Spin Antivortex in 2D Pb film

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In materials with spin-orbit coupling, electron spin is interacts with its motion in ways which underpin our understanding of the ways that electron spin travels through materials. Understanding non-trivial “textures” of spin across different electron momenta in realistic materials and their relation to spin transport is challenging but important due to the potential applications in spintronics. A team of MRSEC researchers predicted a new type of spin texture, the spin anti-vortex, and its potential realization in a monolayer of lead on a silicon carbide substrate. Since it is define topologically, the spin anti-vortex is mobile but locally unremovable. They can strongly influence spin transport phenomena, including current-induced spin polarization and the spin Hall effect, in a monolayer Pb film. This work proposed 2D Pb films with strong spin-orbit coupling as an appealing platform for spintronic applications.

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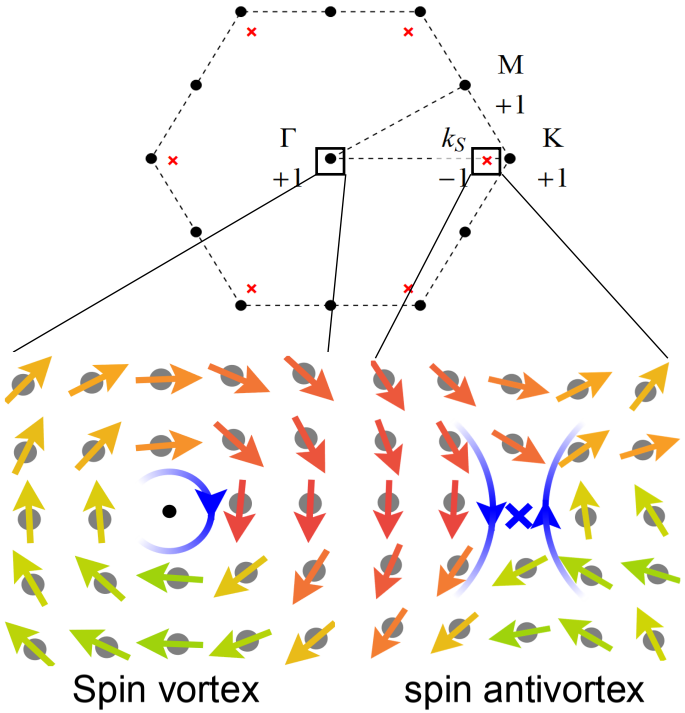

In the momentum space (Brillouin zone) of 2D lead, spin vortices exist at the high symmetry points marked with black dots, while spin antivortices exist at other momenta shown as red crosses.