Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Kinetic Models of the Cyclotron Resonant Wave-Particle Interaction in Heliospheric Plasmas PHILIP ISENBERG, University of New Hampshire — The resonant cyclotron interaction between gyrating ions and MHD waves is fundamental to understanding the behavior of many plasma phenomena in the heliosphere. Close to the Sun, the heating and acceleration of the solar wind in the corona is likely caused by the resonant dissipation of ion cyclotron waves. In the outer heliosphere, the ionization of inflowing interstellar neutrals creates rapidly streaming "pickup ions" whose isotropization generates waves which heat the core proton plasma there. Between these extreme positions, this interaction governs the energetic particle scattering required for shock acceleration, transport of solar energetic particles, and modulation of cosmic rays, and also contributes to shaping the distributions of the various thermal and suprathermal ion populations in the solar wind. Recent quasilinear models without some of the traditional simplifications have recognized the importance of a more complete kinetic treatment of this interaction, in particular the ion diffusion along velocity-space resonant surfaces which include the effects of wave dispersion. We will present the basic concepts involved in this interaction and discuss a number of applications to plasma processes in the heliosphere.

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Date submitted: 20 Jul 2006 Electronic form version 1.4