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Quantum Hall Superfluids in Topological Insulator

Thin Films DAGIM TILAHUN, BYOUNGHAK LEE, Texas State Univ/ Univ of Texas at Austin, EWELINA HANKIEWICZ, Universitaet Wuerzburg, ALLAN MACDONALD, University of Texas at Austin — Three-dimensional topological insulators have protected Dirac-cone surface states. In this work we argue that gapped excitonic superfluids with spontaneous coherence between top and bottom surfaces can occur in the TI-thin-film quantum-Hall regime. We find that the large dielectric constants of TI materials increase the layer separation range over which coherence survives and decrease the superfluid sound velocity, but have little influence on the superfluid density or on the charge gap. The coherent state at total Landau-level filling factor $\nu_T = 0$ is predicted to be free of edge modes, qualitatively altering its transport phenomenology compared to the widely studied case of $\nu_T = 1$ in GaAs double quantum wells.

- Prefer Oral Session
 Prefer Poster Session

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