Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Effective lattice model for collective modes in a Fermi liquid with spin-orbit coupling ABHISHEK KUMAR, DMITRII MASLOV, University of Florida, Gainesville — A Fermi liquid (FL) with spin-orbit coupling (SOC) supports special type of collective modes–spin-chiral waves–which are oscillations of magnetization even in the absence of the external magnetic field. In this work, we study the collective spin modes of a two-dimensional (2D) FL in the presence of both SOC (of Rashba and Dresselhaus type) and in-plane magnetic field. We map the system of coupled kinetic equations for the angular harmonics of the distribution function onto an effective one-dimensional tight-binding model, in which the lattice sites correspond to values of the angular momentum. Linear-in-momentum coupling ensures that the effective tight-binding model has only nearest-neighbor hopping. In this language, the continuum of spin-flip excitations becomes a lattice band. The FL interaction, characterized by the harmonics of the Landau function, produces defects of both on-site and off-site type. The collective modes correspond to bound states produced by these defects. We find the dispersions of the collective modes both analytically, for the case when the Landau function can be approximated by the zeroth harmonic, and numerically, for the most general case.

Abhishek Kumar
University of Florida, Gainesville

Date submitted: 09 Nov 2016 Electronic form version 1.4