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Scattering of particles by spatially localized wavepackets[1] Y. KOMINIS, K. HIZANIDIS, NTUA, Greece, A.K. RAM, PSFC, MIT — The dynamics of particles in the presence of electromagnetic waves has been an important paradigm for the theory of nonlinear Hamiltonian dynamics and chaos. It is also of interest in fusion plasmas where wave-particle interactions are important in heating and current drive by radio frequency waves. Previous studies of wave-particle interactions have generally assumed that the waves are periodic, thereby having a discrete spectra. We consider wave fields that range from ordinary wave packets with continuous spectra to ultra short, few-cycle and subcycle, transient pulses. The electrostatic wave fields are assumed to propagate in a magnetized plasma at arbitrary angles with respect to the magnetic field. The effect of finite particle Larmor radius is included in our model. The theoretical work is a generalization of a previous study on the interaction with localized wave packets propagating in an unmagnetized plasma [1]. The results from our theoretical analysis are compared with detailed numerical simulations for a variety of cases. The study provides an insight into heating, current drive, and transport of particles by wave-particle interactions.

[1] Y. Kominis, K. Hizanidis and A.K. Ram, *Phys. Rev. Lett.* **96**, 025002 (2006).

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