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Mean-field Superconductivity in Dirac-cone at high magnetic field GAURAV CHAUDHARY, Univ of Texas, Austin, XIAO LI, University of Maryland, College Park, ALLAN MACDONALD, Univ of Texas, Austin — Many strategies for realizing topological superconductivity in two dimensions are based on Cooper-pairing of Dirac fermions. Dirac fermions are realized by electrons in graphene and at the surface of three-dimensional topological insulators. In this work we study the influence of Landau-quantization on the superconductivity of Dirac fermions in an external magnetic field. We derive a mean-field theory for the critical temperature of the superconducting instability in such a system, which is valid for both in the weak-field semiclassical limit and in the strong-field extreme quantum limit, demonstrate the presence of topological superconductivity in such a system, and characterize the structure of the emerging vortex lattice states. We find that the present system has important differences compared to the case of two-dimensional electrons with parabolic bands in an external magnetic field.

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