Contribution ID: **46** Type: **Talk**

Trapped ions in optical tweezers

Tuesday, 28 June 2022 09:45 (22 minutes)

We present progress on our experimental setup where we will use novel optical tweezers –derived from spatial light modulators –to manipulate the phonon spectrum of a two-dimensional ion crystal in a Paul trap [1]. This allows us to control the effective spin-spin interactions between the ions in order to realize and study various Hamiltonians of interest [2]. In particular, the pinning of a single ion can be used to create short-range spin-spin interactions. In 2D crystals, this can be used to quantum simulate spin Hamiltonians on a kagome lattice [2].

In one dimensional ion chains optical tweezers can be combined with oscillating electric fields in order to realize two-qubit geometrical phase gates [3]. This novel approach, combined with other well-established techniques, can be used to realize a novel architecture for quantum computing using trapped ions.

Primary author: Mr MAZZANTI, Matteo (University of Amsterdam)

Co-authors: Prof. GERRITSMA, Rene (University of Amsterdam); Dr SCHÜSSLER, Rima Xenia (University of Amsterdam); Mr WU, Zhenlin (University of Amsterdam); Mr ARIAS ESPINOZA, Juan Diego (University of Amsterdam); Mr ACKERMAN, Zeger (University of Amsterdam); Dr SAFAVI NAINI, Arghavan (University of Amsterdam); Ms ROBALO PEREIRA, Clara (University of Amsterdam); Dr FELDKER, Thomas (University of Innsbruck)

Presenter: Mr MAZZANTI, Matteo (University of Amsterdam)

Session Classification: Quantum Technologies