Abstract Submitted
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The transition from a one-dimensional to a quasi-one-dimensional state in interacting quantum wires[1] JULIA S. MEYER, The Ohio State University, KONSTANTIN A. MATVEEV, Argonne National Laboratory, ANATOLY I. LARKIN, W.I. Fine Theoretical Physics Institute, University of Minnesota — Upon increasing the density of electrons in a quantum wire, the system undergoes a transition from a one-dimensional to a *quasi*-one-dimensional state. In the absence of interactions between electrons, this corresponds to filling up the second subband of transverse quantization. On the other hand, strongly interacting one-dimensional electrons form a Wigner crystal, and the transition corresponds to it splitting into two chains (zig-zag crystal). While the two subbands in the non-interacting case represent two gapless electron modes, in the Wigner crystal the two chains are locked, i.e., the relative motion is gapped, and only one gapless mode remains. We study the evolution of the system as the interaction strength changes. In particular, we establish that only one gapless mode exists near the transition at any interaction strength.

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