ICFO



COLLOQUIUM SERIES: Programming Complex Systems for Quantum Information & Machine Learning

DIRK ENGLUND

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12:00 to 13:00
ICFO Auditorium

PROFILE: ?

Dirk Englund received his BS in Physics from Caltech (2002), MS in Electrical Engineering a Stanford, and PhD in Applied Physics also at Stanford (2008). After a postdoctoral fellowshi at Harvard University, he joined Columbia University as Assistant Professor of E.E. and o Applied Physics. He joined the MIT EECS faculty in 2013. Major recognitions include th Presidential Early Career Award in Science and Engineering, the Sloan Fellowship in Physics the OSA's Adolph Lomb Medal, the Bose Research Fellowship, and the A.v. Humbold Research Fellowship. He is a fellow of the Optica Society

ABSTRACT:

After several decades of intensive theoretical and experimental efforts, the field of quantum information processing is at a critical moment: special-purpose quantum information processors are at or past the i¿½quantum complexity frontieri¿½ where classical compu ers can no longer predict their outputs: we can i¿½program complexityi¿½, unable to pre ict the outcome. Meanwhile, new technologies to connect quantum processors by photons g ve rise to quantum networks with functions impossible on today's i¿½classical-physicsi¿? internet. But to harness the power of quantum complexity in i¿½noisy intermediate-s alei¿½ quantum computers and networks, we need new methods to control and under tand them -- and perhaps to manage noise sufficiently to reach fault tolerance. This t lk discusses one approach: large-scale programmable photonic integrated circuits (PICs) de igned to control photons and atomic or atom-like q
antum memories. The second part of the talk considers another i¿½complexity frontieri¿½ requiring large-scale control: that encountered in machine learning and signal proc ssing. These problems present new opportunities at the intersection with quantum infor ation technologies -- specifically, we will consider new directions for processing classical and quantum information in deep learning neural networks architectures, with a particular focus on hardware error correction.

Hosted by: Prof. Dr. Frank Koppens