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Continuous and Pulsed Quantum Zeno Effect[1] ERIK STREED, JONGCHUL MUN, MICAH BOYD, GRETCHEN CAMPBELL, PATRICK MEDLEY, DAVID PRITCHARD, WOLFGANG KETTERLE, Massachusetts Institute of Technology — The quantum Zeno effect is the suppression of transitions between quantum states by frequent measurement. Oscillation between two ground hyperfine states of a magnetically trapped ^{87}Rb Bose-Einstein condensate, externally driven at a transition rate ω_R, was substantially suppressed by destructively measuring one of the levels with resonant optical scattering. While an ideal continuous measurement will stop the transition, any real measurement method will occur at a finite rate. The suppression of the transition rate in the two level system was quantified for pulsed measurements with a time between pulses δt and weak continuous measurements with a scattering rate γ. We observe that the weak continuous measurements exhibit the same suppression in the transition rate as the pulsed measurements when $\gamma\delta t = 3.60(0.43)$, in agreement with the previously predicted value of 4. Increasing the measurement frequency suppressed the transition rate down to $0.005\omega_R$.

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