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Vortex zero modes, chiral anomaly and effective field theory for odd parity topological superconductor in three dimensional Dirac materials[1] BITAN ROY, PALLAB GOSWAMI, National High Magnetic Field Laboratory — The low energy quasiparticle dispersion of various narrow gap and gapless semiconductors are respectively described by three dimensional massive and massless Dirac fermions. The three dimensional Dirac spinor structure admits an interesting time-reversal invariant, odd parity and Lorentz pseudo-scalar topological superconducting state. In this talk we demonstrate the existence of fermion zero energy states in the vortex core of this odd parity topological superconductor under generic conditions. Guided by the existence of the zero modes and its intimate connection with the chiral anomaly and the index theorem, we derive an effective topological field theory for such a superconducting state. We also discuss the experimental consequences of the zero modes and the topological field theory for the low temperature unconventional superconducting states of copper intercalated bismuth selenide, and indium doped tin telluride.

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