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Partial heating between counter propagating quantum Hall edge channels[1] KAZUHISA WASHIO, RYO NAKAZAWA, MASAYUKI HASHISAKA, Department of Physics Tokyo Institute of Technology, KOJI MURAKI, NTT Basic Research Laboratories, TOSHIMASA FUJISAWA, Department of Physics Tokyo Institute of Technology — In contrast to clear unidirectional charge flow in quantum Hall edge channels, heat transport and equilibration remain veiled. Most of the previous works were concentrated on heating between co-propagating edge channels, where co-propagating charge and spin modes are formed by the Coulomb interaction [1]. Here, we investigate heating between counter propagating edge channels separated by a narrow surface gate of the width 0.1 μm, where the plasmon coupling forms counter-propagating dragging modes [2]. One edge channel is directly heated up by a quantum point contact at its half transmission, and energy spectrum of the other edge channel is evaluated by quantum dot thermometry. We observed partial heating in the spectrum, where a small fraction (1-5 percent) of electrons is highly excited over the original Fermi distribution, for an interaction length of 5-10 μm in the coupled channels. This can be understood by considering weak scattering process between the channels. The flow of this non-equilibrium distribution will be discussed with different configurations of heating and detecting channels in terms of the chirality and the dragging modes.

[1] H. le Sueur el al., PRL 105, 056803 (2010)
[2] H. Kamata et al., to be published. (cond-mat/1309.7471)

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