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Scattering of Suprathermal Electrons in the Solar Wind: Particle-in-Cell Simulations S. PETER GARY, SHINJI SAITO, Los Alamos National Laboratory — Properties of the narrow, magnetic-field-aligned strahl electron velocity distributions are sensitive indicators of collisionless processes in the solar wind. Three distinct signatures have been observed in the characteristics of this suprathermal (70 eV $<$ Energy $<$ 1 keV) component: 1) Pitch-angle widths that decrease with increasing energy, 2) Pitch-angle widths that increase with increasing energy, and 3) Pitch-angle widths that have a distinct maximum as a function of energy. This presentation describes results from particle-in-cell simulations which have used three different sources of enhanced fluctuations to demonstrate how each of these signatures can arise. Signature 1) is well-known as being due to scattering by Coulomb collisions, but the simulations have shown that it may also arise as a consequence of scattering by the whistler anisotropy instability driven by a $T_{\perp}/T_{\parallel} > 1$ condition on the electron core component. Signature 2) has been shown by quasilinear theory to arise due to scattering by a broadband spectrum of whistler fluctuations; our simulations confirm that conclusion. Signature 3) arises from scattering due to the electrostatic electron/electron instability. The simulations demonstrate how the latter two signatures change with various plasma parameters.

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