

Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Polaron physics in hybrid ion-atom systems KRZYSZTOF JACHYMSKI, Forschungszentrum Julich, Germany, ANTONIO NEGRETTI, University of Hamburg, Germany, GRIGORI ASTRAKHARCHIK, Polytechnic University of Catalonia, Barcelona, Spain, LUIS PEA ARDILA, Hannover University, Germany, RICHARD SCHMIDT, Max Planck Institute for Quantum Optics, Munich, Germany — Hybrid systems of ultracold ions and atoms are characterized by relatively long-range interactions which compete with the other length scales in the system. This opens the possibility to study new regimes of polaron physics. We show that a single ion immersed in a degenerate Bose gas can acquire very large effective mass, binding multiple bosons in a cluster state. The presence of the ion induces correlations in the gas which can be interpreted as effective interaction. We also discuss the properties of an ion crystal with an atomic impurity, where the polaron is formed by dressing with the lattice distortion. We show that the system can be described in terms of an extended Hubbard-Holstein model with exotic long-ranged interactions.

Krzysztof Jachymski
Forschungszentrum Julich

Date submitted: 19 Dec 2019

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