Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Elastic impurity scattering and relaxation in electronic lattice under finite electric-field[1] JONG HAN, SUNY Buffalo, WOO-RAM LEE, KWON PARK, Korean Institute for Advanced Study — From the birth of solid state physics, understanding electron transport in solids has been one of the central questions. Recently, rigorous quantum mechanical treatments of solid nonequilibrium have been sought by many groups. Here, we discuss electron transport in tight-binding lattice with disordered potential scatterers when driven by a finite electric field. Based on Floquet formalism with non-perturbative treatment of the electric field, we investigate how the spectral properties evolve when the system is non-dissipative, governed by a *closed* Hamiltonian. As the disorder becomes stronger, the spectra evolve from δ-peaks representing Bloch oscillations to a continuous spectral distribution which is distinctly different from the non-interacting limit. We investigate the fate of electric current in the steady-state nonequilibrium. Finally, we discuss an implementation of energy dissipation channels and the way that the conventional Drude picture is recovered within the Floquet method as a function of Bloch oscillation frequency and electron relaxation-time.

[1]Supported by NSF DMR-0907150

Jong Han
SUNY Buffalo

Date submitted: 11 Nov 2011 Electronic form version 1.4