# SIMONE PERRIELLO


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| *Date of Birth* | July, 25th 1989 |
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## EDUCATION

**Ph.D. Student** *since November 2019*

Enrolled in Ph.D program in Information Technology at Politecnico di Milano
Thesis title: *Quantum Computing Algorithms: functional validation and performance assessment*
Advisor Prof. *Gerardo Pelosi*; Co-Advisor Prof. *Alessandro Barenghi*

**M.Sc. degree** *April 2019*

Master of Science in Computer Science and Engineering at Politecnico di Milano
Thesis title: *Design and developments of quantum circuits to solve the Information Set Decoding problem*
Advisor Prof. *Gerardo Pelosi*; Co-Advisor Prof. *Alessandro Barenghi*; Grade: 110/110

**IELTS** *February 2016*

Grade 7.5/9 (equivalent to C1 of the CEFR)

## RESEARCH INTERESTS

My research revolves around the quantum computing field; at the moment, I am focusing on the design and development of new algorithms and the analysis of their complexity.

My Ms.C. thesis was focused on the Information Set Decoding problem, up to now the most efficient attack against cryptosystems based on linear codes. With the help of my advisors, I designed a quantum version of this kind of attack, that relies at its core on a modified version of Grover's algorithm. The proposed algorithm was completedly implemented and tested with linear codes of different sizes using the IBM's Qiskit framework.

During my months as an intern at Atos, I mainly focused on the exploration of algorithms for Noisy Intermediate-Scale Quantum (NISQ) architectures, that are probably the only type of Quantum Processing Unit (QPU) that will be available in the near-term future. In this field, I am trying to explore the power of the Quantum Approximate Optimization Algorithm (QAOA), which may be used to efficiently solve combinatorial optimization problems with the aid of the aforementioned NISQ computeres.

My Ph.D. research activities, supervised by Prof. Gerardo Pelosi and Prof. Alessandro Barenghi, revolved around the topic of Post-Quantum cryptography. Notably, one of the major quest in the quantum and cryptography communities is the evaluation of new cryptographic standards capable of resisting to attacks from quantum accelerated computers. The search is witnessed by the call for standard carried out by, among the others, the National Institute of Standards and Technology (NIST), that is expected to lead to draft of standards available by the end of 2023. For this reason, practical evaluation of the computational complexity required to attack the proposed Post-Quantum cryptoschemes will be carried out during the research activity.

## WORK EXPERIENCE

**Atos: Bull SAS R&D Labs** January to July 2020
*Quantum computing researcher* *Les Clayes-sous-Bois*

· Researched and explored state-of-the-art quantum algorithms and technologies, under the direct supervision of Bertrand Marchand and Cyril Allouche.
· Tested and implemented the algorithms on the *Atos Quantum Learning Machine* simulator.

**Atos: HPC & Quantum team** July 2019 to January 2020
*Quantum computing researcher* *Milano*

· Configured both the hardware and software of the *Atos Quantum Learning Machine* appliance.
· Used the *Atos Quantum Learning Machine* software simulation stack to develop well-known quantum algorithms.
· Taken internal courses on the advanced usage of the *Atos Quantum Learning Machine*.
· Lectured external customers on the *Atos Quantum Learning Machine* software stack.

## TEACHING EXPERIENCE

**Teaching assistant** 2021
*Computer Architectures and Operating Systems* *Prof. Gerardo Pelosi*

· Held 34 hours of exercise lectures for the Operating Systems part. Among other topics addressed: parallel programming (processes, threads), Linux intro, task scheduler, memory management, file systems and I/O

**Teaching assistant** 2020
*Computer Architectures and Operating Systems* *Prof. Gerardo Pelosi*

· Held 29 hours of exercise lectures for the Operating Systems part. Among other topics addressed: parallel programming (processes, threads), Linux intro, task scheduler, memory management, file systems and I/O

**Teaching tutor** 2019
*Computer Science* *Prof. Andrea Bonarini*

· Held 20 hours of theory lectures and lab exercises on the C programming language.

**Teaching tutor** 2018
*Computer Architectures and Operating Systems* *Prof. Anna Maria Antola*

· Held 25 hours of theory lectures and lab exercises regarding both the architectures of modern computers (ranging from the assembly language to the logic gates) and the structure of an operating system (including the theory of parallel programming and threads management in Linux)