



**Conference on Long-Range Interacting Many-Body Systems:  
from Atomic to Astrophysical Scales  
(25 - 29 July 2016)**

**Venue: ICTP Leonardo da Vinci Building - Budinich Lecture Hall**  
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Title:

**Characterization of non-equilibrium many-body quantum states in trapped ion crystals**

Speaker:

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Abstract:

Laser-cooled and trapped ions interact with each other via Coulomb interactions which determine the equilibrium positions and the vibrational excitations of the resulting ion crystal. These interactions can be turned into state-dependent forces by laser light coupling motional and internal degrees of freedom of the ion crystal. In this way, long-range Ising models can be experimentally investigated with trapped ions. In my talk, I will present experiments along these lines in which we investigated the non-equilibrium dynamics of up to 20 spins encoded in a linear ion chain. We characterized the resulting quantum states using matrix-product state tomography and direct fidelity estimation.