



Contribution ID: 202

Type: **Parallel Talk**

## Simulating Field Theories with Quantum Computers

*Friday, 4 August 2023 10:20 (20 minutes)*

In this talk, we investigate the Trotter evolution of an initial state in the Gross-Neveu model and hyperbolic Ising model in two spacetime dimensions, leveraging quantum computers. We identify different sources of errors prevalent in various quantum processing units and discuss challenges to scale up the size of the computation. We present benchmark results obtained from some platforms and employ a range of error mitigation techniques to address incoherent noise. By comparing these mitigated outcomes with exact diagonalization results and density matrix renormalization group calculations, we assess the effectiveness of our approaches. Moreover, we demonstrate the possible implementation of an out-of-time-ordered correlators (OTOC) protocol using IBM's quantum machine, and thoroughly examine the sources of errors that emerge in the calculation. Finally, we explore the feasibility of real-time scattering calculations for a multi-flavor fermionic model using NISQ-era machines.

### Topical area

Quantum Computing and Quantum Information

**Primary author:** ASADUZZAMAN, Muhammad (University of Iowa)**Co-authors:** TOGA, Goksu (Syracuse University); MEURICE, Yannick (U. of Iowa); CATTERALL, simon (syracuse university)**Presenter:** ASADUZZAMAN, Muhammad (University of Iowa)**Session Classification:** Quantum Computing and Quantum Information