UNIVERSITY SEMINAR: LOGIC ACROSS DISCIPLINES

Spring 2021

University Seminar: Logic Across Disciplines

Time: Monday, April 12, 3:45-5:00PM

Place: **zoom**

Speaker: Alaina Green, Joint Quantum Institute and University of Maryland

Title: Quantum Algorithms on a Programmable Trapped-Ion Quantum Computer

Abstract: With working prototypes available today, quantum computing remains a promising paradigm for solving difficult problems with greater efficiency than classical computers. In this talk I will briefly contrast the main idea of quantum computing to that of classical computing and outline the history of the first proposed quantum algorithms. Next I will discuss the implementation of simple quantum algorithms on our prototype trapped-ion quantum computer, beginning with a description of the physical hardware and describing the experimental controls used to execute quantum logic gates and thereby operate a programmable quantum computer [1]. Finally, I will provide an overview of the recent growth in algorithm design driven by the availability of working prototypes such as ours and provide a sampling of experimental results produced by these quantum algorithms.
[1] S. Debnath et al., *Nature* 563:63 (2016)

If you would like a Zoom invitation please write to harizanv@gwu.edu

Short bio: Alaina Green is Postdoctoral Fellow at The Joint Quantum Institute and University of Maryland. After earning a PhD at the University of Washington for the study of ultracold quantum gases, she joined the group of Norbert M. Linke in 2020, using her expertise in atomic physics to lead experimental research on quantum algorithms and quantum simulation on the group's trapped-ion quantum computing prototype.

University Seminar: Logic Across Disciplines

https://math.columbian.gwu.edu/university-seminar-logic-across-disciplines-quantum-ideas-applied-computing

Time: Monday, March 29, 3:45-5:00PM

Place: **zoom**

Speaker: Ali Eskandarian, Stevenson University

Title: Quantum Ideas Applied to Computing

Abstract: The continuing interest in and explosive development of quantum computing and

quantum information in recent years promises to enhance significantly our technological capabilities in the near future. Understanding the power of quantum computing requires an appreciation of the fundamental differences between quantum theory and classical theories of the laws of nature that underlie the power of classical computers. This presentation will address the essence of those differences, and through discussion of a simple example will demonstrate their applicability to the field of computing, while also listing the type of problems that quantum computers are likely to tackle successfully.

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University Seminar: Logic Across Disciplines
https://math.columbian.gwu.edu/university-seminar-logic-across-disciplines-cryptographic-constructions

Time: Thursday, February 18, 4:00-5:00PM

Place: **zoom**

Speaker: Keshav Srinivasan, GWU

Title: Universal Cryptographic Constructions

Abstract: The encryption and authentication schemes used in modern cryptography are dependent on mathematical hardness assumptions, unproven conjectures in computational complexity theory. We will give an introduction to these hardness assumptions, and explain their relationship to cryptographic constructions. In the final portion of the talk, we will discuss work by Leonid Levin and others concerning universal cryptographic constructions, which utilize Universal Turing Machines to avoid reliance on specific hardness assumptions.

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