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**Kurt Jacobs\*** ([kurt.jacobs@umb.edu](mailto:kurt.jacobs@umb.edu)), Physics Department, UMass Boston, 100 Morrissey Blvd, Boston, MA 02135, and **Justin Finn** and **Sai Vinjanampathy**. *Real-time feedback control of a mesoscopic superposition.*

We show that continuous real-time feedback can be used to track, control, and protect a mesoscopic superposition of two spatially separated wave-packets. The feedback protocol is enabled by an approximate state-estimator, and requires two continuous measurements, performed simultaneously. For nanomechanical and superconducting resonators, both measurements can be implemented by coupling the resonators to superconducting qubits. (Received August 17, 2011)