

The good, the bad, and the ugly in spin superfluids: Domain walls, phase slips, and skyrmions

YAROSLAV TSERKOVNYAK¹

¹*Department of Physics and Astronomy, University of California, Los Angeles, California 90095, USA*

August 19, 2016

ABSTRACT

In this talk, I will review the aspects of spin superfluidity that make it distinct from the familiar mass and charge superfluids. In particular, the focus will be on thermal and quantum fluctuations, which, depending on the regime, geometry, and temperature, either enable experimental manifestations of a superfluid-like spin transport in magnetic insulators or suppress them. The key issues concern the role of magnetic anisotropies, thermally-activated topological solitons (domain walls, skyrmions, and phase slips), as well as topological effects associated with low-dimensional quantum fluctuations at low temperatures.

References

- [1] S. K. Kim, S. Takei, Y. Tserkovnyak, *Topological spin transport by Brownian diffusion of domain walls*, Phys. Rev. B 92 (2015) 220409(R)
- [2] S. K. Kim, S. Takei, Y. Tserkovnyak, *Thermally activated phase slips in superfluid spin transport in magnetic wires*, Phys. Rev. B 93 (2016) 020402(R)
- [3] S. K. Kim, Y. Tserkovnyak, *Topological effects on quantum phase slips in superfluid spin transport*, Phys. Rev. Lett. 116 (2016) 127201
- [4] H. Ochoa, S. K. Kim, Y. Tserkovnyak, *Topological spin-transfer drag driven by skyrmion diffusion*, Phys. Rev. B 94 (2016) 024431