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Title:	Do weak values capture the complete truth about the past of a quantum particle? Author links open overlay panel
Authors:	Bhati, Rajendra Singh (/jspui/browse?type=author&value=Bhati%2C+Rajendra+Singh) Arvind (/jspui/browse?type=author&value=Arvind)
Keywords:	Weak values Weak measurements ABL retrodiction rule
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Abstract:	Weak values inferred from weak measurements have been proposed as a tool to investigate trajectories of pre- and post-selected quantum systems. Are the inferences drawn from the weak values about the past of a quantum particle fully true? Can the two-state vector formalism predict everything that the standard formalism of quantum mechanics can? To investigate these questions we present a "which-path" gedanken experiment in which the information revealed by a pre- and post-selected quantum system is surprisingly different from what one would expect from the weak values computed using the two-state vector formalism. In our gedanken experiment, a particle reveals its presence in locations where the weak value of the projection operator onto those locations was vanishingly small. Therefore our predictions turn out to be in contradistinction to those made based on the non-vanishing weak values as the presence indicators of the quantum particle. We propose a six port photon-based interferometer setup as a possible physical realization of our gedanken experiment.
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