Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

**Implementation and test of an Levitov's n-electron coherent source**[1] JULIE DUBOIS, THIBAUT JULLIEN, PREDEN ROULLEAU, FABIEN PORTIER, PATRICE ROCHE, D. CHRISTIAN GLATTLI[2], Service de Physique de l'Etat Condensé, CEA Saclay — Injecting a controlled number of electrons in a quantum ballistic conductor opens the way to new kind of quantum experiments, yet never done. It is well known that a voltage biased contact applied on a single mode quantum conductor, such as a Quantum Point Contact, inject continuously single electrons at a rate $eV/h$ , a remarkable property of the Fermi sea. Here we consider the injection of electrons during a very short time where is is expected that a voltage pulse with $\int eV(t)dt = nh$ injects exactly n-electrons, n being integer. If in addition, if the voltage pulse has the form of a Lorentzian shape in time, Levitov has shown that the n-electron are not accompanied by neutral spurious electron-hole pair excitations and thus form a minimal excitation n-electron source. The electron being indistinguishable if the time-scale is shorter than the coherence time, the Levitov's source is coherent and new quantum experiments involving interference with serveral electrons become at reach. We present here experimental realization of the n-electron source using short sub-nanosecond pulses and tests of the minimal excitation number using the shot noise created by repeatedly sending n-electrons toward a quantum point realized in clean ballistic 2D electrons. The square-wave, sine-wave and Lorentzian shape pulses are compared. This is also accompanied by photon-assisted current measurements. J. Dubois, T. Jullien, P. Roulleau, F. Portier, P. Roche, and D.C. Glattli, in preparation.

[1]ERC Advanced grant 228273 MeQuaNo
[2]submitting author, Head of the Nanoelectroncis Group.

Christian Glattli
Service de Physique de l'Etat Condensé, CEA Saclay

Date submitted: 08 Dec 2011 Electronic form version 1.4