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Dynamics of the Inter-Landau-Level Magnetoplasmon Coherence in a Quantum Hall system KESHAV DANI, JEROME TIGNON, MICHAEL BREIT, DANIEL CHEMLA, Dept. of Physics, UC Berkeley and Lawrence Berkeley Lab, Berkeley, CA 94720, ELEFTHERIA KAVOUSANAKI, ILIAS PERAKIS, Dept. of Physics, Univ. of Crete, Heraklion, Greece and Dept. of Physics and Astronomy, Vanderbilt Univ., Nashville, TN 37235 — Collective many-electron behavior of the cold 2DEG in a magnetic field leads to novel Quantum Hall (QH) effects and electronic excitations like the inter-Landau-level magnetoplasmon (MP). Using 3-pulse four-wave mixing (FWM) spectroscopy, we study coherent MP dynamics in a QH system. By delaying the arrival of one pulse relative to the others, the FWM signal shows striking beats for short time delays (∼300fs), followed by a rise (∼10ps) and then a decay (∼200ps). We analyze the experiment in the coherent regime (short time delays) by extending the Dynamics Controlled Truncation Scheme to the case of a strongly correlated ground state. We infer that the beats are due to quantum interference of the MP and magnetoexciton coherences. The decay of the beats gives the decay of the MP coherence. We perform a comprehensive study of these effects as a function of excitation frequency, magnetic field, excitation intensity and temperature.

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