

distributions at the structure's base as the eruption evolves, and provide true expansion speeds of loop-like features in the object. Topographical maps of the CME constructed using polarimetric analysis show a bilateral symmetry, or 'butterfly' pattern, aligned with the source region magnetic neutral line and corresponding loop arcade observed in EUV emission. The topographical maps and total brightness images are used to construct 'top' and 'side' views of the eruption, which show the CME cone angle remaining approximately constant after the front reached the frame boundary except for a small decrease over 2 hours. Narrow, radially oriented structures forming the asymmetric cone-like base of the CME remained connected to the source region for at least 14 hours. The analysis supports a model of CME expansion from a source region magnetic flux loop arcade containing hundreds or thousands of fine loops. Possible arcade sources are identified in EUV images of the active region which produced the eruption. A wave extending 170 degrees in azimuth and up to 10,000,000 km laterally was observed moving radially in the CME base over 5 hours. We present enhanced movies showing the wave and analysis of its dynamics, which suggest that it was launched in the legs of current carrying flux tubes and pulled outward by the expanding eruption.

The Effect of Magnetic Turbulence Energy Spectral Scaling in the Heating of the Solar Wind

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Recent studies of a solar wind heating model based on energy cascade following Kolmogorov scaling have produced reasonably good agreements with observations, after taking into account the effect of turbulence generation due to pickup ions. In this study, we have incorporated in that model the energy cascade rate based on the Iroshnikov-Kraichnan (IK) scaling, derivable from incompressible magnetohydrodynamics, and have shown that the model can give higher proton temperature, within the range of observations, with or without the pickup ions terms. Moreover, the turbulence correlation lengths under the IK scaling seem to follow better the trend of observations, as compared with previous results, which predicted an opposite trend. We have also studied the effects due to finite cross helicity, and the self-consistent treatment of the pickup ions terms.

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Observations of escaping photoelectrons generated by the X3.0 solar flare on July 15, 2002

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The Fast Auroral SnapshoT Explorer (FAST) satellite, which was launch into a 4,000 by 500 km polar orbit in 1997, continues to provide high temporal (100 ms) and energy (DE/E 0.15) observations of photoelectrons in the energy range from 10 eV to 1 keV. Upstreaming electrons observed equatorward of the auroral oval are primarily the result of solar ionization by photons in the 1.2 to 80 nm range. On July 15, 2002 shortly after 20:00 UT the flux of photoelectrons in the 10-20 eV range increased within a few 10's of seconds by a factor of 2. In the following 10 minutes the flux of photoelectrons in the 300 to 700 eV range increased by almost a factor of 2. The analysis presented here of the photoelectron spectra shows that the photoelectrons observed by FAST are the result of the increased irradiance from the impulsive (10-20 eV) and gradual phases (300 to 700 eV) of the X3.0 Flare.