DAMOP13-2013-000071

Abstract for an Invited Paper
for the DAMOP13 Meeting of
the American Physical Society

Photonic Quantum Computing

STEFANIE BARZ, Vienna Center for Quantum Science and Technology, Faculty of Physics, University of Vienna

Quantum physics has revolutionized our understanding of information processing and enables computational speed-ups that are unattainable using classical computers. In this talk I will present a series of experiments in the field of photonic quantum computing. The first experiment is in the field of photonic state engineering and realizes the generation of heralded polarization-entangled photon pairs. It overcomes the limited applicability of photon-based schemes for quantum information processing tasks, which arises from the probabilistic nature of photon generation. The second experiment uses polarization-entangled photonic qubits to implement "blind quantum computing," a new concept in quantum computing. Blind quantum computing enables a nearly-classical client to access the resources of a more computationally-powerful quantum server without divulging the content of the requested computation. Finally, the concept of blind quantum computing is applied to the field of verification. A new method is developed and experimentally demonstrated, which verifies the entangling capabilities of a quantum computer based on a blind Bell test.