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Quantum key distribution with "dual detectors"[1] XIONGFENG MA, BING QI, YI ZHAO, HOI-KWONG LO, LI QIAN, University of Toronto — To improve the performance of a quantum key distribution (QKD) system, high speed, low dark count single photon detectors (or low noise homodyne detectors) are required. However, in practice, a fast detector usually is noisy. Here, we propose a "dual detectors" method to improve the performance of a practical QKD system with realistic detectors: the legitimate receiver randomly uses either a fast (but noisy) detector or a quiet (but slow) detector to measure the incoming quantum signals. The measurement results from the quiet detector can be used to bound eavesdropper's information, while the measurement results from the fast detector are used to generate secure key. We apply this idea into various QKD protocols. Simulation results demonstrate significant improvements in both BB84 protocol with ideal single photon source and Gaussian-modulated coherent states (GMCS) protocol, while in decoy state BB84 protocol with weak coherent source, the improvement is moderate.

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