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Waves in Relativistic Scalar QED Plasma¹ YUAN SHI, NATHANIEL FISCH, HONG QIN, Princeton Plasma Physics Laboratory, PRINCETON PLASMA PHYSICS LABORATORY TEAM — When ultra-intense laser is used to compress solid targets, particles are accelerated to relativistic energy and plasma with density higher than solid can be created. In such plasma, the relativistic and quantum nature of particles can no longer be ignored. Using a quantum field theory description of scalar QED plasma, we demonstrate how waves in such plasma are affected. It is found that in unmagnetized plasma, the electrostatic wave can now propagate with nonzero group velocity even when the plasma is cold. In magnetized plasma, Landau levels serve as resonances and polarization due to transitions between these resonances give rise to Bernstein waves even when the plasma is cold.

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