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Ising quantum Hall ferromagnetic states in bilayer graphene RENÉ CÔTÉ, WENCHEN LUO, ALEXANDRE BÉDARD-VALLÉE, Université de Sherbrooke — We present a study of the phase diagram of the chiral two-dimensional electron gas (C2DEG) in the higher Landau levels, $|N| \geq 1$, of a chirally stacked bilayer graphene as a function of magnetic field B and interlayer electrical bias Δ_B. In the Hartree-Fock approximation, the ground states of the C2DEG are respectively valley-pseudospin or spin Ising quantum Hall ferromagnets at odd or even filling factors of the quartet of states in levels $|N| \geq 1$ [1]. Changing the magnetic field or the bias introduces first order phase transitions between the different Ising ground states that are characterized by a discontinuity in the transport gap Δ_t. The C2DEG shows an hysteretic behavior with respect to the bias Δ_B with a marked difference between positive $N > 0$ and negative $N < 0$ Landau levels [2]. We discuss the relevance of our results with recent experimental measurements of broken-symmetry gaps in bilayer graphene [3].

[1] Wenchen Luo, R. Côté, and Alexandre Bédard-Vallée, Phys. Rev. B **90**, 075425 (2014).
[2] Wenchen Luo and R. Côté, arXiv:1410.4232 (2014).
[3] Kayoung Lee et al., Science **345**, 58 (2014).

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