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Spin-Orbit Coupled Degenerate Fermi Gases with Topological Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) phase CHUN FAI CHAN, MING GONG, The Chinese University of Hong Kong — The spin-orbit coupled degenerate Fermi gas provides an ideal platform for the search of topological matters and associated topological excitations. Recently, it has been shown that the topological Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) phase, in which the Cooper pairs carry finite center-of-mass momentum, can be realized in the presence of in-plane and out-of-plane Zeeman field. In this work, we study the topological phase transition and topological edge modes in the degenerate Fermi gas system. We first show that the in-plane Zeeman field creates an s-wave pairing channel, thus the effective pairing is a $s + p$ wave pairing in the topological FFLO phase regime. Then we study the phase diagram in the parameter space and discuss how these phases can be reached in experiments. At last we study topological excitations in a slab geometry, and discuss their possible experimental measurement issues.

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