Time resolved Compton scattering for a model fermion-boson system[1] R. WAGNER, Q. SU, R. GROBE, Intense Laser Physics Theory Unit, Illinois State University — We study the scattering of a boson with a fermion with full spatial and temporal resolution based on the one-dimensional Yukawa Hamiltonian. In quantum field theory this interaction is described by the annihilation and creation of bosons with intermediate virtual particle states. We show that this process can be modeled in the center of mass frame by a scattering potential, permitting us to interpret the absorption and re-emission processes in quantum mechanical terms of a characteristic force. This Compton force between the fermion and boson is repulsive for large distances and attractive for shorter spacings. We also examine the periodic dynamics of a fermion and a boson that are spatially confined to a ring-cavity in which they counter-propagate, enabling us to study interactions independent of the transients that characterize the (one-time) scattering event of two wavepackets.

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