1023-93-1645 **Zhigang Zhang*** (zgzhang@math.tamu.edu), Dept. of Mathematics, Texas A&M University, College Station, TX 77840. *Effect of Input Noise on a Magnetometer with Quantum Feedback.*

We have investigated the effects of input noise on a magnetometer with quantum feedback. Although the system is originally described by a complicated quantum stochastic master equation (SME), a simplified stochastic differential equation can be proven to be equivalent.Previous research has shown that feedback makes the measurement robust to an unknown parameter, the number of atoms involved, with the assumption that the feedback is noise free. But when the noise becomes strong, the advantage provided by the feedback will be overwhelmed by the deterioration of the estimation and measurement. To evaluate the effects of the feedback noise, we extend the original model by an input noise term. We then analyze the steady state performance of the Kalman filter for both the closed-loop and open-loop cases and retrieve the estimation error variances. The results are compared and criteria for evaluating the effects of input noise are obtained. We will also discuss the robust and optimal designs. Computations and simulations show how quantitatively the level of input noise increases the estimation error variances and changes the region where closed-loop behaves better than open-loop. (Received September 26, 2006)