Abstract Submitted
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Intrinsic edge dipole moment of incompressible fractional quantum Hall ground states[1] YEJE PARK, F.D.M. HALDANE, Princeton University — The edges of incompressible fractional quantum Hall (FQH) fluids have a characteristic dipole moment related to their Hall viscosity, which can be split into two separate contributions: a (trivial) contribution from the Landau orbit (common to all FQH fluids in the same Landau level, and a (non-trivial) guiding-center contribution that depends on the FQH state. Using the model wave functions for (fermonic and bosonic) Laughlin states ($\nu = 1/2,\ 1/3,\ 1/4$), and Moore-Read states ($\nu = 2/2,\ 2/4$) expressed as Jack polynomials, we obtained the guiding-center occupation number distributions $n(k)$ of "Landau-gauge" basis states with k near the edge "$\nu^{-1}k_F$" of a FQH fluid in cylindrical geometries of various circumferences, and verified the "Luttinger" and "edge-dipole" sum rule. The edge-dipole moments of the FQH fluids were expressed as a combination of quantized quantities: electric charge e, "guiding center spin" s and number of fluxes per "composite boson" q in [F. D. M. Haldane, arXiv:0906.1854 (2009)]. Our work provides a numerical verification of the prediction. The edge dipole experiences a force due to the gradient of electric field perpendicular to the edge, and the force is balanced by stress from the "guiding center Hall viscosity".

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