Title:	Bounding quantum advantages in weak value metrology
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Abstract:	Weak Value Amplification and Post-selection based quantum protocols have been exten- sively used to enhance the precision of estimating small parameters. However, the benefit of these protocols are largely constrained by the fact that higher enhancements come with a cost of very low probability of successful post-selection. Here we propose a geometric relation between the absolute value of the Weak Value and corresponding probability of successful post-selection which characterizes the condition to obtain a given amount of amplification with minimal cost and vice versa. We further implement this relation in the recently developed method of postselected metrology to find a similar relationship between the postselected quantum Fisher Information and the postselection probability. Finally we provide a preparation and postlection procedure in which we obtain the optimally enhanced postselected quantum Fisher Information using a three level non-degenerate quantum system.
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