R008-12
C 会場 ： 11/27　AM1（9:15-10:45）
9:15〜9:30:00

#岩本 昌倫 [1)], 井岡 邦仁 [2)]
[(1] 神戸大, [(2] 京都大

Propagation of Linearly Polarized Strong Waves in Pair Plasmas

#Masanori Iwamoto[1)], Kunihito Ioka[2)]
[(1]Kobe University, [(2]Kyoto University

Strong electromagnetic waves are ubiquitous in the universe, with fast radio bursts (FRBs) being the most prominent example. FRBs are millisecond-duration bright flashes of radio waves, typically originating from extragalactic distances (Lorimer 2007). Some FRBs repeat, and these repeating sources often exhibit a high degree of linear polarization. Magnetars are considered the most likely progenitors of repeating FRBs. However, the emission mechanism remains debated, with proposed models including coherent curvature radiation in the magnetosphere and synchrotron maser emission in relativistic collisionless shocks. In any scenario, FRB pulses must propagate through the surrounding plasma to escape. The waves are strong in the sense that the particle oscillation velocity within them becomes relativistic. Such strong waves are inevitably subject to stimulated scattering, which may hinder their propagation and constrain the emission region (Beloborodov 2024). The role of stimulated scattering, however, remains controversial, particularly in the relativistic regime (Lyutikov 2024).

A major challenge in studying stimulated scattering lies in the analytical intractability of the self-consistent equations for linearly polarized electromagnetic plane waves of arbitrary amplitude. In this talk, we revisit these equations and show that the degree of nonlinearity is governed by a single variable. Using particle-in-cell simulations, we further demonstrate the time evolution of the steady-state solution and discuss the implications of stimulated scattering for FRB pulse propagation.