

## THE SOLAR WIND

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The existence of a supersonic plasma outflow from the Sun was predicted theoretically by Parker before it was observed, from the realization that a static solar atmosphere would have a finite pressure at infinity orders of magnitude larger than the pressure of the interstellar medium. A large number of observations and theoretical studies have since helped to refine the basic picture. We know the wind is driven by heating of the corona. Modelling has shown that in a magnetically "open" corona most of the energy deposited is lost in the solar wind. Hence the wind is not merely an "evaporating tail" of a hydrostatic plasma, rather the corona and wind should be regarded as one tightly coupled system. Moreover, the energy flux of the wind is then a measure of the amount of coronal heating, of order  $100 \text{ W/m}^2$  at the Sun. We now also know that the solar mass loss is controlled by the amount of coronal heating and by the energy flow between the chromosphere and corona. The heating mechanism has still not been decisively identified. Observations of coronal spectral lines by the UVCS instrument on the SOHO satellite have shown that protons and heavy ions are much hotter than electrons, that the wind is rapidly accelerated within a few solar radii, and furthermore provided evidence for anisotropic proton (and heavy ion) velocity distributions, with the temperature perpendicular to the magnetic field much higher than the parallel temperature. This suggests that electrons play a minor role in the acceleration process, which is driven mainly by proton heating close to the Sun, perhaps through ion cyclotron waves.

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