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Metamorphosis of quantum Hall bilayer state into a composite fermion metal B. KARMAKAR, V. PELLEGRINI, NEST and Scuola Normale Superiore, Italy, A. PINCZUK, Columbia University, NY, L.N. PFEIFFER, K.W. WEST, Bell labs, Alcatel-Lucent NJ — In the regime of strong interlayer correlation and tunneling gap Δ_{SAS} >0, the quantum Hall (QH) ground state of bilayers at filling fraction ν_T=1 can be viewed as an excitonic insulator [1]. Here it will be shown that a phase transition occurs between this excitonic state and a composite-fermion CF metal as Δ_{SAS} decreases [2,3]. The observations are based on inelastic light scattering of spin-wave (SW) mode at the Zeeman energy and spin-flip (SF_{SAS}) mode across Δ_{SAS}. These experiments show that the SF_{SAS} excitation collapses to the SW and disappears at a critical value of Δ_{SAS} while a low energy continuum of spin transitions below the SW mode appear. These transitions are interpreted as spin-flip SF_{CF} excitations of the CF metal in which orientation of spin and CF Landau level index change simultaneously. Measurements of SW excitations at ν_T=1 in the regime of Δ_{SAS} ≈0 will be also shown [4]. The behavior of the SW thermal activation gap as a function of the Zeeman energy suggests a subtle competition between interlayer correlation and spin effects in the broken-symmetry QH state at Δ_{SAS} ≈0. [1] S. Luin, et al., PRL. **94**, 146804 (2005); [2] S. Luin, et al., PRL. **97**, 216802 (2006); [3] B. Karmakar, et al., Solid State Comm. **143**, 504 (2007); [4] B. Karmakar, et al., work in progress.

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