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The BCS-BEC crossover and the disappearance of FFLO-correlations in a spin-imbalanced, 1D Fermi gas FABIAN HEIDRICH-MEISNER, LMU Munich, ADRIAN FEIGUIN, U Wyoming, ULRICH SCHOLL-WOECK, LMU Munich, WILHELM ZWERGER, TU Munich — We present a numerically exact study of the one-dimensional BCS-BEC crossover of a spin-imbalanced Fermi gas, using a two-channel model. Specifically, the crossover is described by the Bose-Fermi resonance model in a real space representation. Our main interest is in the behavior of the pair correlations, which, in the BCS limit, are of the Fulde-Ferrell-Larkin-Ovchinnikov type, while in the BEC limit, a superfluid of diatomic molecules forms that exhibits quasi-condensation at zero momentum. We use the density matrix renormalization group method to compute the phase diagram as a function of the detuning of the molecular level and the polarization. As a main result, we show that, for sufficiently large densities, FFLO-like correlations disappear well below full polarization close to the resonance, and on the BCS side. The critical polarization depends on both the detuning and the filling. F. Heidrich-Meisner, A. Feiguin, U. Schollwoeck, W. Zwerger, Phys. Rev. A, in press, arXiv:0908.3074

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