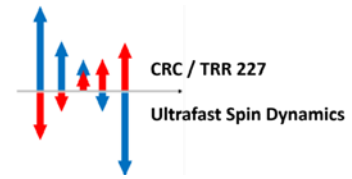


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Macroscopic Quantum Phenomena with Magnons

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In magnetic materials, the elementary excitations are often magnons. The magnons, particle-like objects, are delocalized and dynamical disturbances of the spin densities. At ambient temperatures, there are many magnons, and they move incoherently. Macroscopic phase-coherent features of the magnons are then tricky to explore.

In nano-scale systems, naturally occurring exchange couplings at interfaces between metals and magnetic insulators facilitate new ways to couple the magnons with electrons. We will discuss to what extent this coupling can enable magnon-induced macroscopic phenomena. Typical examples are Bose-Einstein condensation and spin superfluidity. However, we will focus on the new areas of magnon-induced superconductivity and exciton condensation.

