Progress toward continuous measurement and feedback-stabilization of Pauli operators in an optical qubit. TOM JONES, THOMAS LOYD, JM GEREMIA, University of New Mexico — We describe progress toward an optical qubit implementation of continuous measurement and real-time quantum feedback, with the ultimate objective to achieve complete control over single-shot polarization-basis Pauli measurements performed on the qubit. Current work has focussed on the production of high-quality optical qubits by cavity-enhanced degenerate type II downconversion of light from 426nm to 852nm. Weak measurement of Pauli operators in the polarization basis will be performed by heterodyne detection. Our objective is to analyze the near quantum-limited continuous measurement data using techniques from real-time quantum filtering theory to enable us to feedback on the qubit polarization in order to obtain a deterministic outcome of the Pauli measurement being performed.

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Date submitted: 01 Feb 2008