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Edge properties of principal fractional quantum Hall states in the cylinder geometry PAUL SOULE, THIERRY JOLICOEUR, Univ of Paris - Sud 11 CNRS — We study fractional quantum Hall states in the cylinder geometry with open boundaries. We focus on principal fermionic $\nu = 1/3$ and bosonic $\nu = 1/2$ fractions in the case of hard-core interactions. The gap behavior as a function of the cylinder radius is analyzed. By adding enough orbitals to allow for edge modes, we show that it is possible to measure the Luttinger parameter of the nonchiral liquid formed by the combination of the two counterpropagating edges when we add a small confining potential. Although we measure a Luttinger exponent consistent with the chiral Luttinger theory prediction for the full hard-core interaction, the exponent remains nontrivial in the Tao-Thouless limit as well as for simple truncated states that can be constructed on the cylinder. If the radius of the cylinder is taken to infinity, the problem becomes a Tonks-Girardeau one-dimensional interacting gas in Fermi and Bose cases. Finally, we show that the Tao-Thouless and truncated states have an edge electron propagator, which decays spatially with a Fermi-liquid exponent, even if the energy spectrum can still be described by a nontrivial Luttinger parameter.

Paul Soule
Univ of Paris - Sud 11 CNRS

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