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Relativistic Quantum Cryptography EVAN JEFFREY, PAUL KWIAT, University of Illinois at Urbana-Champaign — We present results from a relativistic quantum cryptography system which uses photon storage to avoid bit sifting, in principle doubling the useful key rate. Bob stores the photon he receives from Alice in an optical delay line until she sends him the classical basis information, allowing him to measure every photon in the correct basis. Accounting for loss in our 489-ns storage cavity, we achieve a 66% increase in the BB84 key rate. The same system could be used for even greater gains in either the six-state protocol or cryptography using a larger Hilbert space. We show that the security of this protocol is equivalent to standard BB84: assuming the quantum and classical signals are space-like separated, no eavesdropper bound by special relativity can access both simultaneously.

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