DPP20-2020-020023

Abstract for an Invited Paper
for the DPP20 Meeting of
the American Physical Society

Large amplitude Alfvnic turbulence, Switchbacks and the Acceleration of the Solar Wind.[1]

MARCO VELLI, UCLA

Perhaps the most striking observation made by Parker Solar Probe during its first few orbits is that of the prevalence of extremely large amplitude oscillations in the radial magnetic field, leading to reversals in sign not connected to crossings of the heliospheric current sheet but rather to kinks of the field line themselves, as demonstrated by the permanence of the electron pitch angle. Such rapid folds in the field, also called switchbacks, are seen with periods going from seconds to more than an hour, while an analysis of the corresponding velocity field shows that the fluctuations in radial velocity, δV_r are well correlated to those of the radial magnetic field, with a correlation with δB_r corresponding to Alfvén waves propagating away from the Sun. Switchbacks however belong to a well - developed power spectrum, so the appropriate description is that of Alfvénic turbulence. In addition, the magnitude of the total magnetic field often remains almost constant, i.e., the compressibility of the fluctuations is very small. The present talk will discuss these intriguing Probe observations, including the prevalence of high velocity magnetic field correlation even in extremely low speed wind, to suggest scenarios for the origin and evolution of such fluctuations in the solar wind, and their potential role in coronal heating and solar wind acceleration.

[1]This research was funded by the FIELDS experiment on the Parker Solar Probe spacecraft, designed and developed under NASA contract NNN06AA01C