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Fulde-Ferrell Superfluids in Degenerate Fermi Gases with Synthetic Gauge Fields[1]

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Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) phase was first predicted in two-dimensional superconductors about 50 years ago, but so far unambiguous experimental evidence is still lacking. The recently experimentally realized spin-imbalanced Fermi gases may potentially unveil this elusive state, but they require very stringent experimental conditions. In this talk, I will discuss a new route for generating stable FF phases through single particle band dispersion engineering using the recently experimentally generated synthetic gauge fields, such as artificial spin-orbit coupling or band hybridization in driven optical lattices. I will show that such FF superfluids can support topological quantum excitations such as Majorana and Weyl fermions.

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