

# PhD Course on Quantum Computing

a.y. 2018/2019

Ivano Tavernelli (IBM, Zürich)

## Superconducting qubits

12-13 February 2019 - A102

10:00-12:00 and 15:00-17:00

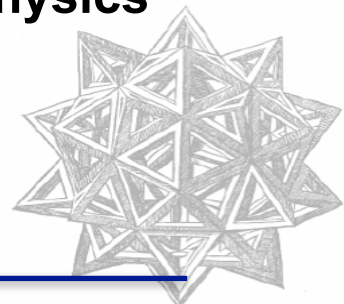
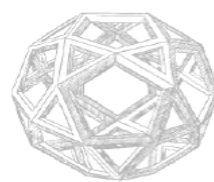
*Short overview of the main quantum computing devices (with focus on superconducting circuits). Fundamentals on digital quantum computing: focus on quantum gates (one-qubit and two-qubit operations) and their implementations. Overview of some optimisation algorithms (mainly VQE). Description of the electronic structure problem and other problems in chemistry and physics (e.g. folding). Implementation and solution of the electronic structure problems. Introduction to IBM Quantum Experience. Coding of the solution of the problems of the electronic structure using quantum experience. Examples and applications.*

**J. I. Latorre (Barcelona) - Hybrid quantum algorithms** (*seminar, 2 hours*)

- 14 February 2019, 10:00-12:00

**F. Carminati (CERN) - Quantum Computing for High Energy Physics Applications** (*seminar, 2 hours*)

- 21 February 2019, 10:00-12:00



Lectures will be given in **A102** of the Physics Department, Via Bassi 6, Pavia

For further details, please visit the website <http://fisica.unipv.it/dottorato/corso-quantum-computing.htm> and contact the course responsible ([daniela.rebuzzi@unipv.it](mailto:daniela.rebuzzi@unipv.it)) or the PhD Coordinator ([lucio.andreani@unipv.it](mailto:lucio.andreani@unipv.it)).

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J. I. Latorre (Barcelona)

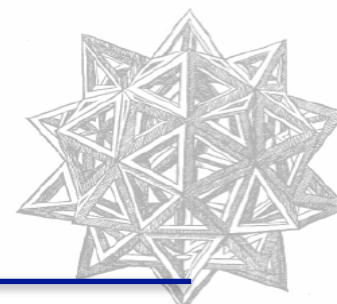
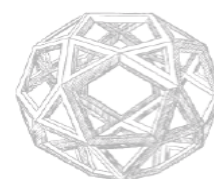
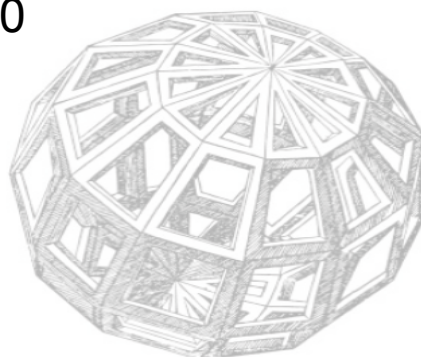
## Hybrid quantum algorithms

14 February 2019, 10:00-12:00 - A102

*The idea of building hybrid quantum algorithms that combine machine learning with quantum circuits is explored in this seminar. In particular, the idea of the application of variational methods opens the possibility of dealing with non-trivial optimisation problems, autoencoders and training of neural networks.*

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