Edoardo (Edo) **Giusto**

ASSISTANT PROFESSOR (RTD-A)   ·   PH.D. IN COMPUTER AND SYSTEMS ENGINEERING

University of Naples Federico II (UniNa) - Department of Electrical Engineering and Information Technology
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Research Interests

Quantum Computing (QC) offers the potential to enhance traditional High-Performance Computing (HPC) work-loads by leveraging the unique properties of qubits, leading to the emergence of a new computing paradigm: HPC-QC. My research revolves around the *dependability* of such hybrid systems, from the point of view of *reproducibility* of computation results, *resilience* to hardware and software failures, *security and privacy* of code and data.

Education

SQMS - Fermilab   *Batavia, IL, US*

US QUANTUM INFORMATION SUMMER SCHOOL (USQIS)   *Aug. 7-15 2023*

Politecnico di Torino - Dept. of Control and Computer Engineering   *Torino, IT*

PH.D. IN COMPUTER AND SYSTEMS ENGINEERING   *Nov. 2017 - Sept. 2021*

Thesis: *Sensor-based ICT systems for Smart Societies.* Defining guidelines for the correct and scientifically-sound design of a device operating in the IoT domain. Tasks taken into account: data acquisition, data transmission, and data authenticity and safe-storage.
Advisor: *Prof. Maurizio Rebaudengo*. Committee: *Antonio Liotta, Julio Perez, Luca Sterpone, Giovanni Pau, Enrico Natalizio*.

Eidgenössische Technische Hochschule (ETH) Zürich   *Zurich, CH*

QUANTUM INFORMATION FOR DEVELOPERS - SUMMER SCHOOL   *Sept. 8-12, 2019*

MITxPRO Professional Certificate Program   *MIT - Online Course*

APPLICATIONS OF QUANTUM COMPUTING   *Apr. 2018 - Oct. 2018*

Politecnico di Torino   *Torino, IT & Paris, FR*

MASTER'S DEGREE IN COMPUTER ENGINEERING   *Sept. 2014 - July 2017*

Design and implementation of a low-cost, high-precision air pollution monitoring IoT device. Master's thesis project carried out at
LiP6 - Universitè Pierre et Marie Curie, Paris, France.
Advisors: *Prof. Maurizio Rebaudengo* in Politecnico di Torino and by *Prof. Giovanni Pau* in UPMC, Paris.

Politecnico di Torino   *Torino, IT*

BACHELOR'S DEGREE IN COMPUTER ENGINEERING   *Sept. 2010 - Mar. 2015*

Experience

University of Naples, Federico II - Department of Electrical Engineering and Information Technology   *Naples, Italy*

ASSISTANT PROFESSOR - RTD-A   *Dec. 29th, 2023 - Ongoing*
- PNRR CN1 - National Centre for HPC, Big Data and Quantum Computing, Spoke 9 - Digital Society & Smart Cities.

Oak Ridge National Laboratory   *Oak Ridge, TN, US*

VISITING ASSISTANT PROFESSOR   *Jul. 29th, 2024 - Aug. 27th, 2024*
- Visiting period at the Quantum Science Center, hosted by *Dr. Travis S. Humble*.

University of Illinois, Urbana-Champaign   *Urbana-Champaign, IL, US*

VISITING POSTDOC   *Nov. 27 - Dec. 1 2023*
- Visiting period in the DEPEND research group at the *Coordinated Science Laboratory*, hosted by *Prof. Ravishankar K. Iyer*.

SQMS - Fermi National Accelerator Laboratory

Batavia, IL, US

NGI Enrichers - Fellow

Aug. 2023 - Dec. 2023

- *CRIT-Q - Cosmic ray impact on transmon qubits*: Characterization of transient faults impact caused by cosmic rays on superconducting quantum devices. Expedition made possible by the European Union *NGI Enrichers fellowhip*.

Supervisor: *Dr. Silvia Zorzetti.*

Politecnico di Torino - Department of Control and Computer Engineering

Torino, Italy

Postdoctoral Research Assistant

Apr. 2022 - Dec. 2023

- Reliability assessment of Quantum Computing devices, compilation and problem mapping, applications of Quantum Computing for IoT, Industry 4.0 and Financial domains.
- Investigation on Wireless Sensor Network applications for low-cost air pollution monitoring tasks.

Supervisors: *Prof. Maurizio Rebaudengo, Prof. Bartolomeo Montrucchio.*

Funded Projects

Qubip - Quantum-oriented Update to Browsers and Infrastructures for the PQ Transition

Torino, IT

Funding by: European Commission

Sept. 2023 - Ongoing

Aiding transition to PQC by addressing key components of digital infrastructure, validating practical use cases, and contributing to standardization and policy efforts. Amount: $\approx$ US $6'000'000 (our portion $\approx$ US $55'000).

EQUO - European QUantum ecOsystems

Torino, IT

Funding by: European Commission

Jan. 2023 - Ongoing

Design, develop and test mature QKD nodes with high TRL level (8-9) with cutting-edge technology developed in Europe, ready for integration in telecommunication networks, both for metro and long-distance scenario. Amount: $\approx$ US $6'000'000 (our portion $\approx$ US $500'000).

Quantum Computing for Financial Industry

Torino, IT

Funding by: Intesa San Paolo S.p.A.

Oct. 2021 - Ongoing

Improvement of a quantum algorithm for Credit Risk Analysis. Project conducted in collaboration with *IBM Italy*. Amount: undisclosed.

Quantum Computing for Telecommunications Industry

Torino, IT

Funding by: TIM S.p.A.

June 2019 - Ongoing

Study of possible applications of Quantum Computing in the Telecommunications domain and development of dedicated Quantum Algorithms. Amount: $\approx$ US $30'000/year.

Quantum Computing for Automotive Industry

Torino, IT

Funding by: General Motors

2018 - 2020

Study of applications of Quantum Computing in the automotive sector. Amount: $\approx$ US $25'000.

Honors & Awards

2023	**NGI - Next Generation Internet Enrichers - Transatlantic Fellowship,** Funding to carry out a 5-months visiting research period at SQMS - Fermilab. Amount: $\approx$ US $25'000 .	*Fellowship*
2021	**Politecnico di Torino**, 3rd Year PhD Award Competition 2021. Amount: $\approx$ US $1'500.	*3rd Prize*
2020	**Politecnico di Torino**, 2nd Year PhD Award Competition 2020. Amount: $\approx$ US $1'500.	*3rd Prize*
2020	**IBM Quantum**, Challenge 2020 Achievement.	*IBM Quantum Challenge Badge*
2019	**IBM Quantum**, Qiskit Advocate Badge.	*Qiskit Advocate Badge*
2019	**IBM Qiskit Camp Europe 2019 - Quantum Computing Hackathon,** Winning team member, *"Quantum Synth: a quantum-computer-based music synthesizer"*. Team composed by: Costa Hamido, O.; Ghazi Vakili, M.; Giusto, E.; Baiardi, A.; and Cirillo, G.A. Video description available *here*. Related conference publication available *here*.	*Community Choice Award*

Research Community Engagement

IEEE/ACM Design Automation Conference (DAC) 2025

Technical Program Committee member

- Technical Program Committee member for track *DES6 - Quantum Computing*, website *here*.

IEEE/ACM Design, Automation and Test in Europe (DATE) 2025

Technical Program Committee member

- Technical Program Committee member for track *D16 - Design Automation for Quantum Computing*, website *here*.

IEEE Quantum Week (QCE) 2024
MEMBER AT LARGE
- General Chair for *1st Workshop on Dependability Challenges in Hybrid Classical-Quantum Computing Systems*, Workshop website *here*.
- Technical Committee Member for *Quantum Technologies and Systems Engineering (QTEM) track*.
- Technical Committee Member for *Quantum Applications (QAPP) track*.
- Organizing Committee Member for *3rd Workshop on Quantum in Consumer Technology*, Workshop website *here*.

UIUC - Online Workshop
GENERAL CHAIR
- Organizer for UIUC/NCSA-hosted workshop *Virtual Workshop on Dependable Classical-Quantum Computing Systems Engineering (DCQCS)*, website *here*.

IEEE Workshop on Quantum IntelLigence, Learning & Security (QUILLS) 2024
PROGRAM COMMITTEE MEMBER
- Program Committee Member for QUILLS workshop, website *here*.

Frontiers in Computer Science
TOPIC EDITOR
- Topic Editor for *Realizing Quantum Utility: Grand Challenges of Secure & Trustworthy Quantum Computing*, website *here*.

IEEE International Conference on Consumer Electronics (ICCE) 2024
TRACK CHAIR
- Track: *Quantum In Consumer Technology*.

IEEE Quantum Week (QCE) 2023
MEMBER AT LARGE
- Technical Committee Member for *Quantum Technologies and Systems Engineering (QTEM) track*.
- Technical Committee Member for *Quantum System Stability and Reproducibility Workshop*.
- Organizing Committee Member for *2nd Workshop on Quantum in Consumer Technology*, Workshop agenda *here*.

IEEE Consumer Technology Society
TECHNICAL COMMITTEE MEMBER
- Technical Committee Member for *Quantum in Consumer Technology*.

Peer Reviewing - Journals

- IEEE - *Transaction on Nuclear Science*
- IEEE - *Internet of Things*
- IEEE - *Consumer Electronics Magazine*
- IEEE - *Transactions on Quantum Engineering*
- IEEE - *Transactions on Services Computing*
- IEEE - *Network*
- Elsevier - *Transportation Research*
- Elsevier - *Internet of Things*
- Springer - *Nature*

Peer Reviewing - Conferences

- ACM - *Design Automation and Test in Europe (DATE)* 2024
- IEEE - *Quantum Computing and Engineering (QCE)* 2023
- IEEE - *International Conference on Consumer Electronics (ICCE)* 2022, 2023, 2024

Society Memberships

- ACM - member
- IEEE - member - Quantum Community

Publications - Journal papers ——————————————— Complete list at 🎓 *here*

Understanding Logical-Shift Error Propagation in Quanvolutional Neural Networks
IEEE TRANSACTIONS ON QUANTUM ENGINEERING (IMPACT FACTOR: 4.4)   *2024*
M. Vallero, E. Dri, E. Giusto, B. Montrucchio and P. Rech; https://doi.org/10.1109/TQE.2024.3372880

Quantum Computing in Finance: The Intesa Sanpaolo Experience
IEEE ENGINEERING MANAGEMENT REVIEW   *2024*
R. Sotelo, D. Corbelletto, E. Dri, E. Giusto and B. Montrucchio; https://doi.org/10.1109/EMR.2024.3373796

The 2nd Workshop on Quantum in Consumer Technology At IEEE Quantum Week 2023

IEEE CONSUMER ELECTRONICS MAGAZINE *2024*

R. Sotelo, E. Giusto, Y. Nakamura and J. Wang; https://doi.org/10.1109/MCE.2024.3407740

A Systematic Methodology to Compute the Quantum Vulnerability Factors for Quantum Circuits

IEEE TRANSACTIONS ON DEPENDABLE AND SECURE COMPUTING (IMPACT FACTOR: 7.3) *2023*

D. Oliveira, E. Giusto, B. Baheri, Q. Guan, B. Montrucchio, P. Rech; https://doi.org/10.1109/TDSC.2023.3313934 - Citations: 2

A More General Quantum Credit Risk Analysis Framework

MDPI ENTROPY (IMPACT FACTOR: 2.7) *2023*

E. Dri, A. Aita, E. Giusto, D. Ricossa, D. Corbelletto, B. Montrucchio, R. Ugoccioni; Volume 25, number 4, 2023. https://doi.org/10.3390/e25040593 - Citations: 2.

Air-to-Ground Transmission and Near Real-Time Visualization of FBG Sensor Data via Cloud Database

IEEE SENSORS JOURNAL (IMPACT FACTOR: 4.3) *2022*

A. Marceddu, G. Quattrocchi, A. Aimasso, E. Giusto, L. Baldo, M. Ghazi Vakili, M. D. L. Dalla Vedova, B. Montrucchio, P. Maggiore; https://doi.org/10.1109/JSEN.2022.3227463 - Citations: 4.

A fuzzy control system for energy-efficient wireless devices in the Internet of vehicles

WILEY INTERNATIONAL JOURNAL OF INTELLIGENT SYSTEMS (IMPACT FACTOR: 7 - ACCEPTANCE RATE: 12%.) *2021*

M. Collotta, R. Ferrero, E, Giusto, M. Ghazi Vakili, J. Grecuccio, X Kong, I. You; https://doi.org/10.1002/int.22353. Citations: 12.

A Densely-Deployed, High Sampling Rate, Open-Source Air Pollution Monitoring WSN

IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGIES (IMPACT FACTOR: 6.8) *2020*

B. Montrucchio, E. Giusto, M. Ghazi Vakili, S. Quer, C. Fornaro; Volume 69, Issue 12. https://doi.org/10.1109/TVT.2020.3035554 - Citations: 40.

Combining Blockchain and IoT: Food-Chain Traceability and Beyond

MDPI ENERGIES (IMPACT FACTOR: 3.2) *2020*

J. Grecuccio, E. Giusto, F. Fiori, M. Rebaudengo ; *Combining Blockchain and IoT: Food-Chain Traceability and Beyond*. Volume 13 (15), 3820. https://doi.org/10.3390/en13153820 - Citations: 60.

Quantum pliers cutting the Blockchain

IEEE IT PROFESSIONAL (IMPACT FACTOR: 2.6) *2020*

E. Giusto, M. Ghazi Vakili, F. Gandino, C. Demartini, B. Montrucchio; Vol.22, Issue 6. https://doi.org/10.1109/MITP.2020.2974690 - Citations: 1.

Publications - Conference Proceedings ———————————— Complete list at 8ʳ *here*

Harnessing a 256-qubit Neutral Atom Simulator for Graph Classification
Montreal, CA

IEEE INTERNATIONAL CONFERENCE ON QUANTUM COMPUTING AND ENGINEERING (QCE24) *Sept. 15–20, 2024*

E. Giusto, G. Iurlaro, B. Montrucchio, A. Scionti, O. Terzo, C. Vercellino, G. Vitali, P. Viviani. *Accepted - to be presented*.

Q-SCALE: Quantum computing-based Sensor Calibration for Advanced Learning and Efficiency
Montreal, CA

IEEE INTERNATIONAL CONFERENCE ON QUANTUM COMPUTING AND ENGINEERING (QCE24) *Sept. 15–20, 2024*

L. Bergadano, A. Ceschini, P. Chiavassa, E. Giusto, B. Montrucchio, M. Panella, A. Rosato. *Accepted - to be presented*.

Quantum Kernel Estimation With Neutral Atoms For Supervised Classification: A Gate-Based Approach
Bellevue, WA, US

IEEE INTERNATIONAL CONFERENCE ON QUANTUM COMPUTING AND ENGINEERING (QCE23) *Sept. 17–22, 2023*

M. Russo, E. Giusto, B. Montrucchio; https://doi.org/10.1109/QCE57702.2023.00032.

BBQ-mIS: a parallel quantum algorithm for graph coloring problems
Bellevue, WA, US

WIHPQC @ IEEE INTERNATIONAL CONFERENCE ON QUANTUM COMPUTING AND ENGINEERING (QCE23) *Sept. 17–22, 2023*

C. Vercellino, G. Vitali, P. Viviani, E. Giusto, A. Scionti, A. Scarabosio, O. Terzo, B. Montrucchio; WIHPQC, Third International Workshop on Integrating High-Performance and Quantum Computing, co-located with QCE23. https://doi.org/10.1109/QCE57702.2023.10198.

Towards An End-To-End Approach For Quantum Principal Component Analysis
Bellevue, WA, US

QML @ IEEE INTERNATIONAL CONFERENCE ON QUANTUM COMPUTING AND ENGINEERING (QCE23) *Sept. 17–22, 2023*

E. Dri, A. Aita, T. Fioravanti, G. Franco, E. Giusto, G. Ranieri, D. Corbelletto, B. Montrucchio; International Workshop on Quantum Machine Learning: From Foundations to Applications, co-located with QCE23. https://doi.org/10.1109/QCE57702.2023.10175. Citations: 1.

Understanding the Effect of Transpilation in the Reliability of Quantum Circuits

Bellevue, WA, US

STABLEQ @ IEEE INTERNATIONAL CONFERENCE ON QUANTUM COMPUTING AND ENGINEERING (QCE23)

Sept. 17–22, 2023

N. Dilillo, E. Giusto, E. Dri, B. Baheri, Q. Guan, B. Montrucchio, P. Rech; Quantum System Stability and Reproducibility Workshop, co-located with QCE23. https://doi.org/10.1109/QCE57702.2023.10220

Neural optimization for quantum architectures: graph embedding problems with Distance Encoder Networks

Torino, IT

IEEE INTERNATIONAL COMPUTER SOFTWARE AND APPLICATIONS CONFERENCE (COMPSAC) (ACCEPTANCE RATE: 26%)

June 26-30, 2023

C. Vercellino, G. Vitali, P. Viviani, A. Scionti, A. Scarabosio, O. Terzo, E. Giusto, B. Montrucchio; https://doi.org/10.1109/COMPSAC57700.2023.00058.

Comparison of heuristic approaches to PCI planning for Quantum Computers

Las Vegas, NV, US

IEEE INTERNATIONAL CONFERENCE ON CONSUMER ELECTRONICS (ICCE23)

Jan. 6-8, 2023

G. Barillaro, A. Boella, F. Gandino, M. Ghazi Vakili, E. Giusto, G. Mondo, B. Montrucchio, A. Scarabosio, A. Scionti, O. Terzo , G. Vitali ; https://doi.org/10.1109/ICCE56470.2023.10043394. Citations: 1.

Towards practical Quantum Credit Risk Analysis

Teddington, UK

NPL JOINT SYMPOSIUM ON QUANTUM TECHNOLOGIES

Sept. 13-14, 2022

E. Dri, E. Giusto, A. Aita, B. Montrucchio; https://doi.org/10.1088/1742-6596/2416/1/012002. Citations: 2.

Neural-powered unit disk graph embedding: qubits connectivity for some QUBO problems

Broomfield, CO, US

IEEE INTERNATIONAL CONFERENCE ON QUANTUM COMPUTING AND ENGINEERING (QCE22)

Sept. 18-23, 2022

C. Vercellino, P. Viviani, G. Vitali, A. Scionti, A. Scarabosio, O. Terzo, E. Giusto, B. Montrucchio; https://doi.ieeecomputersociety.org/10.1109/QCE53715.2022.00038

QuFI: a Quantum Fault Injector to Measure the Reliability of Qubits and Quantum Circuits

Baltimore, MD, US

IEEE/IFIP INTERNATIONAL CONFERENCE ON DEPENDABLE SYSTEMS AND NETWORKS (DSN22) (ACCEPTANCE RATE: 18%)

June 27-30, 2022

D. Oliveira, E. Giusto, E. Dri, N. Casciola, B. Baheri, Q. Guan, B. Montrucchio, P. Rech; https://doi.org/10.1109/DSN53405.2022.00025. Citations: 5.

Quantum synth: a quantum-computing-based synthesizer

Graz, AT

ACM INTERNATIONAL CONFERENCE ON AUDIO MOSTLY (AM'20)

Sept. 15-17, 2020

O. Costa Hamido, G.A. Cirillo, E. Giusto; Pages 265–268. https://doi.org/10.1145/3411109.3411135. Citations: 10.

Open Source Projects

QuFI

Torino, IT

DEVELOPER

June 2021 - Ongoing

- Development of *QuFI - Quantum Fault Injector*. Flexible tool highlighting the susceptibility of qubits to various noise sources. Related paper accepted at *DSN 22*.

Quantum Synth

Schilthorn, CH

DEVELOPER

Sept. 12-15, 2019

- Development of *Quantum synth*, the Quantum Computer-based Synthesizer. The project won the Community Choice Award at IBM Qiskit Camp Europe 2019. Video description available *here*. Related paper accepted at *AM'20*.

Talks

Qiskit Fall Fest

UniNa, Naples

DEPENDABILITY CHALLENGES IN HPC-QC INTEGRATION

Nov. 11th, 2024

- Talk on dependability challenges in integrating quantum computing systems within classical supercomputing infrastructures.

Washington DC Quantum Computing Meetup

Online

QUANTUM RELIABILITY: CIRCUIT SUSCEPTIBILITY, FAULTS, AND INTEGRATION ISSUES

May 12th, 2024

- The talk addressed reliability challenges in quantum computing systems and integration challenges with traditional computing infrastructure, ultimately working toward improving the reliability and practical implementation of quantum computing technology. Video available *here*.

University of Illinois, Urbana-Champaign

Urbana-Champaign, IL, US

NOISY QUBITS: RELIABILITY ISSUES IN THE QUANTUM ERA

Nov. 29th, 2023

- Presentation on noise-related issues in Quantum Computing and description of tools to analyze them. Presentation given at the attention of *Prof. Ravishankar K. Iyer* and the DEPEND research group.

University of Illinois, Chicago
Noisy Qubits: reliability issues in the quantum era

Chicago, IL, US

Nov. 14th, 2023

- Presentation on noise-related issues in Quantum Computing and description of tools to analyze them. Presentation given at the attention of the Quantum Information Science Society at UIC.

DSN23
Quantum Computing Reliability: Problems, Tools, and Potential Solutions

Porto, PT

June 27th, 2023

- Tutorial on Quantum Computing Fault Injection. Co-organized with my colleagues Prof. Paolo Rech (UniTn), Prof. Devesh Tiwari (Northeastern U.), Dr. Emanuele Dri (PoliTo), Prof. Qiang Guan and Dr. Betis Baheri (Kent State U.).

INFN (National Institute for Nuclear Physics), La Sapienza University
Understanding transient fault propagation in superconducting quantum circuits

Rome, IT

Nov. 21st, 2022

- Seminar on Quantum Computing Fault Injection. Presentation given at the attention of *Dr. Laura Cardani* and her research group.

NASA Goddard Space Flight Center
Understanding transient fault propagation in superconducting quantum circuits

Greenbelt, MD, US

June 30th, 2022

- Seminar on Quantum Computing Fault Injection. Presentation given at the attention of *Dr. Michael Campola* and his collaborators.

New York University, Center for Quantum Phenomena
Understanding transient fault propagation in superconducting quantum circuits

NYC, NY, US

June 23rd, 2022

- Seminar on Quantum Computing Fault Injection. Presentation given at the attention of *Prof. Javad Shabani* and his research group.

Tecnology Biennial - Politecnico di Torino - Open Campus Event
Quantum Computing Demo

Torino, IT

Nov. 7-10, 2019

- Booth activity dedicated to Quantum Computing, presentation of practical use cases for the financial domain. In collaboration with *Intesa Sanpaolo S.p.A.*.

Technology Festival - Politecnico di Torino - Open Campus Event
Quantum Computing Demo

Torino, IT

Nov. 7-10, 2019

- Booth activity dedicated to Quantum Computing, presentation of *Quantum synth*, the Quantum Computer-based Synthesizer.

Politecnico di Torino
Quantum Computing Perspectives

Torino, IT

June 20, 2019

- Presentation on practical applications of Quantum Computing. Presentation given at the attention of *Prof. Matteo Sonza Reorda* and the CAD&Reliability Research Group

General Information

Mother tongue Italian
English Language Certification TOEFL 101/120
Citizenship Italian