PhD Stories
From a quantum doctoral experience to Industry world: an entangled journey

REGISTER HERE

Politecnico di Torino, Room 5B
December 7th - 4:00 PM

Giovanni Amedeo CIRILLO
STMicroelectronics

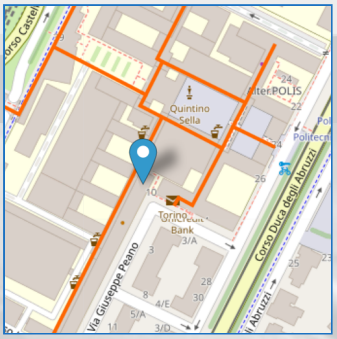
Bio

Giovanni Amedeo Cirillo received the M.Sc. in Electronic Engineering and the Ph.D. in Electrical, Electronics and Communications Engineering from Politecnico di Torino in 2018 and 2022 respectively. His doctoral activities, carried out at the VLSI Lab of the Department of Electronics and Telecommunications, were transversally related to quantum computing: from device modelling to definition of quantum-compliant algorithms for Telecommunications Industry. He was also laboratory assistant in two Electronic Engineering courses and assisted ten M.Sc. students in their thesis projects. He is currently a Digital Design Engineer in the Analog, Mems & Sensors group R&D team of STMicroelectronics (Cornaredo, Italy), focusing on the design of Digital Signal Processing architectures. During his doctorate (2019-2021), Giovanni Amedeo Cirillo was also the treasurer of IEEE Student Branch PoliTO and one of the organizers/presenters of PitchD, the PhD's pitch seminars, which won the bronze Darrel Chong Student Activity Award in 2021.

Abstract

This talk aims to give an overview of my research activities on quantum computing during my three and a half years as a doctoral student at the Department of Electronics and Telecommunications of Politecnico di Torino. After a brief, intuitive introduction to quantum computing, its potential computational advantages and some quantum technologies, an overview of the classical simulation of quantum computers based on compact models, a resource for the preliminary estimation of quantum devices' application-specific capabilities, will be provided. Simulation of the time evolution of qubits affected by non-ideality phenomena could be extremely hard from a computational point of view, according to the canonical formalism based on the differential Lindblad master equation. A compact model of a quantum computing technology, obtained through fitting operations or specific mimic algorithms, is thought to describe qubits evolution. It considers the device-characteristic physical parameters and does not require numerically solving the Lindblad equation, thus allowing faster and more scalable simulations. The compact models of relaxation and decoherence, two dynamic non-ideality phenomena common to the most consolidated quantum computing technologies, and of two technologies based on molecular spin qubits will be taken as an example for introducing the simulation methodology. The achieved results give evidence that the proposed simulation methodology provides results fast and close to the references, thus paving the way for fast and reliable technology-dependent qubits simulation on classical computers. In conclusion, some aspects of the PhD experience that could be useful (at least at the beginning of a new non-academic working experience) are tried to be determined, with the consciousness that definitive conclusions can be drawn only on a much longer timescale.

Location:



Room 5B
Main Campus,
1st floor

IEEE
Advancing Technology for Humanity

IEEE POLITO Student Branch
Politecnico di Torino
IEEE Student Branch