

Abstract Submitted
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Theory of real-time feedback on oscillating qubits using weak measurement¹ HERMANN UYS, CSIR and Stellenbosch University, South Africa, PIETER DU TOIT, National Metrology Institute of South Africa, South Africa, SHAUN BURD, University of Colorado, and National Institute of Standards and Technology, USA, HUMAIRAH BASSA, THOMAS KONRAD, University of KwaZulu-Natal, South Africa — We review our recent work on state estimation and feedback control of single quantum systems based on weak measurement. We discuss two classes of feedback protocols used to control qubit oscillations. The first relies on standard proportional-integral-differential control while the second comprises unitary operations aimed at reversing the phase kicks due to measurement back-action. Analytical expressions for the convergence of state estimation fidelity are also obtained in the continuous measurement limit, by evaluating the fidelity change in an incremental step of the estimation protocol.

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