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Time: **11AM**
Location: **CEPSR 414**

"Quantum Control Engineering using Trapped Ions"

Abstract

Technologies fundamentally enabled by quantum mechanics are poised to transform a broad range of applications from computation to precision metrology over the coming decades. This talk will introduce an exciting new field of research which is seeing concepts from control engineering – the discipline that underlies everything from thermostats to self-driving vehicles – translated to the domain of quantum mechanics in an effort to realize the full potential of engineered quantum technologies. We will focus on the unique capabilities provided by a real quantum technology - trapped ions - in which individual atoms may be confined, manipulated, and coupled together all while preserving and exploiting quantum coherent phenomena. We will present a view of the future development of quantum technology by highlighting a range of new research directions in quantum control using trapped ions as a model quantum system. This work demonstrates the tantalizing possibilities of how quantum control can be leveraged to overcome some of the most challenging problems in quantum engineering, and even provide totally new functionality to quantum systems.

Biography

Prof. Michael J. Biercuk is an experimental physicist and engineer working to develop a new generation of quantum technologies. Michael earned his undergraduate degree in Physics from the University of Pennsylvania, and his Master's and Doctorate degrees from Harvard University. He has worked in and out of academic research, including service as a scientific consultant to DARPA, specializing in quantum information science and next-generation microprocessor architectures. Following his time in DC, Michael worked in the Ion Storage Group at NIST Boulder before establishing a new research group at The University of Sydney. His group, the Quantum Control Laboratory, performs experiments using trapped ions in order to address specific challenges in the field of quantum control engineering, including robust control in quantum systems, quantum computer architecture, quantum simulation, and precision metrology.