One-dimensional Hartree-Fock calculations for electrons in a constriction JIANG QIAN, BERTRAND HALPERIN, Physics Department, Harvard University, WALTER HOFSTETTER, Institut für Theoretische Physik A, RWTH Aachen, GERGELY ZARAND, Institut für Theoretische Festkorperphysik, Universitat Karlsruhe — There are a number of puzzling experimental results associated with electron transport through a narrow constriction of finite length, such as the so-called 0.7 structure in the quantum point contact and the experiments on tunneling between two parallel quantum wires. To gain deeper insights into these experiments, it may be important to understand how a constriction region containing electrons at a very low-density is connected to higher density leads at each end. We have formulated Hartree-Fock methods applicable to one-dimensional models of such systems, in equilibrium or with a finite source-drain voltage. We will present results of the electron density profile and spin structures around the constriction for several models of interaction and constriction potentials. This work is supported in part by NSF grand DMR-02-33773 and PHY-01-17795.

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