Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Coronal heating by turbulence and origin of the fast solar wind M. VELLI, A. VERDINI, Universita di Firenze, W.H. MATTHAEUS, P. DMITRUK, University of Delaware, S. OUGHTON, Waikato University — The central problem in explaining the existence of the fast solar wind is to transport sufficient nonthermal energy into the lower corona, and then to produce the wind. The process has fluid plasma features and distinctive kinetic signatures, e.g., enhanced perpendicular proton temperatures. We examine models in which a low frquency (reduced MHD) turbulent cascade might explain the heating and acceleration process. Energy input is due to low frequency Alfven waves injected at the coronal base. Inhomogeneities cause non-WKB reflection, permitting nonlinear interaction between upward and downward propagating Elsasser fields. Studies with prescribed large scale fields with an open top boundary, neglecting the wind speed itself, have been able to characterize the turbulence – dependence on input wave frequency, sensitivity to density profile, conditions on several time scales involved, and the efficiency of conversion of input energy to heating. The efficiency and the heating profile seem quite compatible with observational requirements. More recently we have implemented a self consistent wind model in which the heating due to the turbulence takes place in large scale fields which themselves are influenced by the turbulence and by the heating, thus producing a wind. Results show that a fast wind can be produced in a coronal hole region starting with reasonable levels of low frequency wave injection at the coronal base.

William Matthaeus
University of Delaware

Date submitted: 23 Jul 2006 Electronic form version 1.4