ICFO



ICFO Colloquium Series: Quantum Computing with Atoms

CHRISTOPHER MONROE

February 03, 2023
12:00 to 13:00
ICFO Auditorium

BIO

Christopher Monroe is the Gilhuly Family Presidential Distinguished Professor of Electrical and Computer Engineering and Physics at Duke University, and the Co-Founder and Chief Scientist at IonQ, Inc. Monroe has pioneered nearly all aspects of trapped ion quantum computing, from the demonstration of the first quantum gate, a monolithic semiconductor chip ion trap, and photonic interconnections between separated ion trap systems. He is a key architect of the US National Quantum Initiative, is a Fellow of the American Physical Society, Optical Society of America, the UK Institute of Physics, the American Association for the Advancement of Science, and is a member of the National Academy of Sciences.

ABSTRACT

Trapped atomic ions are a leading physical platform for quantum computers, featuring qubits with essentially infinite idle coherence times and the highest purity quantum gate operations. Such atomic clock qubits are controlled with laser beams, allowing densely-connected and reconfigurable universal gate sets. The path to scale involves concrete architectural paths based on well-established protocols, from shuttling ions between QPU cores to modular photonic interconnects between multiple QPUs. Full-stack ion trap quantum computers have thus moved away from the physics of qubits and gates and toward the engineering of optical control signals, quantum gate compilation for algorithms, and software-defined error mitigation and correction. I will summarize the state-of-the-art in these quantum computers in both academic and industrial settings, and summarize how they are being used for both scientific and commercial applications.

Hosted by: Prof. Dr. Antonio Acin