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Anisotropy in two-dimensional electronic quantum Hall systems at half filling of valence Landau levels[1] ORION CIFTJA, Department of Physics, Prairie View A&M University, Prairie View, TX 77446, USA, CARLOS WEXLER, Department of Physics and Astronomy, University of Missouri, Columbia, MO 65211, USA — A recent experimental discovery in the quantum Hall regime has been the observation of very strong magneto-transport anisotropies at certain low values of magnetic field below a critical temperature of about 100 mK. While the origin of such anisotropy is yet unknown, we explain the emergence of such anisotropies in terms of electronic liquid crystalline states with broken rotational symmetry. We investigate the stability of liquid crystalline phases with nematic order at half filling of the valence Landau level. Quantum Monte Carlo simulations indicate that while isotropic states are stable in the lowest and first excited Landau level, there are regions of instability towards liquid crystalline states in higher Landau levels. A possible connection of the recently discovered magneto-transport anisotropy in low magnetic fields and these liquid crystalline states is discussed.

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