Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Thermoelectric transport in two-dimensional giant Rashba systems CONG XIAO, Univ of Texas, Austin, DINGPING LI, ZHONGSHUI MA, Peking University, QIAN NIU, Univ of Texas, Austin — Thermoelectric transport in strongly spin-orbit coupled two-dimensional Rashba systems is studied using the analytical solution of the linearized Boltzmann equation. To highlight the effects of inter-band scattering, we assume point-like potential impurities, and obtain the band-and energy-dependent transport relaxation times. Unconventional transport behaviors arise when the Fermi level lies near or below the band crossing point (BCP), such as the non-Drude electrical conducivity below the BCP, the failure of the standard Mott relation linking the Peltier coefficient to the electrical conductivity near the BCP, the enhancement of diffusion thermopower and figure of merit below the BCP, the zero-field Hall coefficient which is not inversely proportional to and not a monotonic function of the carrier density, the enhanced Nernst coefficient below the BCP, and the enhanced current-induced spin-polarization efficiency.

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Date submitted: 11 Nov 2016 Electronic form version 1.4