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Novel Gapped Quantum Wire TRINANJAN DATTA, ERICA W. CARLSON, Department of Physics, Purdue University — High quality state of the art quantum wires (QWRs) can be fabricated by the novel cleaved edge overgrowth technique, proposed by (Pfeiffer *et al.*, 1990). Transverse quantization in these QWRs leads to a succession of nested energy bands. With the lowest two successive energy levels occupied, gapped phases are possible including, e.g, an intersubband charge density wave (ICDW) and a Cooper phase with strong superconducting fluctuations (Starykh *et al.*, 2000). Due to the possibility of density reorganization, in which it becomes favorable for the two lowest subbands to match their densities, the ICDW is usually the most likely state. Recently, by exploiting the valley degeneracy in AlAs, a single QWR has been fabricated with two degenerate nonoverlapping bands separated in k space by half an Umklapp vector (Moser *et al.* 2004). For low densities this structure is able to access a multiple subband regime that is not subject to the density reorganizing ICDW, leaving the Cooper phase to flourish. Using Abelian bosonization, we explore the relevant interaction terms for this system, including Umklapp assisted Cooper scattering, and discuss the phase diagram.

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