

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Many-Body Bose Polaron Dynamics: Mass Renormalization, Induced Interactions and Orthogonality Catastrophe¹ SIMEON MISTAKIDIS, University of Hamburg, ARTEM VOLOSNIIEV, Technische Universität Darmstadt, GARYFALLIA KATSIMIGA, GEORGIOS KOUTENTAKIS, University of Hamburg, NIKOLAJ ZINNER, Aarhus University, DK-8000 Aarhus C, Denmark, THOMAS BUSCH, Quantum Systems Unit, Okinawa Institute of Science and Technology Graduate University, Japan, PETER SCHMELCHER, University of Hamburg — We unravel the correlated nonequilibrium dynamics of one dimensional harmonically trapped Bose polarons. Utilizing many-body simulations we demonstrate that inhomogeneity can be taken into account by an effective one-body model where both the mass and the string constant are renormalized [1]. Moreover, we inspect the dynamical dressing of spinor impurities when coupled to a bosonic environment. Monitoring the structure factor of the system three distinct dynamical regions arise upon increasing the interspecies interaction [2]. The polaron formation is imprinted on the spectral response of the system. For strong interactions an orthogonality catastrophe occurs and the polaron picture breaks down. Then, a dissipative motion of the impurity takes place leading to a transfer of energy to its environment and in turn signaling the presence of entanglement. The occurrence of induced interactions is exposed and their effect in the dynamics of several observables is identified. [1] arXiv:1809.01889 (2018). [2] arXiv:1811.10702 (2018).

¹SFB 925 “Light induced dynamics and control of correlated quantum systems”

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Date submitted: 06 Jan 2019

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