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**Efficient feedback controllers for continuous-time quantum error correction** ANDREW LANDAHL, BRAD CHASE, J.M. GEREMIA, University of New Mexico — We present an efficient approach to continuous-time quantum error correction that extends the low-dimensional quantum filtering methodology developed by van Handel and Mabuchi [quant-ph/0511221 (2005)] to include error recovery operations in the form of real-time quantum feedback. We expect this paradigm to be useful for systems in which error recovery operations cannot be applied instantaneously. While we could not find an exact low-dimensional filter that combined both continuous syndrome measurement and a feedback Hamiltonian appropriate for error recovery, we developed an approximate reduced-dimensional model to do so. Simulations of the five-qubit code subjected to the symmetric depolarizing channel suggests that error correction based on our approximate filter performs essentially identically to correction based on an exact quantum dynamical model.

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