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, $\Delta B$ between the layers at filling factor $\nu = -1$. With $\Delta B$, the system evolves from an interlayer coherent state at small $\Delta B$, to a state with mixed interlayer and inter-orbital coherence at intermediate $\Delta B$, and then into a state with inter-orbital coherence only at larger $\Delta B$. 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 $\Delta B^*$, is due to the presence of a Dzyaloshinskii- Moriya term in the Hamiltonian. This term may drive the system into a spiral state for $\Delta B > \Delta B^*$.