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Numerical Investigation of Landau Damping in Arbitrarily Degenerate Fermi-Dirac Quantum Plasmas SHANE RIGHTLEY, DMITRI UZDENSKY, CIPS, University of Colorado — Plasma phenomena in environments where the inter-particle spacing approaches the thermal de Broglie wavelength are modified because of quantum statistical and tunnelling effects. Models of these systems are applicable to the study of microelectronics, dense laser-produced plasmas, and some extreme astrophysical environments. The question of the existence of Landau damping in completely degenerate plasmas has received attention in the literature, but many problems remain open. In this presentation, linear dispersion and Landau damping of electrostatic waves, in a quantum plasma with arbitrarily-degenerate Fermi-Dirac equilibrium distribution, are investigated numerically. The analysis uses a self-consistent mean-field quantum kinetic model (the Wigner-Poisson system). The problem of applying the Landau prescription for the integration contour in the presence of complex poles in the Fermi-Dirac distribution function and the effect of these poles on dispersion is addressed. The application of the method to equilibria containing velocity space anisotropies with the potential for kinetic instabilities is discussed.

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