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Vortex states in a non-Abelian magnetic field[1]

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A type-II superconductor survives in an external magnetic field by admitting an Abrikosov lattice of quantized vortices. This is an imprint of the Aharonov-Bohm effect created by the Abelian U(1) gauge field. The simplest non-Abelian analogue of such a gauge field, which belongs to the SU(2) symmetry group, can be found in topological insulators. This talk will present a lattice model calculation and a Landau-Ginzburg analysis of two-dimensional superconducting ground states that host a lattice of SU(2) vortices, arising from attractive interactions between electrons in an SU(2) magnetic field. The model directly captures a correlated topological insulator ultra-thin film, and approximates one channel for instabilities on the Kondo topological insulator surface. Due to its simplicity, the model might become amenable to cold atom simulations in the foreseeable future. The vitality of low-energy vortex states born out of SU(2) magnetic fields is promising for the creation of incompressible vortex liquids with non-Abelian fractional excitations.

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