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Spin Currents coupling with magnon excitation in Ferromagnetic Insulator[1] TAO LIU, JIAXI LI, JIANWEI ZHANG, School of Physics, Tongji University, THEORETICAL PHYSICS GROUP TEAM — We studied spin currents coupling in two Ferromagnetic/normal metal multilayers which are connected by a Ferromagnetic Insulator(FI) layer(such as YIG). In our modeling, we adopted self-consistent spin dependent Boltzmann equations and magnon Boltzmann equation. When applying an in-plane current in first FM layer, a transverse spin current was generated due to Anomalous Hall effect(AHE), after crossing normal metal layer, this transverse spin current will produce magnon excitation at N/FI interface. With carrying spin information, magnon excitations in FI can eventually excite a new spin current at second F/N interface. Although the FI cannot support any spin current propagation across it, but spin polarization information was passed through FI with propagation of magnon. Finally, the transverse spin current in second FM layer can also generate another in-plane spin current by AHE. Our results showed the spin current in second FM layer can be large as the same order of one in first FM layer at limit case. Through the magnon propagation in FI layer, two spin current circuits were coupled indirectly, i.e.without any charge current exchange. we also showed, when applying a magnetic field on FI layer, spin current in final FM layer can be manipulated by varying magnon excitation.

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