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Quantum Mutual Information Capacity for High Dimensional Entangled States[1] P. BENJAMIN DIXON, Research Laboratory of Electronics, MIT, GREGORY A. HOWLAND, JAMES SCHNEELOCH, JOHN C. HOWELL, University of Rochester — High dimensional Hilbert spaces used for quantum communication channels offer the possibility of large data transmission capabilities and improved security. We propose a method of characterizing the channel capacity of an entangled photonic state in high dimensional position and momentum bases. We use this method to measure the channel capacity of a parametric downconversion state, achieving a channel capacity over 7 bits/photon in either the position or momentum basis, by measuring in up to 576 dimensions per detector. The channel strongly violated an entropic separability bound, indicating the performance cannot be replicated classically.

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