Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Continuous-Variable Quantum Key Distribution using Thermal States CHRISTIAN WEEDBROOK, University of Toronto, STEFANO PIRANDOLA, University of York, TIM RALPH, University of Queensland — We consider the security of continuous-variable quantum key distribution using thermal (or noisy) Gaussian resource states. Specifically, we analyze this against collective Gaussian attacks using direct and reverse reconciliation where both protocols use either homodyne or heterodyne detection. We show that in the case of direct reconciliation with heterodyne detection, an improved robustness to channel noise is achieved when large amounts of preparation noise is added, as compared to the case when no preparation noise is added. We also consider the theoretical limit of infinite preparation noise and show a secure key can still be achieved in this limit provided the channel noise is less than the preparation noise. Finally, we consider the security of quantum key distribution at various electromagnetic wavelengths and derive an upper bound related to an entanglement-breaking eavesdropping attack and discuss the feasibility of microwave quantum key distribution.

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Date submitted: 11 Nov 2011 Electronic form version 1.4