



Contribution ID: 27

Type: **Poster**

Digital-analog simulation of quantum field theories with trapped ions

Monday, 25 September 2023 19:30 (2 hours)

Quantum simulation area promising approach for understanding the dynamics governed by quantum field theories in the strong coupling regime. However, a lot of qubits and gates are required due to the presence of bosons in these models. Taking advantage of the available bosonic degrees of freedom in the quantum system can potentially help with this problem. In this talk, we propose a scheme to perform quantum simulation of field theories where the fermions are mapped to qubits and the bosons are mapped to the vibrational modes of the ion chain. We apply this hybrid method to the Yukawa model and the Schwinger model and numerically compare the qubit counts and gate counts with the digital method. We also show preliminary data for the Yukawa model with two staggered sites performed on a trapped ion quantum simulator.

Primary author: Ms NGUYEN, Hong Nhung (University of Maryland, College Park)

Co-authors: Dr KADAM, Saurabh (University of Maryland, College Park); Dr GREEN, Alaina (University of Maryland College Park); Ms ZHU, Yingyue (University of Maryland College Park); Mr JEANETTE, Liam (University of Maryland College Park); Prof. DAVOUDI, Zohreh (Maryland Center for Fundamental Physics and Department of Physics, University of Maryland); Prof. LINKE, Norbert (Duke University and University of Maryland)

Presenter: Ms NGUYEN, Hong Nhung (University of Maryland, College Park)

Session Classification: Monday Poster