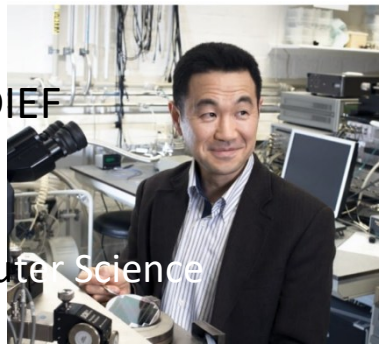
UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

Giovedì 26.11.2026, alle ore 11:00
Nella Sala riunioni MO26, primo piano del DIEF
il **Prof. Ryoichi Ishihara,**
Delft University of Technology , QuTech /
Faculty of Electrical Engineering, Mathematics and Computer Science
terrà un seminario dal titolo



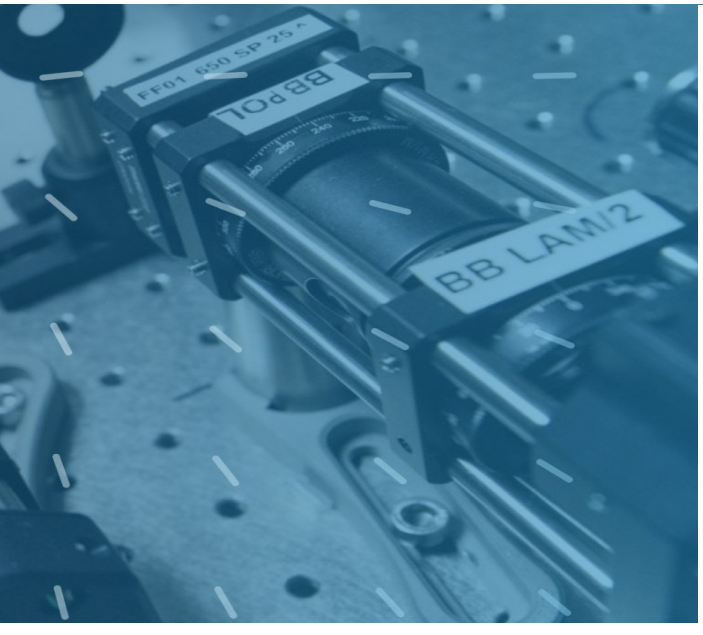
Energy-Efficient Quantum Computing: technology and algorithms

nell'ambito dei corsi di **Laurea e Laurea Magistrale in Ingegneria Elettronica / Electronic Engineering** e del **Corso di Dottorato in ICT**

Tutti gli interessati sono invitati a partecipare

Abstract: Quantum computers represent a groundbreaking paradigm that promises to redefine the boundaries of information processing. However, it is not clear whether a quantum computer can provide greater computational power at a lower energy cost. One issue is that calibrating qubits consumes significant power because each qubit has different control parameters that can even change over time. To calibrate qubits, quantum state tomography (QST) and quantum gate set tomography (QGST), which aim to reconstruct an unknown state via measurement, are recognized as fundamental ingredients. To reconstruct a quantum state or a density of matrix, one should perform many measurements and gather statistical outcomes. In the near future, the number of quantum states and hence the measurements increase exponentially to achieve informational completeness for large-scale quantum systems.

In this talk, I will discuss how AI and machine learning (ML) can effectively calibrate the qubits by reconstructing qubit states and hence reducing the number of measurements and also propose that memristors operating at a cryogenic temperature can be used for minimizing the power consumption of the qubit calibration, hence reducing the total power consumption of the quantum computers.



Ryoichi Ishihara is an associate professor in Electrical Engineering, Mathematics and Computer Science (EEMCS) at TU Delft and also a group leader in QuTech. He is also co-founder and scientific advisor of the startup company Mizusense B.V..

He received his PhD from Tokyo Institute of Technology in 1996. In the same year, he moved to TU Delft, the Faculty of EEMCS, the Department of Microelectronics, and did research on printed thin-film electronics and monolithic 3D integration of transistors. Since 2015, he has been at the Department of Quantum and Computer Engineering of the same university and at QuTech. His current research focus is on energy-efficient computing and sensors with 3D integration of qubits in diamond, electronic, and photonic circuits.

Since 2024, he has been the chair of the Quantum Technologies Technical Committee of the IEEE Electron Device Society (EDS) and the Associate Editor of the IEEE EDS magazine.