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Exciton Condensation and Charge Fractionalization in a Topological Insulator Film BABAK SERADJEH[1], University of Illinois, Urbana-Champaign, JOEL MOORE, University of California, Berkeley and Lawrence Berkeley National Laboratory, MARCEL FRANZ, University of British Columbia — An odd number of gapless Dirac fermions is guaranteed to exist at a surface of a strong topological insulator such as Bi_2Se_3 and Bi_2Te_3. We show that in a thin-film geometry and under external bias, electron-hole pairs that reside in these surface states can condense to form a novel exotic quantum state which we propose to call "topological exciton condensate" (TEC). The TEC is similar in general terms to the exciton condensate recently argued to exist in a biased graphene bilayer, but with different topological properties. It exhibits a host of unusual properties including a stable zero mode and a fractional charge $\pm e/2$ carried by a singly quantized vortex in the TEC order parameter.

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