Joint Quantum Sciences Seminar

Wednesday, November 16, 2022
Pierce Hall 301
4:00 PM

Dr. Jason Cong
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"FPGAs, Real-Time Processing, and Quantum Computing"

An Field Programmable Gate Array (FPGA) is a programmable integrated circuits that one can customize in his/her office/lab to get a dedicated application-specific circuit for his/her own applications with much reduced processing latency and power consumption compared to general-purpose CPUs. In this talk, I shall start with a quick tutorial of the FPGA technology, including its architecture and design flow. Then, I shall give examples how FPGAs are used for real-time processing and control, including recent works on FPGA-based in-vivo calcium image processing and decoding and high-throughput real-time processing for Compact Muon Solenoid (CMS) detector in the Large Hadron Collider at CERN. Next, I shall discuss how FPGAs can be used in quantum computing, such as closed-loop feedback for stabilizing frequency fluctuations and state initialization for the superconducting qubits. Finally, I shall present our latest progress on high-level synthesis (HLS) that supports dataflow programming and latency-insensitive designs. Our goal is to facilitate researchers (e.g. everyone in the HQI community) to efficiently design FPGAs with no or little prior circuit design experience.

10-minute Presentation by Marcin Kalinowski will begin at 400:PM
Refreshments will begin at 4:15 PM
Guest Presentation will begin at 4:30 PM

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