Faisal Alam

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Education

University of Illinois at Urbana Champaign (2019 -)
Candidate for Ph.D. in Physics
Research advisor: Bryan K. Clark

Franklin and Marshall College (2015 - 2019)
Bachelor in Physics with Honors, and Bachelor in Mathematics, summa cum laude
Research advisor: Gregory Adkins
Honors thesis: Calculating higher order corrections to positronium energy levels using NRQED and the method of regions

Research interests

- Dynamic quantum circuits.
- Tensor networks for quantum information.
- Algorithms for quantum evolution and compilation.

Publications

Quantum computing:

1. Faisal Alam, Bryan K. Clark, Learning dynamic quantum circuits for efficient state preparation, arXiv:2410.09030.
2. Noah Berthusen, Faisal Alam, Yu Zhang, Multi-reference quantum Davidson algorithm for quantum dynamics, arXiv:2406.08675.
3. Faisal Alam, Bryan K. Clark, Variational algorithms for quantum dynamics with short depth quantum circuits (presented at APS March Meeting 2023, paper in preparation).
4. Faisal Alam, Lucas Slattery, Bryan K. Clark, Finding excited states on a quantum computer using unitary block optimization with VQE (presented at APS March Meeting 2022, paper in preparation).

High energy theory:

1. Gregory S. Adkins, Md Faisal Alam, Conor Larison, Ruosi Sun, Coulomb expectation values in $D = 3$ and $D = 3 - 2\epsilon$ dimensions, arXiv:1908.02324.

Pulsars and gravitational waves:

1. Gabriela Agazie et al, The NANOGrav 15-year Data Set: Observations and Timing of 68 Millisecond Pulsars, arXiv:2306.16217.
2. Md F. Alam et al, The NANOGrav 12.5 yr Data Set: Observations and Narrowband Timing of 47 Millisecond Pulsars, arXiv:2005.06490.
3. Md F. Alam et al, The NANOGrav 12.5-year Data Set: Wideband Timing of 47 Millisecond Pulsars, arXiv:2005.06495.
4. Shinnosuke Hisano et al, A Parkes Murriyang Search for Pulsars and Transients in the Large Magellanic Cloud, arXiv:2202.11054.

5. C. Patel et al, PALFA Single-Pulse Pipeline: New Pulsars, Rotating Radio Transients, and a Candidate Fast Radio Burst, arXiv:1808.03710.

Experience

- Quantum Error Correction Summer School 2022 hosted by IBM.
- Quantum Computing Summer School Fellowship 2023 at LANL.
- Graduate Research Assistant in Theoretical Division of LANL (2024-).

Programming Skills

- Languages: Python, Mathematica, Julia, C++
- Libraries: Qiskit, JAX, TensorNetwork, ITensor