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Phase diagram of a one-dimensional spin-full Bose-Fermi mixture at large boson densities ALBERTO NOCERA, Northeastern University, Boston MA 02115, USA, ROMAN M. LUTCHYN, Station Q, Microsoft Research, Santa Barbara, CA 93106-6105, USA, ADRIAN E. FEIGUIN, Northeastern University, Boston MA 02115, USA — We determine the ground state phase diagram of a one dimensional Bose-Fermi Hubbard model with spin-full fermions using the Density Matrix Renormalization Group (DMRG) method. We focus on the regime with one fermion per site, and deep into the superfluid phase. We study the effects of the boson-fermion interaction on the fermionic pairing, as a function of the interaction strength, hopping, and bosonic density. We identify the regime in which fermionic superfluidity dominates, and a phase with coexisting CDW and bosonic superfluidity. At high boson densities we find a fermionic Wigner crystal coexisting with bosonic superfluidity. We analyze the structure of the Cooper pairs and the bosonic cloud that acts as the glue.

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