Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Electron quantum optics as signal processing BENJAMIN ROUSSEL, CLÉMENT CABART, PASCAL DEGIOVANNI, ENS - Lyon — Electron quantum optics is an emerging field aiming at understanding quantum transport using ideas from photon quantum optics [Annalen der Physik, **526**, 1 (2014)]. The key question in electron quantum optics is to determine which single-electron and more generally many-electron wavefunctions are propagating in the conductor. This is encoded within the electronic coherences defined similarily to the Glauber correlation function of order n giving access to the result of every n-particle interferometry experiments. This raises the question of the best elementary signals describing the electronic coherences of a periodically driven electronic source [arXiv:1610.02086]. In this work, we introduce the spectral decomposition of the electron and hole parts of the first-order coherence. From this, we compute the best elementary signals describing a periodic source. Whenever interactions can be neglected, we can reconstruct the whole many-body state. We then define a many-body notion of entanglement spectrum giving a many-body criterion for pure electron or hole emission relevant when considering a driven Ohmic contact or the mesoscopic capacitor. This work is a first step towards the development of quantum signal processing techniques in electron quantum optics.

Benjamin Roussel
ENS - Lyon

Date submitted: 13 Nov 2016 Electronic form version 1.4