

Abstract Submitted
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Wide-range control of ion temperature in a linear rf ion trap¹

MITSUTOSHI ARAMAKI, AKIHIRO KONO, Dept. Engineering, Nagoya University, Japan — Ion trap is a device which confines charged particles using an electromagnetic field. The characteristics of the confinement by ion trap are long confinement time and weak interaction with the surrounding environment. Thus ion trap is suitable for the research of statistical character of ion cloud. The aim of our study is to clarify the dynamics of the phase transition between liquid and solid state of ion cloud. The technique of accurate ion temperature control is important for this purpose. As the first step of our ion trap experiment, we tried to expand the controllability of ion temperature in a linear rf ion trap using buffer-gas cooling, laser cooling, and rf heating. We developed a linear ion trap and tunable diode laser systems. The laser systems were used for both of laser cooling and the laser induced fluorescence (LIF) measurements of Ca ion. The ion temperature was estimated from Doppler LIF spectrum. The ion temperature could be controlled from several thousand Kelvin to less than room temperature using buffer gas cooling and laser cooling. We are trying to decrease the minimum temperature by decreasing rf heating effect. We will discuss about accurate temperature control around the phase transition between liquid and solid state of ion cloud.

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