

Spin super fluids: From DC and AC transport to topological hydrodynamics

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In this talk, I will discuss various aspects of spin superfluidity (long-ranged, dissipationless transport of spin angular momentum) in magnetic insulators that make it distinct from the familiar mass and charge super fluids. I first propose the

simplest realization of the phenomenon using a spin Hall-facilitated two-terminal device. Various $U(1)$ -symmetry breaking effects that lead to the suppression and the eventual destruction of the superfluid state are introduced and discussed. I then present ways in which superfluid-like behavior can be restored in the presence of such detrimental effects by considering spin transport in the AC regime and via topological magnetic solitons.

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