

UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II
DOTTORATO DI RICERCA / PHD PROGRAM IN
INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING

Seminar announcement

Thursday, 16 December 2021, Time: 10:30 - 12:30
Via Teams (Code: 39a8bp5)



Prof. Michele Amoretti

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Designing Quantum Algorithms

Abstract: Most quantum algorithms leverage a few useful techniques that every quantum software designer should master. On the other hand, to devise novel quantum subroutines and effective&efficient complex solutions, a lot of practice is necessary. In this lecture, the most basic techniques will be illustrated, namely: quantum interference, quantum oracles, quantum parallelism, phase kickback, amplitude amplification, QFT. At the same time, some noteworthy quantum

algorithms will be presented: Deutsch's, Deutsch-Jozsa, Grover's, and Shor's. Some of these algorithms are merely illustrative of the "quantum advantage", while others have also a practical impact (on data search and cryptography). All the presented algorithms will be analyzed either in terms of query complexity or computational complexity. At the end of the lecture, a quick overview of current research on quantum algorithms will be provided.

Lecturer short bio: Michele Amoretti received his PhD in Information Technologies in 2006 from the University of Parma, Parma, Italy. He is Associate Professor of Computer Engineering at the University of Parma. In 2013, he was a Visiting Researcher at LIG Lab, in Grenoble, France. He authored or co-authored over 100 research papers in refereed international journals, conference proceedings, and books. He serves as Associate Editor for the journals: IEEE Trans. On Quantum Engineering and International Journal of Distributed Sensor Networks. He is involved in the Quantum Information Science (QIS) research and teaching initiative at the University of Parma, where he leads the Quantum Software research unit. He is the CINI Consortium delegate in the CEN-CENELEC Focus Group on Quantum Technologies. His current research interests are mainly in High Performance Computing, Quantum Computing, and the Internet of Things.

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