

9th Annual International Astrophysics Conference  
Sheraton Maui  
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Schedule of Talks

NOTES

Monday, March 15, 2010: 16:30 - 16:55  
Presenter: Ng, Chung-Sang

**The effect of magnetic turbulence energy spectra and pickup ions on the heating of the solar wind**

C. S. Ng, Geophysical Institute, University of Alaska Fairbanks  
A. Bhattacharjee, P. A. Isenberg, D. Munsi, and C. W. Smith, Space Science Center, University of New Hampshire

In recent years, a phenomenological solar wind heating model based on a turbulent energy cascade prescribed by the Kolmogorov theory has produced reasonably good agreement with observations on proton temperatures out to distances around 70 AU, provided the effect of turbulence generation due to pickup ions is included in the model. In a recent study [Ng et al., J. Geophys. Res., 115, A02101 (2010)], we have incorporated in the heating model the energy cascade rate based on Iroshnikov-Kraichnan (IK) scaling, derivable from incompressible magnetohydrodynamics. We showed that the IK cascade rate can also produce good agreement with observations, with or without the inclusion of pickup ions. This effect was confirmed both by integrating the model using average boundary conditions at 1 AU, and by applying a method [Smith et al., Astrophys. J., 638, 508 (2006)] that uses directly observed values as boundary conditions. The reduction of effects due to pickup ions is because less turbulence is generated by pickup ions for the IK spectrum, which has a shallower spectral index than the Kolmogorov spectrum. In this talk, we will discuss more on this part of the theory. This work is supported by NASA, DOE and NSF.