Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Experimental repetitive quantum error correction JULIO T. BARREIRO, P. SCHINDLER, T. MONZ, Institute for Experimental Physics, Univ. of Innsbruck, V. NEBENDAHL, Institute for Theoretical Physics, Univ. of Innsbruck, D. NIGG, M. CHWALLA, M. HENNRICH, R. BLATT, Institute for Experimental Physics, Univ. of Innsbruck — The computational power of a quantum processor can only be unleashed if errors during a quantum computation can be controlled and corrected for. Quantum error correction works if imperfections of quantum gate operations and measurements are below a certain threshold and corrections can be applied repeatedly. We have realized the first implementation of multiple quantum error correction steps for phase-flip errors on qubits encoded with trapped ions. Errors are corrected without measurement by a quantum feedback algorithm employing high-fidelity gate operations and a reset technique for the auxiliary qubits. Up to three consecutive consecutive correction steps are realized and the behavior of the algorithm for different noise environments is analyzed.

Julio T. Barreiro
Institute for Experimental Physics, Univ. of Innsbruck

Date submitted: 04 Feb 2011 Electronic form version 1.4