Abstract for an Invited Paper
for the DAMOP07 Meeting of
The American Physical Society

Free-space quantum key distribution at GHz transmission rates

JOSHUA BIENFANG, NIST

Quantum key distribution (QKD) can produce unconditionally secure cryptographic key for use in symmetric cryptosystems. We have shown that telecommunications clock-recovery techniques enable the continuous operation of both free-space and fiber QKD systems at transmission rates in the GHz range, limited only by the timing resolution of the single-photon detectors. Taking advantage of improvements in detector timing resolution and FPGA performance that enable transmission rates of 2.5 GHz and higher, we discuss the performance of a free-space QKD system operating in the H_α Fraunhofer window, the classical-channel bandwidth required for post-processing, and the limitations imposed by detector recovery time. We also show that with high-repetition-rate sub-clock gating these higher-resolution detectors can reduce a free-space QKD system's exposure to solar background photons, thus reducing the quantum-bit error rate (QBER) and improving system performance.