Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Quantum dynamics of impurities coupled to a Fermi sea JESPER LEVINSEN, MEERA PARISH, Monash University — We consider the dynamics of an impurity atom immersed in an ideal Fermi gas at zero temperature. We focus on the coherent quantum evolution of the impurity following a quench to strong impurity-fermion interactions, where the interactions are assumed to be short range like in cold-atom experiments. To approximately model the many-body time evolution, we use a truncated basis method, where at most two particle-hole excitations of the Fermi sea are included. When the system is initially non-interacting, we show that our method exactly captures the short-time dynamics following the quench, and we find that the overlap between initial and final states displays a universal non-analytic dependence on time in this limit. We further demonstrate how our method can be used to compute the impurity spectral function, as well as describe many-body phenomena involving coupled impurity spin states, such as Rabi oscillations in a medium or highly engineered quantum quenches.

Jesper Levinsen
Monash University

Date submitted: 26 Jan 2018 Electronic form version 1.4