Hersh Kumar

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EDUCATION

University of Maryland, College Park, College Park, MD USA

B.S in Physics (minor in Computer Science) **2020 – present**
Physics GPA: 3.760
Cumulative GPA: 3.658

Montgomery Blair HS, Silver Spring, MD, USA

Science, Mathematics, and Computer Science Magnet Program **2016 – 2020**

PUBLICATIONS AND PREPRINTS

Paulo F. Bedaque, Hersh Kumar, Andy Sheng. *Neural Network Solutions of Bosonic Quantum Systems in One Dimension.* Preprint available at https://arxiv.org/abs/2309.02352. Under Review.

Edison M. Murairi, Michael J. Cervia, Hersh Kumar, Paulo F. Bedaque, Andrei Alexandru. *How many quantum gates do gauge theories require?* Phys. Rev. D 106, 094504 (2022)

RESEARCH EXPERIENCE

University of Maryland, College Park, MD USA

Researcher; Quarks, Hadrons, and Nuclei **May 2022 – Present**

Conducting theoretical physics research regarding the application of feedforward neural networks to the Variational Monte Carlo method, for use in more efficiently approximating the ground state energy of many-particle systems. Research conducted under the guidance of Prof. Paulo Bedaque and Andy Sheng.

University of Maryland, College Park, MD USA

Researcher; Quarks, Hadrons, and Nuclei **June 2021 – May 2022**

Continued previous research, this time focusing on the generation of quantum circuits for the Horn model. Devised and implemented methods of obtaining quantum circuits for arbitrary large unitary matrices in Python. Research was conducted under the guidance of Prof. Paulo Bedaque and Prof. Andrei Alexandru.

University of Maryland, College Park, MD USA

Researcher; NuQS Collaboration **June 2019 – August 2020**

Conducted theoretical physics research with the NuQS collaboration on generating quantum circuits for group operations of subgroups of $S(1080)$, for use in simulation of Lattice QCD gauge theories on quantum computers. Also investigated automated quantum circuit synthesis methods, and wrote a small order quantum circuit solver using SAT/SMT methods in Python. Research was conducted under the guidance of Scott Lawrence.

TALKS

University of Maryland Physics Undergraduate Colloquium

Variational Monte Carlo with a Neural Network Ansatz **October 10th, 2023**

Delivered an informal talk on the applications of neural networks as ansatze for many-boson systems in one dimension. The talk was geared towards undergraduate physics students. The slides I created for the talk can be found at https://hershkumar.github.io/slides.pdf.

TEACHING EXPERIENCE

Undergraduate Teaching Assistant: University of Maryland **2022 – present**

Quantum Physics II, Introduction to Thermodynamics and Statistical Mechanics.
Held office hours, assisted in group problem solving sections, graded homeworks.

Skills

Languages: Python, Java, C++, LaTeX, HTML/CSS, Javascript
Tools: Linux, `git`, Jupyter Notebook, MPI, OpenMP, CUDA, Excel
GitHub: https://github.com/hershkumar

Awards and Honors

UMD CMNS Dean's List: Fall 2020, Fall 2021, Spring 2022, Fall 2022, Spring 2023.