

# First Quantum Technology Seminar

Centre of Excellence on Quantum Technologies  
&  
School of Interdisciplinary Research, IIT Delhi

*Invites you all to a webinar on*

## What's next in computing: when classical and quantum computing meet

**Date & time: March 04 (Friday) 2022, 8:30 am IST**

### Abstract

Semiconductor advances have powered nearly every aspect of technology for over 50 years and continue to push the limits of computing performance. This talk will discuss the most recent advances and what's next in semiconductor technology. Last year, we saw another breakthrough when IBM announced its 2 nm node, enabling 45% faster speed or 75% less power than the best available chips and opening the door to electronic devices with gains in energy efficiency and richer functionality. The trend will continue, with more innovations in microelectronics increasing functionality, advances in packaging and heterogeneous integration, power optimizations, algorithmic and programming breakthroughs, and new kinds of hardware circuits to do more at lower cost. For example, we will see specialized hardware designed to run AI more efficiently; and the combination of emerging technologies to find better solutions for particular, more complex problems than microelectronics improvements alone. One of those technologies is quantum computing.

Quantum computing is a new paradigm of computation combining physics and information to solve problems intractable to conventional computers. Superconducting quantum computers rely on similar fabrication processes and materials development as microelectronics, aiding in scalability. We will discuss quantum circuits and their integration in cloud-available computing through Qiskit, recent hardware advances including the latest 127-qubit Eagle processor, and the quantum roadmap for the next several years. We will discuss how the seamless integration of quantum computers and HPC enable trade-offs of quantum and classical computing resources that extend the computational power of quantum computers to open the door for the first demonstrations of quantum advantage without the need for fault-tolerant quantum computers. The results of the combination of quantum computing and semiconductor technology advances for HPC will be the creation of unseen compute power dramatically accelerating the rate of scientific discovery, with a profound impact on science and industry.



**Dr. Mukesh V. Khare**  
Vice President,  
Semiconductor & Cloud,  
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### BRIEF CV

Dr. Mukesh V. Khare is Vice President at IBM Research, driving IBM's Hybrid Cloud research agenda. His team of more than 1000 researchers worldwide is re-defining the future of computing for the next generation workloads such as AI, Machine Learning, High-Performance Computing and their delivery through Hybrid Cloud. Dr. Khare's areas of responsibilities at IBM range from fundamental materials and device research for semiconductors, novel chip architecture and design, cloud and enterprise systems and software for hybrid cloud. Dr. Khare is a recipient of IBM Corporate Award for his technical accomplishments and is also an IBM Distinguished Engineer. He serves on the Board of Directors for the Semiconductor Research Corporation (SRC) and is an active board member of several research-focused entities. Dr. Khare served as the General Chair of the 2018 Symposia on VLSI Technology, has co-authored more than 100 research papers and holds many U.S. and international patents. Dr. Khare began his career at IBM in 1998 after finishing his M.S, M. Phil. and Ph.D. degrees from Yale University. He did M.Tech. from IIT Bombay in 1994 and BE from Univ. of Mumbai in 1990.