UNIVERSITÀ DEGLI STUDI DI PADOVA

DiSC

Martedì **11 giugno 2019** alle ore **11:30** presso l'aula H

la **Prof.ssa Rosa Di Felice**

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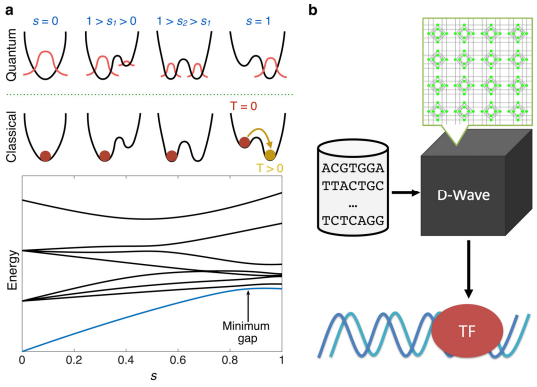
terrà il seminario dal titolo:

Application and performance of adiabatic quantum optimization to a simplified computational biology problem

Quantum computation (QC) is currently in the stage of noisy intermediate-scale quantum (NISQ) devices. These are available to users in two different implementations: adiabatic quantum computation (AQC, in D-Wave qubit arrays) and gate-model QC (GQC, in IBM and Rigetti qubit arrays on the cloud). While they are far from universal QC, these devices allow users to test their performance for practical problems.

I will illustrate an example devoted to modeling transcription factor-DNA binding affinity data by machine learning on a D-Wave AQC device. We found [1] that a multiple linear regression (MLR) approach can be mapped onto the quantum optimizer, which shows a slight advantage relative to classical methods in cases of scarce training data. We also showed that the biological information is retrieved by D-Wave, thus corroborating the significance of using quantum computers to solve this practical problem.

We are now applying GQC devices to compute the electronic structure of molecules and are designing materials optimization problems suitable for AQC.



References.

[1] Li, R.; Di Felice, R.; Rohs, R.; Lidar, D. Quantum annealing versus classical machine learning applied to a simplified computational biology problem. *npj Quant. Inf.* **2018**, 14.

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Stefano Corni

Il Direttore del Dipartimento
Michele Maggini