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Particle-hole symmetry without particle-hole symmetry in the quantum Hall effect at $\nu = 5/2$.[1] DMITRI FELDMAN, PHILIP ZUCKER, Brown Univ — Numerical results suggest that the quantum Hall effect at $\nu = 5/2$ is described by the Pfaffian or anti-Pfaffian state in the absence of disorder and Landau level mixing. In realistic samples both disorder and Landau level mixing are strong on the 5/2 plateau. The experimental observation of the upstream neutral mode on the sample edge is incompatible with the Pfaffian state. Tunneling experiments give an upper bound on the universal exponent g in the zero bias conductance $G \sim T^{2g-2}$. That bound is inconsistent with the anti-Pfaffian state. We show that a recent proposal of the PH-Pfaffian topological order by Son is compatible with the tunneling experiments and the observation of the upstream mode. The quasiparticle statistics of the PH-Pfaffian state is similar to the statistics in the Pfaffian and anti-Pfaffian states and its interferometric signatures are also similar to those of the Pfaffian and anti-Pfaffian topological orders. The absence of the particle-hole symmetry at $\nu = 5/2$ is not an obstacle to the existence of the PH-Pfaffian order since the order is robust to symmetry breaking.

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