Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Photon-assisted thermoelectric properties of noncollinear spin-valves XIAOBIN CHEN, Tsinghua University and McGill University, DONGPING LIU, Department of Physics, McGill University, WENHUI DUAN, Department of Physics and State Key Laboratory of Low-Dimensional Quantum Physics, Tsinghua University, HONG GUO, Department of Physics, McGill University, DUAN GROUP TEAM, GUO GROUP TEAM — We report theoretical analysis of thermal-spin and thermoelectric properties of noncollinear spin-valves driven by a high frequency AC voltage bias. The spin-valve consists of two ferromagnetic contacts sandwiching a single-level or multi-level quantum dot (QD). A general formulation for the time-averaged thermal-spin and thermoelectric properties of spin-valves is derived within the nonequilibrium Green's function theory, which provides a starting point for further numerical calculations of these properties. Numerical results of a spin-valve having a spin-degenerate single-level QD are given as an example. The AC bias induces various photon-assisted transmission peaks which can greatly enhance the Seebeck coefficients and the figures of merit, and offer a new possibility to tune both the spin-dependent and normal thermoelectric properties of the spin-valve. Details of these properties and how they depend on the non-collinearity of the spin-valve, magnetic polarization, temperature, AC bias, and other control parameters are reported. A particularly interesting result is the opposite dependency of the thermoelectric properties on the magnetic polarization and non-collinearity for contacts with or without spin accumulation.

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Date submitted: 10 Nov 2013 Electronic form version 1.4