Abstract Submitted
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Implementation and test of an Levitov's n-electron coherent source[1] D. CHRISTIAN GLATTLI, JULIE DUBOIS, THIBAUT JULLIEN, PREDEN ROULLEAU, FABIEN PORTIER, P. ROCHE, Service de l'Etat Condense CEA Saclay — Injecting a controlled number of electrons in a quantum conductor opens the way to new quantum experiment. It is known that a voltage biased contact applied on a single mode quantum conductor, such as a perfectly transmitting Quantum Point Contact (QPC), continuously injects single electrons at a rate eV/h. Here we consider the injection of n electrons using a short time voltage pulse with $\int eV(t)dt = nh$. When the voltage pulse has a Lorentzian shape, L. Levitov et al. [1] have shown that the n-electron injection is free of extra neutral electron-hole pairs and is a minimal excitation state. We present the first realization of Levitov's proposal. Using periodic voltage pulses applied on a contact of a 2DEG, a coherent train of n-electrons is send to a QPC which acts as an electron beam splitter. By measuring the shot noise resulting from the partitioning of all excitations we demonstrate that Lorentzian pulses are minimal excitation states. This is complemented by energy domain study of the excitations using shot noise spectroscopy and by a time-domain study using shot noise in a Hong-Ou-Mandel like n-electron collision experiment.

[1] H-W Lee & L. Levitov, cond-mat: 9312013; J. Keeling, I. Klich, and L. Levitov, Phys. Rev. Lett. 97, 116403 (2006).
[2] J. Dubois, T. Jullien, P. Roulleau, F. Portier, P. Roche, W. Wegscheider and D.C. Glattli, submitted.

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