Abstract Submitted
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Disc configuration exact diagonalization studies of the phase diagram and edge states of the $\nu = 5/2$ fractional quantum Hall state with Landau level mixing and finite well thickness[1] ANTHONY TYLAN-TYLER, YULI LYANDA-GELLER, Department of Physics and Astronomy, Purdue University, West Lafayette, IN 47907 USA — The $\nu = 5/2$ fractional quantum Hall effect is of experimental and theoretical interest as a possible manifestation of non-Abelian statistics. The nature of this state has yet to be fully determined. The leading candidates are the Moore-Read Pfaffian state and its particle-hole conjugate, the anti-Pfaffian. When effects which break particle-hole symmetry are not included, these states are degenerate. We carry out an exact diagonalization calculation in a disk of neutralizing charge configuration, which breaks this degeneracy, and include Landau level mixing interactions arising from a diagrammatic expansion of the Coulomb potential and the effects of finite thickness. The Pfaffian sector is shown to favor strong interactions with the neutralizing background and strong Landau level(LL) mixing, while the anti-Pfaffian state occurs at weak LL mixing and background interactions. We find that there is a phase transition from the anti-Pfaffian to the Pfaffian state through a series of compressible stripe states as LL mixing is turned on. Furthermore, LL mixing interactions lead to an increased quasihole size and can overcome the effects of edge reconstruction. When the effects of the finite thickness of the confining quantum well are included, we observe enhancement these properties.

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