University of Crete
Department of Physics

Physics Colloquium

Thursday, 14 December 2023 | 17:00 – 18:00, Online with Zoom

Quantum simulation using ion traps

Dr. Antonios Kyprianidis

Indiana University Bloomington, USA

ABSTRACT

Quantum simulators and computers promise to tackle certain classes of problems more efficiently than classical computers, harnessing superposition and entanglement between quantum bits. Since Feynman's delivery of his famed seminal lecture "Simulating Physics with Computers", and Shor's conception of the quantum factoring algorithm, much experimental progress has been made. This is catalyzing progress in related fields, such as quantum algorithms, quantum communication, and quantum encryption protocols. However, even cutting-edge quantum device prototypes haven't yet decisively surpassed classical super-computers.

In my talk I will briefly introduce the motivation for the field of Quantum Information, and I will present the most recent successes of trapped-ion platforms in realizing programmable analog quantum simulators, a type of quantum processor. Some of these successes include proof-of-concept demonstrations of ground-state preparation using adiabatic or variational methods, and observations of exotic phases of matter such as the discrete time crystal. Finally, current limitations and challenges will be discussed.

Zoom link: https://uoc-gr.zoom.us/j/85141700338