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**Spontaneous Domain Walls in Bilayer Graphene** XIAO LI, Department of Physics, The University of Texas at Austin, Austin, Texas 78712, USA, FAN ZHANG, Department of Physics and Astronomy, University of Pennsylvania, Philadelphia, PA 19104, USA, QIAN NIU, ALLAN MACDONALD, Department of Physics, The University of Texas at Austin, Austin, Texas 78712, USA — Intrinsic bilayer graphene is susceptible to a family of gapped broken symmetry states in which each spin-valley flavor spontaneously polarizes between layers. These states are close in energy and can coexist above a critical temperature, separated by domain walls (DW), the collective and topological excitations. Our simulation further reveals three important facts. (i) The critical temperature of DW nucleation is smaller than the homogenous mean-field estimation and determines the phase transition. (ii) A Ginzburg-Landau theory can be built to characterize the DWs. (iii) Each DW leads to a surprising nonlinear transverse pseudospin response, which can be explained by the presence of zero modes propagating along the DW. We discuss the rich classification of these spontaneous DWs based on their distinct zero modes which may form unusual Luttinger liquids.

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