

Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Quantum analysis of atom-ion sympathetic cooling in the presence of micromotion MICHAL KRYCH, ZBIGNIEW IDZIASZEK, University of Warsaw — We investigate the problem of a single ion in a radio-frequency trap and immersed in an ultracold Bose gas either in condensed or non-condensed phase. We develop master equation formalism describing the sympathetic cooling and we determine the cooling rates and final energies of ions. We show that cold atomic reservoir modifies the stability diagram of the ion in the Paul trap creating the regions where the ion is either cooled or heated due to the energy quanta exchanged with the time-dependent potential. Our calculation indicates that micromotion constitutes an important source of heating limiting the final temperature of ions to values higher than $100\mu\text{K}$ for parameters of present experiments.

Michał Krych
University of Warsaw

Date submitted: 31 Jan 2014

Electronic form version 1.4