Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Quantum Wires with Electrons and Cold Atoms LINEY HALLA KRISTINSDOTTIR, JONAS C. CREMON, ANDREAS WACKER, STEPHANIE M. REIMANN, Lund University — Advances in atom trapping and atom chip techniques allow the controlled preparation and manipulation of clouds of cold, neutral atoms, in optical lattices as well as on lithographically patterned gate structures. This opens up many new possibilities to study quantum transport in systems other than semiconductor quantum dots or nanowires, with the exciting perspective of future "atomtronic" systems. Inspired by these developments, we study transport through two different interacting systems as a function of externally controllable parameters: Electrons in a nanowire, and cold atoms in a one-dimensional finite well. For a nanowire system we can demonstrate that Wigner crystallization occurs, when the length of the wire is changed in the experiment [1]. Distinct diamond patterns appear, when conductance is plotted against source-drain bias and the gate voltage, as common for quantum dot systems. The same holds for more general types of "interaction blockade," and we demonstrate that such phenomena can also be studied by cold atom systems.

[1] Kristinsdóttir, L.H., J. Cremon, H. Nilsson, H. Xu, H. Linke, L. Samuelson, A. Wacker and S.M. Reimann, Phys. Rev. B **83**, 041101, (2011).

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Date submitted: 07 Dec 2011 Electronic form version 1.4