

**Abstract for GR-TR Conference on Statistical Mechanics
and Dynamical Systems**

Talk Invited

Invited Talk

Spin Transistor Action from Hidden Onsager Reciprocity

Inanc Adagideli*

Faculty of Engineering and Natural Sciences, Sabanci University,
Orhanli-Tuzla, Istanbul, Turkey

* Electronic Address: adagideli@sabanciuniv.edu

We investigate generic Hamiltonians for confined electrons with weak inhomogeneous spin-orbit coupling. Using a local gauge transformation we show how the $SU(2)$ Hamiltonian structure reduces to a $U(1) \times U(1)$ structure for spinless fermions in a fictitious orbital magnetic field, to leading order in the spin-orbit strength. Using an Onsager relation, we further show how the resulting spin conductance vanishes in a two-terminal setup, and how it is turned on by either weakly breaking time-reversal symmetry or opening additional transport terminals, thus allowing one to switch the generated spin current on or off. We numerically check our theory for mesoscopic cavities as well as Aharonov-Bohm rings.