Spintorques and skyrmions in chiral magnets

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In chiral magnets, for example in MnSi, spins can form a lattice of magnetic vortices[1], a skyrmion lattice, similar to the vortex lattice of type II superconductors. The topology of the skyrmions leads to a very efficient coupling of magnetism and electric currents associated with Berry phases picked up by the electrons when their spins follows the magnetic texture. Using neutron scattering, it was possible to observe directly[2] how currents affect the magnetic structure. Remarkably, the skyrmion lattice starts to move at rather low current densities, more than five orders of magnitude smaller than typically used in spin-torque experiments.
We discuss the theoretical concepts underlying the formation of skyrmions, their pinning by disorder and their coupling to currents.

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