Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Photodetachment of K^- into highly polarizable excited states[1]
MATTHEW EILES, CHRIS GREENE, Purdue Univ — Photodetachment of atomic negative ions is a robust tool for probing highly non-trivial electron correlation, especially when the photon has sufficient energy to both detach an electron and excite the residual neutral atom into a low-lying Rydberg state. In this scenario, the detached electron induces strong polarization and dipole forces in the residual neutral atom, leading to non-coulombic long-range interactions. These interactions are of particular interest in two regimes. First, excited states of maximal angular momentum can possess huge negative polarizabilities, which lead to repulsive polarization potentials. Secondly, near-degeneracies in atomic states with high angular momenta can lead to the formation of permanent dipole potentials. In order to study the effects of these unusual atomic potentials on the partial photodetachment cross sections observed experimentally, we have performed an extensive R-matrix calculation over this range of highly excited states.

[1]We acknowledge support from the DoE

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Date submitted: 26 Jan 2018 Electronic form version 1.4