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Using photon to probe spin excitations CHUNJING JIA, Stanford Institute for Materials and ENergy Sciences, CHENG-CHIEN CHEN CHEN, Argonne National Lab, BRIAN MORITZ, TOM DEVEREAUX, Stanford Institute for Materials and ENergy Sciences — Elementary spin excitations have attracted considerable attention in the understanding of strongly correlated materials, especially in high temperature superconductors where a full understanding of spin dynamics might reveal important information where the phase emerges in proximity of magnetic order. Photon spectroscopies, such as resonant inelastic x-ray scattering (RIXS) and optical Raman scattering, are powerful tools for the measurement of spin excitations. In this presentation, I will discuss the simulation of various spectroscopies that can reveal spin excitations, using both single- and multi-orbital models. I will show that transition metal in-direct RIXS provides information about two-magnon excitations at low energies in addition to the usual charge transfer excitations; while direct RIXS measures single spin-flip (single magnon) excitations, making it a complementary technique to inelastic neutron scattering. I also will show that Raman scattering can probe two-magnon spin excitations in correlated materials. We track the evolution of these excitations as functions of momentum and doping. These results highlight the nature of spin excitations in correlated materials and are an important step in our understanding of the corresponding experiments in real materials

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