

# Mach-Zehnder interferometry of quantum Hall edge states.

Eugene V. Sukhorukov

Department of Theoretical Physics, University of Geneva, CH-1211 Geneva, Switzerland

We address the recently observed unexpected behavior of Aharonov-Bohm oscillations in the electronic Mach-Zehnder (MZ) interferometer experimentally realized in a quantum Hall system [1,2]. We show that the measured lobe structure in the visibility of oscillations and the phase rigidity result from a strong long-range interaction at the edge of 2DEG. The interaction effects depend on the filling factor : For  $\nu=1$  the dephasing may originate from the resonant back-scattering of charge excitations (plasmons) [3], while for  $\nu=2$  the intrinsic structure of the edge seems to be important [4]. Interestingly, the I-V characteristics of a single quantum point contact is not affected by the interaction. Therefore, the MZ interferometry provides a unique experimental tool for the investigation of the physics of edge states.

[1] I. Neder et al., Phys. Rev. Lett. 96, 016804 (2006).

[2] P. Roulleau et al., Phys. Rev. B76, 161309 (2007).

[3] E.V. Sukhorukov, and V.V. Cheianov, Phys. Rev. Lett. 99, 156801 (2007).

[4] I.P. Levkivskyi, and E.V. Sukhorukov, unpublished.