament of an electric bulb radiates in more colours of the spectrum and gives light that is almost white.

The body of the sun is about as hot as the filament of a light bulb and we have the visible sunlight that we all know so well, along with infrared providing the warmth for the earth's natural processes. There is also some emission in the harmful ultra violet, but happily, the atmosphere filters it out.

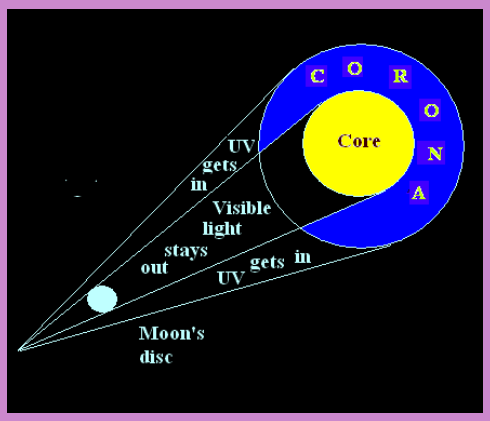
Emission from the corona

But the corona is effectively at more than 100,000˚C and here the radiation is almost entirely in the ultra violet and X ray regions. If it was not for the atmosphere being a shield, not a single living thing could have developed with this radiation striking the earth.

A little ultra violet does get through, though and this does useful work, helping plants use carbon dioxide of the air to make food, for instance. But our skin is strong enough to bear reasonable exposure and we do not come to any harm.

But this is not true of the sensitive retina, in our eyes, which is not as hardy and would get roasted in seconds if it were exposed. Happily, the visible light from the sun itself is so intense that the iris of our eyes shrink to pinpoints and we instantly look away if we tried to look directly into the sun. As a result, the bright visible disk of the sun does not allow us to expose our retina to the blast of ultra violet from the corona.

But not during a solar eclipse!



During a solar eclipse, the moon blocks out the bright visible disk of the sun. The result is that the 'glare' is shut off and the faintly visible aspects of the corona now become visible, to eyes or to cameras. But if we did try to view the eclipse with our eyes, we would now not look away in pain and the ultra violet would make short work of our retinas.

Pictures of the corona, which becomes visible during an eclipse, which are visually breathtaking and of abundant scientific value, are always taken by cameras, or seen in 'projection' on a screen, or viewed for short periods through 'metallic' filters that keep out the ultra violet.