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Deterministic Production of Photon Number States via Quantum Feedback Control J.M. GEREMIA, University of New Mexico — It is well-known that measurements reduce the state of a quantum system, at least approximately, to an eigenstate of the operator associated with the physical property being measured. Here, we employ a continuous measurement of cavity photon number to achieve a robust, nondestructively verifiable procedure for preparing number states of an optical cavity mode. Such Fock states are highly sought after for the enabling role they play in quantum computing, networking and precision metrology. Furthermore, we demonstrate that the particular Fock state produced in each application of the continuous photon number measurement can be controlled using techniques from real-time quantum feedback control. The result of the feedback- stabilized measurement is a deterministic source of (nearly ideal) cavity Fock states. An analysis of feedback stability and the experimental viability of a quantum optical implementation currently underway at the University of New Mexico will be presented.

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