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Observation of a pressure-driven quantum phase transition from a fractional quantum Hall state to an electronic stripe state at $\nu = 5/2$[1]

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The nature of the ground state of a two-dimensional electron gas at half-filled Landau level has been a remarkably interesting problem. Depending on the number of filled Landau levels, there are three fundamentally distinct ground states: a composite Fermi liquid in the lowest Landau level, a fractional quantum Hall state in the second Landau level, or an electronic stripe (or nematic) state in high Landau levels. The theory of the half-filled Landau level has recently been reexamined in the limit of exact particle-hole symmetry. This talk will present evidence of a stripe state in the second Landau level at filling factor $\nu = 5/2$ in a two-dimensional electron gas under hydrostatic pressure. We also observe a pressure driven phase transition at $\nu = 5/2$ from a fractional quantum Hall state to a stripe state. Since the former is a topological phase and the latter a traditional broken symmetry phase, the observed transition is an interesting example of a phase transition from a topologically ordered to a broken symmetry phase. Remarkably, the stripe state develops in the absence of any externally applied symmetry breaking fields.

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