JORDI MUR-PETIT 'Measurement and Control of Molecular Ions and Polar Molecules'

JORDI MUR-PETIT

September 27, 2012

Seminar, September 27, 2012, 15:00. Seminar Room

JORDI MUR-PETIT

Instituto de Fisica Fundamental

IFF-CSIC, Madrid, SPAIN

Trapped atomic ions constitute one of the most advanced and promising physical systems to implement Quantum Information Processing and Computation (QIPC) protocols due to the exquisite experimental control, low decoherence rates, and the precise theoretical understanding of the physics involved. Very recently, molecular ions have been trapped and cooled to the mK regime in well defined internal states, opening a new window for precision spectroscopy of molecular species and quantum information with cold molecular ions. A first

requirement for both applications is the ability to control and measure the state of molecular ions.

I will first review the ideas of quantum logic spectroscopy and fast quantum gates to show how they can be used to design a fast, non-destructive and temperature-independent protocol suitable to probe electronic, vibrational, rotational and Zeeman transitions in complex ions.

Then, I will present a generalization of this protocol for hybrid ion-electric dipole systems, that shall allow for probing and manipulation of polar molecules with trapped atomic ions.

Seminar, September 27, 2012, 15:00. Seminar Room

Hosted by Prof. Maciej Lewenstein