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(I) Resonant inelastic light scattering from materials with spin-orbit coupling

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Inelastic light scattering allows one to transfer energy from light to a system. Tracking the absorption provides clues about the allowed energy states in the system. The strongest signatures in such a spectrum usually come from the collective modes excited in the system. In this talk I will present new collective modes in spin-orbit coupled (SOC) systems, called the chiral-spin waves, and how they can be studied using resonant electronic Raman scattering, a form of inelastic light scattering. This discussion is relevant to a wide variety of quantum materials such as quantum wells, topological insulators, 2D Vanderwaal's structures and even giant-Rashba SOC materials. The presence of spin-momentum locking in SOC systems also provides an enhanced coupling of light to certain charge excitations such as plasmons. I will present the unifying theory behind all these effects and provide the corresponding experimental evidence.

Keyword-1

Spin-orbit coupling

Keyword-2

Raman Scattering

Keyword-3

Plasmons

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