

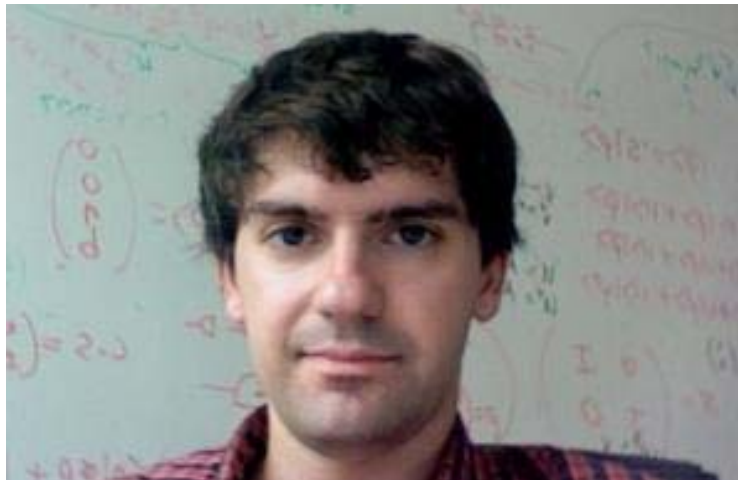
Joint Quantum Information Science Seminar

Thursday, January 17, 2019

PHYS 242 at 11:00 am

(Refreshments served at 10:45 am)

Dr. Davide Girolami



Quantum Resources for Information Processing

Quantum information science studies how to identify, quantify, and use distinctive properties of quantum systems, such as atoms and photons, for outperforming classical devices in data processing related to computing, communication, and high-precision metrology. A fundamental quantum trait is coherence, the ability to prepare superpositions of two or more states. Also, quantum systems can display correlations with no classical analogue, e.g. entanglement. I outline my contributions to determine the quantitative laws of quantum resource manipulation in complex scenarios. By employing methods of information theory, I show how to detect, quantify, and create quantum coherence and correlations in noisy quantum devices, thus evaluating their computational power. I then discuss future avenues of investigation, including the description of many-body correlation structures in quantum machines, for example computers made of thousands of qubits, and disruptive applications of quantum resources for artificial intelligence.