

Abstract Submitted
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Optical Signatures of Competing Quantum Phases in the Second Landau Level¹ ANTONIO LEVY, Columbia University Department of Physics, URSULA WURSTBAUER, Technische Universitat Munchen Department of Physics, ARON PINCZUK, Columbia University Department of Physics, JOHN WATSON, GEOFF GARDNER, MICHAEL MANFRA, Purdue University Department of Physics, KEN WEST, KIRK BALDWIN, LOREN PFEIFFER, Princeton University Department of Electrical Engineering — The fractional quantum Hall states and anisotropic phases of electrons in the $N=1$ Landau Level (LL) have drawn considerable experimental focus in recent years[1-3]. We report evidence that the competition and coexistence of these phases is probed directly by optical recombination from the partially populated $N=1$ LL at dilution refrigerator temperatures. Spectral bands that display striking dependence on perpendicular magnetic field in the full range $3 > \nu > 2$ are interpreted as linked to anisotropic phases. Optical recombination thus enables the monitoring of the evolution competing phases as the $N=1$ LL filling is changed. Remarkable changes in the optical recombination reveal that coexistence of distinct quantum phases has a marked dependence on filling of the $N=1$ LL. The signatures of anisotropic phases remain strong at filling factors of the FQHE. This is consistent with recent reports on anisotropic FQHE states in the second Landau level[1-3]. References: [1] J. Xia et al, Phys. Rev. Lett. 105, 176807 (2010). [2] J. Xia, J.P. Eisenstein, L.N. Pfeiffer, and K. West, K.W. Nature Phys. 7, 845–848 (2011). [3] Y. Liu, et al, Phys. Rev. B 88, 035307 (2013).

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