Achieving long-range spin transport is essential in spintronics. In metals, conduction electrons can carry spin information. The spin-diffusion length is generally less than a few hundred nanometers and often as short as a couple of nanometers. However, in magnets, there are additional transport channels via spin excitations, typically in the form of spin waves. In magnetic insulators, the absence of noisy itinerant carriers implies less dissipation but still the spin diffusion length decays exponentially.

In this talk, I introduce a new way for spin transport through the so-called spin superfluidity in magnetic insulators in which the spin currents decays algebraically and consequently the spin transport can persist across many micrometers, even in dirty samples.