

Abstract Submitted  
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**Interactions in quantum Hall edge channels at filling fraction 2<sup>1</sup>**

PASCAL DEGIOVANNI, CNRS / ENS Lyon, ERWANN BOCQUILLON, VINCENT FREULON, Laboratoire Pierre Aigrain, ENS Paris, CHARLES GRENIER, Centre de Physique Théorique, Ecole Polytechnique, JEAN-MARC BERROIR, BERNARD PLAÇAIS, Laboratoire Pierre Aigrain, ENS Paris, ANTONELLA CAVANNA, YONG JIN, CNRS / Laboratoire de Photonique et de Nanostructures, GWENDAL FÈVE, Laboratoire Pierre Aigrain, ENS Paris — Coulomb interactions play a major role in one dimensional electronic transport. They modify the nature of the elementary excitations from Landau quasiparticles in higher dimensions to collective excitations in 1D. We report here on the direct observation of the collective neutral and charge modes of the two chiral co-propagating edge channels of opposite spins of the quantum Hall effect at filling factor  $\nu = 2$ . Generating a charge density wave at frequency  $f$  in the outer channel, we measure the current induced by inter-channel Coulomb interaction in the inner channel after a 3 microns propagation length. Varying the driving frequency from 0.7 to 11 GHz, we observe damped oscillations in the induced current that results from the phase shift between the fast charge and slow neutral eigenmodes. Measuring the dispersion relation and dissipation of the neutral mode from provides quantitative information on the scattering of quantum edge magnetoplasmons. We will then comment on the consequences of these results on quasi-particle relaxation and decoherence in the  $\nu = 2$  quantum Hall edge channel system.

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