



USC Viterbi School of Engineering

Seminar

Ming Hsieh Department of Electrical and Computer Engineering



QMC of everything: A universal algorithm for simulating arbitrary quantum many-body systems

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1:00pm – 2:00pm

EEB 248

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Meeting ID: 997 8129 5519 Passcode: 297388

Abstract: Gaining insight into the equilibrium properties of quantum many-body systems is essential for advancing our understanding of fundamental physics, materials science, and a wide range of scientific and technological applications. Quantum Monte Carlo (QMC) techniques are, in the majority of cases, the only viable approach to developing a systematic understanding of large-scale quantum systems. However, current QMC schemes have limitations, with a major one being the need to tailor distinct, specific updates to each model to ensure the ergodicity of the stochastic process. In this talk, I will discuss a novel, universal, parameter-free QMC algorithm capable of simulating arbitrarily conceived physical models, including models containing mixtures of particle types and interactions in arbitrary geometries. This work is a collaboration with Lev Barash (ISI) and Arman Babakhani (Physics Dept. and ISI).



Bio: Itay Hen is a Principal Scientist at Viterbi's Information Sciences Institute, where he leads the computational physics group. He also holds an adjunct appointment as a research associate professor in the Department of Physics and Astronomy. Dr. Hen's main areas of research are quantum computing, specifically quantum simulation algorithms, and computational physics, particularly quantum many-body simulations and optimization. He currently serves as the PI for several quantum computing-related projects sponsored by DARPA, the Department of Energy, and the NSF. Dr. Hen earned his Ph.D. in particle physics from Tel-Aviv University in 2009. He then held a postdoctoral fellowship in theoretical condensed matter at Georgetown University and later completed another postdoctoral fellowship in theoretical condensed matter and quantum computing at UC Santa Cruz in 2012. Before joining USC in 2013, Dr. Hen spent a year as a senior scientist in the Intelligent Systems Division at NASA Ames Research Center as a member of the Quantum Artificial Intelligence Laboratory.

Host: Dr. Richard M. Leahy, leahy@usc.edu