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Simultaneous continuous measurement of non-commuting observables and correlation in qubit trajectories AREEYA CHANTASRI, ANDREW JORDAN, University of Rochester — We consider the continuous quantum measurement of two or more non-commuting observables of a single qubit. Examples are presented for the measurement of two observables which can be mapped to two measurement axes on the Bloch sphere; a special case being the measurement along the X and Z bases. The qubit dynamics is described by the stochastic master equations which include the effect of decoherence and measurement inefficiencies. We investigate the qubit trajectories, their most likely paths, and their correlation functions using the stochastic path integral formalism[1]. The correlation functions in qubit trajectories can be derived exactly for a special case and perturbatively for general cases. The theoretical predictions are compared with numerical simulations, as well as with trajectory data from the transmon superconducting qubit experiments[2]. [1] Phys. Rev. A **92**, 032125 (2015) [2] Nature, **538**, 491 (2016)

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