

Abstract Submitted
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Bose polaron and bi-polaron in 1D: condensate depletion and generalized phonons MARTIN WILL, University of Kaiserslautern, JONAS JAGER, RYAN BARNETT, Imperial College London, MICHAEL FLEISCHHAUER, University of Kaiserslautern — We discuss the interaction of mobile impurities with a surrounding condensate in 1D. For a large impurity-condensate coupling the usual approach of linearizing around a constant condensate density (extended Frhlich model) does not account correctly for deformations of the BEC and is therefore no longer applicable. We give an alternative approach, taking into account the condensate deformation already on a mean field level, which can be solved analytically [1]. The energy and effective mass of the polaron quasi-particle agree well with quasi exact quantum Monte-Carlo calculations [2] and the agreement is further improved by including phonon-like excitations of the deformed background. We present the mean-field solution for one as well as two impurities immersed in the condensate from which an effective impurity-impurity interaction potential, mediated through the condensate, is derived.

[1] V. Hakim Phys. Rev. E 55, 2835-2845 (1997)

[2] F. Grusdt, G. Astrakharchik, E. Demler New J. of Phys. 19.10, 103035 (2017)

Martin Will
University of Kaiserslautern

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