Abstract Submitted
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Unexpected Roles for Spin Degrees of Freedom in Competing Phases of the Second Landau Level[1] TREVOR D. RHONE, J. YAN, U. WURSTBAUER, Columbia University, Y. GALLAIS, Université de Paris 7, A. PINCZUK, Columbia University, L. PFEIFFER, K. WEST, Princeton University, PINCZUK GROUP TEAM — Competing liquid and solid ground states as well as intriguing quantum Hall fluids such as that at ν=5/2 create great current interest in the N=1 Landau level. The spin degrees of freedom in quantum phases of the 2nd Landau level is probed by resonant light scattering. The long wavelength spin wave mode, which monitors the degree of spin polarization, is at the Zeeman energy in the spin polarized state at ν=3. At lower filling factors the intensity of the Zeeman mode collapses indicating loss of spin polarization. At filling factors slightly lower the intensity of the spin wave attenuates and a broad continuum of low-lying excitations emerges - sharp and broad modes coexist. While the coexistence of spectral features has not been explained, the observation could manifest the presence of mixed quantum phases and some loss of spin polarization. A continuum of low-lying excitations emerges that dominates near ν=8/3 and ν=5/2. Resonant Rayleigh scattering reveals that the quantum fluids away from ν=3 break up into robust domains. It is conceivable that these domains could comprise both spin polarized and depolarized quantum fluids. While the state at ν=5/2 is considered to be polarized, these results reveal unprecedented roles for spin.

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