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Particle energization and current sheets in Alfvenic plasma turbulence KIRIT MAKWANA, University of Chicago, HUI LI, FAN GUO, WILLIAM DAUGHTON, Los Alamos National Laboratory, FAUSTO CATTANEO, University of Chicago — Plasma turbulence is driven by injecting energy at large scales through stirring or instabilities. This energy cascades forward to smaller scales by nonlinear interactions, described by magnetohydrodynamics (MHD) at scales larger than the ion gyroradius. At smaller scales, the fluid description of MHD breaks down and kinetic mechanisms convert turbulent energy into particle energy. We investigate this entire process by simulating the cascade of strongly interacting Alfven waves using MHD and particle-in-cell (PIC) simulations. The plasma beta is varied and particle heating is analyzed. Anisotropic heating of particles is observed. We calculate the fraction of injected energy converted into non-thermal energy. At low beta we obtain a significant non-thermal component to the particle energy distribution function. We investigate the mechanisms behind this acceleration. The velocity distribution function is correlated with the sites of turbulent current sheets. The different dissipative terms due to curvature drift, gradB drift, polarization drifts, and parallel current density are also calculated. This has applications for understanding particle energization in turbulent space plasmas.

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