

Solar Probe's Inside-out UV Spectrography of the Solar Wind

SILVANO FINESCHI¹, SHADIA HABBAL² and HUW MORGAN² ¹INAF - Osservatorio Astronomico Torino, Italy ²IfA - University of Hawaii, USA

The Solar Probe will fly through the corona, as close as 3 solar radii from the photosphere at perihelion. This will provide the unique and first-ever possibility of remote-sensing observations of ultraviolet (UV) coronal line-emission from insideout, that is, along the radial direction of the solar wind outflow, and away from the Sun. Past UV spectrographic observations of the corona have been possible only from a sideways perspective (e.g., UVCS/SOHO). The expected UV spectra of the OVI doublet, 103.2/103.4 nm, Lyman-α HI, 121.6 nm, and HeII, 304 nm, lines from the Probe's new radial perspective will be presented. The collisional and resonantly scattered components of the line-emission when observed radially are spectroscopically separated. This allows a direct measure of the solar wind outflow speed from the Doppler shift of the collisional component. The line profiles and intensities of both components yield information on the unresolved velocity distribution of ions along the radial direction. This is the predominant direction of the coronal magnetic field. In the past, sideways, UV spectroscopic observations of line-emission have yielded information on the unresolved ion velocity distribution perpendicular to the magnetic field. Therefore, radial UV spectroscopic observations from Solar Probe will offer a unique opportunity of investigating the anisotropy of the unresolved coronal ion velocity distribution for the first time.