



INSTITUTE FOR THEORETICAL ATOMIC, MOLECULAR AND OPTICAL PHYSICS
at the Harvard-Smithsonian Center for Astrophysics and Harvard Physics Department, Cambridge MA USA

HARVARD Quantum Optics Center

Joint Quantum Sciences Seminar

Wednesday | Sept 5 | 4:00 pm
Jefferson 250

Philip Walther

Assistant Professor of Physics
University of Vienna

"Quantum Cloud Computing, Photonic Quantum Simulation and Quantum Discord as Resource"

During the last few years the degree of control over photonic multi-particle entanglement has improved substantially and allows now for the quantum simulation of other quantum systems. Here, I will present the simulation of four spin-1/2 particles interacting via any Heisenberg-type Hamiltonian and present an outlook of feasible simulation experiments with more complex interactions. The advantage of the photon's mobility makes optical quantum system not only the natural choice for quantum communication but also ideally suited for delegated quantum computation. I will also present results for the realization for a measurement-based quantum network in a client-server environment, where quantum information is securely communicated and computed using the same physical system. Finally I will mention a recent experiment showing that quantum discord can be used as resource for the remote state preparation, which might shine new light on the requirements for quantum-enhanced information processing. As outlook I will discuss the current status of new quantum technology for improving the scalability of photonic quantum systems by using superconducting single-photon detectors and tailored light-matter interactions.

Student Presentation by Jarrod McClean, Aspuru-Guzik Lab
**"Solving Eigenvalue Problems with the Quantum Computer in Your
Lab Instead of the Quantum Computer in Your Dreams"**

Student Presentation will begin promptly at 4:00 PM
Presentations will begin promptly at 4:30 PM