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Signatures of electron-magnon interaction in charge and spin current in magnetic tunnel junctions: A nonequilibrium many-body perturbation theory approach[1] FARZAD MAHFOUZI, BRANISLAV NIKOLIC, Department of Physics and Astronomy, University of Delaware, QTTG TEAM — We develop a numerically exact scheme for resumming certain classes of Feynman diagrams in the perturbation expansion for the electron and magnon self-energies of the nonequilibrium Green function (NEGF) formalism applied to electron-magnon (e-m) interacting system driven out of equilibrium by finite bias voltage. This is then employed to understand the effect of inelastic e-m scattering on current-voltage (*I–V)* characteristics of F/I/F (F-ferromagnet; I-insulating barrier) magnetic tunnel junctions (MTJs). For this purpose, we evaluate self-consistently Fock diagram for the electron self-energy which ensures charge current conservation (i.e., sum of charge currents in all leads must be zero), as well as electron-hole polarization bubble diagram for magnon self-energy, where respective GF lines within these diagrams are the fully interacting ones. Furthermore we present the formulation to calculate the Fano factor in correlated systems out of equilibrium and then investigate the effect of e-m coupling on noise in MTJs.

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