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Monte Carlo study of anisotropic quantum Hall liquid phases¹

ORION CIFTJA, LEDARION ESCAMILLA, GIANCARLO PAREDES, MYEGAN GRIFFIN, Department of Physics, Prairie View A&M University, Prairie View, Texas 77446, USA — Studies of novel unconventional correlated quantum phases of electrons are a topic of great interest in condensed matter physics. In this work we provide a microscopic understanding of quantum Hall anisotropic states from the perspective of an anisotropic liquid crystalline phase with broken rotational symmetry. Even though a standard charge density wave theory serves as a good starting point to explain anisotropic behavior in quantum Hall systems, another plausible mechanism leads to less conventional phases. These quantum phases can be characterized as anisotropic electronic phases with liquid crystalline order. In this work, we present finite-size Monte Carlo simulation results that support this view for the case of anisotropic quantum Hall liquid states observed at certain quantum Hall filling factors.

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