

Informal AMO talk



Title: Applications of Coulomb crystals in cold chemistry

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Time: Thursday, July 1 at 11:15

Place: 1525-323

Abstract:

Following the advances made by a number of groups in producing cold molecules, experiments to study molecular collisions at very low collision energies have now become possible. Our approach uses the technique of electrostatic velocity selection, as developed by the Rempe group, to study reactive collisions of slowly-moving polar molecules with trapped cold ions. Calcium ions are produced inside a linear Paul trap and laser-cooled to mK temperatures to form ordered structures usually referred to as Coulomb crystals. The strong localisation and long trapping times of the ions allows chemical reactions to be studied with a high sensitivity, even down to the single particle level. We have investigated reactions of both atomic and sympathetically cooled molecular ions with a variety of translationally-cold polar molecules.

Recent experiments have focused on studying reactivity as a function of the laser-cooling parameters to obtain reaction rate constants for the ground and electronically-excited states of the calcium ion. In addition, single-ion resonance-excitation mass spectrometry techniques, developed by the group of Prof. Drewsen, were employed to identify the product ions of these reactions. Plans for future experiments which may involve Stark deceleration or a cryogenically-cooled electrostatic guide for the production of translationally and/ internally/ cold neutrals will be discussed.

Michael Drewsen