

In this talk, we shortly review how topological insulators (TIs) were born by tracing topological invariants in the new members of Hall family such as quantum spin Hall (QSHE) and also quantum anomalous Hall effects (QAHE) and also introducing some important toy models such as Haldane and Kane-Mele models. Emergence of QAHE in magnetically doped TI thin films opens up some questions about the origin of such strong ferromagnetism observed in experiment and also their quantum transport properties. As the starting point, based on some quantum selection rules governing in QAH insulators, a nono-electronic switch is designed and moreover, regarding to strong Rashba spin-orbit coupling in these materials, spin-polarization is investigated in nanojunctions of QAH insulators. To shine a light on the question about strong ferromagnetism, multiple subjects is studied such as single-impurity scattering, linear and non-linear RKKY interaction in TI thin films.