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Quantum Hall ferromagnetic states of a graphene bilayer at $\nu = -1$ JULES LAMBERT, RENÉ CÔTÉ, U. Sherbrooke, YAFIS BARLAS, U. Florida and NHMFL, ALLAN H. MACDONALD, U. Texas at Austin — It was shown recently [1] that Coulomb interaction can lift the degeneracy of the octet of states in Landau level $N = 0$ of a graphene bilayer by forming different kinds of quantum Hall ferromagnetic states. In this talk, we study the sequence of phase transitions induced by an external potential difference, Δ_B between the layers at filling factor $\nu = -1$. With Δ_B, the system evolves from an interlayer coherent state at small Δ_B, to a state with mixed interlayer and inter-orbital coherence at intermediate Δ_B, and then into a state with inter-orbital coherence only at larger Δ_B. We discuss the nature of the ground state of these three phases and compute the dispersion of their collective excitations in the generalized random-phase approximation. For the inter-orbital coherent state, we develop an effective pseudospin model and explain that the finite wave- vector instability of the pseudospin mode at some critical bias Δ_B^*. is due to the presence of a Dzyaloshinskii- Moriya term in the Hamiltonian. This term may drive the system into a spiral state for $\Delta_B > \Delta_B^*$.

[1] Yafis Barlas, R. Côté, K. Nomura, and A. H. MacDonald, Phys. Rev. Lett. **101**,097601 (2008).

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