

Abstract Submitted
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Optical Studies of Quantum Phases with Filling Factors $2 \leq \nu \leq 3$ in the Second Landau Level¹ TREVOR DAVID RHONE, JUN YAN, Columbia University, YANN GALLAIS, Universite Paris7, ARON PINCZUK, Columbia University, LOREN PFEIFFER, KEN WEST, Bell labs, Alcatel-Lucent — We report low temperature inelastic light scattering and optical recombination measurements of quantum phases in the second Landau level of 2D electron systems. We focus on states with filling factors $2 \leq \nu \leq 3$. An ultra high mobility, high density GaAs quantum well (240nm) is probed at low temperature (42mK – 1.2K). Low energy spin excitations are studied by resonant inelastic light scattering. We confirm the existence of a ferromagnetic state at $\nu = 3$ by the observation of a well-defined long wavelength spin wave mode at the Zeeman energy. Surprisingly, the ferromagnetic spin wave collapses at filling factors slightly away from $\nu = 3$. While this behavior may be a signal of the disappearance of ferromagnetic order in the second Landau level, experiments in progress may offer deeper insights on fundamental interactions and quantum phases in the second Landau level.

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