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Strong-coupling polarons in one dimensional Bose condensates JONAS JAGER, RYAN BARNETT, Imperial College London, London, MICHAEL FLEISCHHAUER, MARTIN WILL, University Kaiserslautern, Germany — We discuss the interaction of a mobile impurity with a surrounding Bose-Einstein condensate (BEC) forming a Bose polaron. For high BEC-impurity couplings, the standard approach of expanding around a homogeneous condensate does not account adequately for condensate deformations and thus becomes inappropriate. We present an alternative approach taking into account the condensate deformation already on the mean-field level, for which analytic solutions can be obtained in 1D [1]. The calculated polaron energy and condensate depletion show excellent agreement with quantum Monte-Carlo simulations and improves on approaches based on expansions around an undepleted BEC [2]. Finally, we discuss potential problems in the calculation of a proper polaron mass.

[1] M. Schecter, D. Gangardt, A. Kamenev, New J. Phys. 18 (2016) 065002
[2] F. Grusdt, G. Astarkarchik, E. Demler, New J. Phys. 19 (2017) 103035

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