Trade-off between information gain and fidelity under weak measurements[1] LONGFEI FAN, WENCHAO GE, Texas A&M Univ, HYUNCHUL NHA, Texas A&M Univ at Qatar, SUHAIL ZUBAIRY, Texas A&M Univ — It is of general interest how a quantum measurement may disturb a quantum system while it gives information on the state of the system. We study a trade-off relation between the information gain and the output fidelity for a quantum non-demolition (QND) measurement scheme for photon numbers. To this aim, we obtain general expressions for the information gain and the output fidelity for an arbitrary initial state. We particularly investigate how the sum of these two quantities varies with the measurement strength for some general classes of states, through a single measurement or sequential measurements. We also show that the information on the photon-number distribution can always be fully retrieved for an arbitrary initial state by a large number of sequential measurements.

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