Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Methods for Producing Decoherence-free States and Noiseless Subsystems Using Photonic Qutrits[1] C. ALLEN BISHOP, MARK BYRD, Physics Department, Southern Illinois University Carbondale — We outline a proposal for a method of preparing a single logically encoded two-state system (qubit) that is immune to collective noise acting on the Hilbert space of the particles supporting it. The logical qubit is comprised of three photonic 3-state systems (qutrits) and is generated by the process of spontaneous parametric down-conversion. The states are constructed using linear optical elements along with three down-conversion sources, and are deemed successful by the simultaneous detection of six events. We also show how to select a maximally entangled state of two qutrits by similar methods. For this maximally entangled state we describe conditions for the state to be decoherence-free which do not correspond to collective errors, but which have a precisely defined relationship between them.

[1]This material is based upon work supported by the National Science Foundation under Grant No. 0545798 to MSB.

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Date submitted: 26 Nov 2007 Electronic form version 1.4