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The information inequality in postselection on parameter estimation problems SAKI TANAKA, NAOKI YAMAMOTO, Keio University — The weak measurement proposed by Aharonov and his co-workers allows the meter to generate an infinitely large measurement result. The essence of this measurement is the operation called postselection; more precisely, we read the measurement result displayed by the probe only when we get a particular postselected state of the system, after the system-probe interaction. When the postelected state is nearly orthogonal to the preselected state, this weak measurement significantly amplifies the amount of displacement of the probe, which is regarded as a signal amplification. However, does the large displacement really mean signal amplification? We show that this is not true in the parameter estimation context. In general, the estimation error of a parameter is lower bounded by the inverse of the SLD-Fisher information, known as the Cramér-Rao inequality. We compare the SLD-Fisher information of the states with and without postselection. Taking into account the success rate of the postselection, we then derive an inequality showing that the postselection never decrease the estimation error.

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