Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Stringent Tests of Instabilities and Heating: Microphysics of the Solar Wind in the Modern Era JUSTIN KASPER, Smithsonian Astrophysical Observatory — Early observations of the solar wind established that the plasma is rich with complex distribution functions and electromagnetic fluctuations. Solar wind observed in the heliosphere possesses non-Maxwellian features such as ions with significantly different temperatures, anisotropies, and differential flow. These features are an energy source for instabilities and an artifact of heating by dissipation. The microphysics of the solar wind is the non-linear coupling between particles and fields in a medium that at times acts as a fluid, a collisionless plasma, and a collection of individual particles. The purpose of this talk is to review solar wind microphysics, from its role in the heating of the corona and expansion of the wind, through early analytic theory, to the modern era where large statistical analysis of precision distribution measurements are combined with advanced analysis and simulations to quantify the roles of heating and instabilities. In particular, I will track the development of our understanding of the mirror, cyclotron, and firehose instabilities driven by ion temperature anisotropies and the resonant heating of ions through Alfven-cyclotron dissipation.

Justin Kasper
Smithsonian Astrophysical Observatory

Date submitted: 24 Jul 2008 Electronic form version 1.4