



Quantum & AI - Microelectronics development at Fermilab

Dr. Farah Fahim
Division Head, Emerging Technologies Directorate
Fermi National Accelerator Laboratory, IL

Date: June 7, 2023, 1p - 2p

Location: BRK_2001

Abstract:

Fermilab High Energy Physics (HEP) science goals demand ever increasing precision instruments, driving the need for developing new, innovative techniques and technologies. At the same time, through its HEP program, Fermilab has developed unique, world leading competencies and capabilities in microelectronics and technology acceleration. Fermilab has fundamental Physics research areas (e.g. searches for dark matter, collider experiments) that can benefit immensely from successful application of Quantum Science and Technology (QIS&T) and AI/ML techniques.

To meet this goal we have been investigating advanced node chip technologies for Quantum Support chips and edge AI hardware development. We have a diverse program and collaborations with industry, academia and other labs leveraging Fermilab's custom microelectronics chip design capabilities. I'll present the status of this development effort.

Bio:

Dr Fahim is a principal engineer specializing in mixed signal ASIC design at Fermi National Accelerator Laboratory. She is currently the Head of Microelectronics Division in the Emerging Technologies Directorate and an Adjunct Professor at Northwestern University Department of Electrical and Computer Engineering.

For over 15 years Farah has been developing low noise, high-speed readout and control electronics for detectors which operate in harsh environments such as high ionizing radiation for a wide range of applications. Her current research pursuits include on-chip artificial intelligence for data processing at source and designing ultra-low power, compact readout electronics for modular scalable cryogenic quantum control systems. She is a recipient of the DOE Early Career research award.

Hosts: Prof. Zhihong Chen (zhchen@purdue.edu) and Prof. Yong Chen (chen276@purdue.edu)