UNIVERSITÀ DEGLI STUDI DI PADOVA

DiSC

Giovedì **13 febbraio 2019** alle ore **11:00** presso l'aula H

il Prof. Leonardo Guidoni

Dipartimento di Scienze Fisiche e Chimiche, Università dell'Aquila

terrà il seminario dal titolo:

Quantum Chemistry using Quantum Computers

Quantum computing is a rapidly emerging field attracting an increasing amount of founding and research from different private companies (such as IBM, Google, Microsoft, Rigetti, ..) and public institutions (for instance the Quantum Technology Flagship of the European Community). Among the important problems that quantum computers promise to solve in the future, Computational Quantum Chemistry will probably be one of the firsts in which quantum computers might show advantage over classical computers [1,2]. The near-term gate model quantum computers will still have limitations due to a reduced number of qubits, a high level of noise and a short coherence time. The present seminar will review in an introductive and pedagogical way the basic concepts of quantum computation and the main algorithms that are currently developed to use imperfects but currently available quantum computing devices to solve small Quantum Chemistry problems. I will also report a recently proposed wavefunction that can be used to effectively improve the variational space within the framework of the Variational Quantum Eigensolver algorithm.[3]

[1] S. McArdle, S. Endo, A. Aspuru-Guzik, S. Benjamin, X. Yuan: Quantum computational chemistry. arXiv: 1808.10402 [quant-ph] 2018.
[2] A. Kandala, A. Mezzacapo, K. Temme, M. Takita, M. Brink, J. M. Chow, J. M. Gambetta: Hardware-efficient variational quantum eigensolver for small molecules and quantum magnets. Nature. 2017 Sep 13;549 (7671):242-246.
[3] F. Benfenati, L. Guidoni, G. Mazzola, P. Barkoutsos, P. Ollitrault, I. Tavernelli: Extended wavefunctions for the Variational Quantum Eigensolver Quantum Information and Measurement, F5A. 36 (2019).

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Stefano Corni

Il Direttore del Dipartimento
Michele Maggini