

Abstract Submitted
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Time-resolved correlated dynamics of Polarons and evidence for thermalization¹ SIMEON MISTAKIDIS, GARYFALLIA KATSIMIGA, GEORGIOS KOUTENTAKIS, University of Hamburg, THOMAS BUSCH, OIST Graduate University, PETER SCHMELCHER, University of Hamburg, THEORY GROUP OF FUNDAMENTAL PROCESSES IN QUANTUM PHYSICS TEAM — We unravel the time-resolved dynamics of either fermionic or bosonic impurities immersed in a harmonically trapped Bose Einstein condensate utilizing pump-probe spectroscopy. A pump pulse transfers the impurities from a noninteracting to the polaronic state whilst the probe pulse allows to directly monitor their nonequilibrium dynamics. Coherent attractive or repulsive Fermi and Bose polarons and their induced-interactions are detected in the probe spectra for moderate attractive and repulsive interspecies interactions. Strikingly, for strong repulsions an orthogonality catastrophe occurs independently of the impurities flavour and interactions. In this case and for long time scales a steady state is reached characterized by substantial coherence losses of the impurities which acquire an effectively large temperature. This steady state is related to an eigenstate thermalization which is found to be independent of the systems characteristics.

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