

Towards Arrays of Ions (and Atoms) for Quantum Simulations

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We will summarize our status and our view of the perspectives of the following topics:

(1) Optical trapping of ions (and atoms) – towards a new class of Analogue Quantum Simulations:

We recently trapped Mg ion in a one-dimensional optical lattice. We will report on our results and discuss our approach to confine an ion and atoms in one common laser focus to reach towards the chemistry at minimal mutual kinetic energies (collaboration with C.Cormick and G.Morigi) and, on a long term perspective, towards a new-class of quantum simulations.

(2) Analogue Quantum simulations in surface radiofrequency traps:

We will report about the progress in our alternative approach for scaling quantum simulations in two-dimensional radiofrequency traps (collaboration with Roman Schmied, Didi Leibfried and Sandia National Lab, Diego Porrás and Alejandro Bermudez).

(3) Topological defects in more-dimensional Coulomb crystals:

We additionally introduce our findings on topological defects within "conventional " two-dimensional Coulomb crystals enclosed in one common trapping potential (collaboration Haggai Landa and Benni Reznik).