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Spontaneous layer polarization and conducting domain walls in bilayer graphene EREZ BERG, KUSUM DHOCHAK, Weizmann Institute of Science — Bilayer graphene subjected to perpendicular magnetic and electric fields displays a subtle competition between different quantum Hall ferromagnetic phases, resulting from an interplay from the internal spin and valley degrees of freedom. The transition between different phases is often identified by the closing of the gap and an enhanced conductance. Here, we formulate a criterion for the existence of conducting edge states at domain walls between different phases. For example, for a spontaneously layer polarized state at filling factor $\nu = 2$, domains walls between of regions of opposite polarization carry conducting edge modes. A microscopic analysis shows that lattice-scale interactions can favour such a layer polarized state in an intermediate range of magnetic field. We analyze the experiments of Weitz et al. (Science, 2010) in light of these results.

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