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SU(3) Quantum Hall Ferromagnetism in SnTe CHENG-CHENG LIU, The University of Texas at Dallas, XIAO LI, University of Maryland, FAN ZHANG, The University of Texas at Dallas, A. H. MACDONALD, The University of Texas at Austin — The (111) surface of SnTe hosts one isotropic G-centered and three degenerate anisotropic M- centered Dirac surface states. We predict that a nematic phase with spontaneously broken C3 symmetry will occur in the presence of an external magnetic field when the N=0 M Landau levels are 1/3 or 2/3 filled. The nematic state phase boundary is controlled by a competition between intravalley Coulomb interactions that favor a valley-polarized state, and weaker intervalley scattering processes that increase in relative strength with magnetic field. An in-plane Zeeman field alters the phase diagram by lifting the three-fold M Landau level degeneracy, yielding a ground state energy with $2\pi/3$ periodicity as a function of Zeeman-field orientation angle.

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