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Towards an ontological theory with weak values

Tuesday 10 July 2018 12:00 (30 minutes)

The Aharonov Albert Vaidman weak values provide a starting point for a time symmetric ontology to quantum mechanics. While some of the work on weak measurements hinted at such an ontology, it was never formally defined. I will provide results for the initial steps taken in formally defining a weak value ontology, starting with an operational definition for weak values. The operational approach clarifies the basic assumptions required in order to accept weak values as ontological elements of a theory (and weak measurements as fundamental empirical tools). I will then show that it is possible to build a neo-classical model to give a clear ontology to a recent weak measurement experiment [Hallaji et al. Nat. Phys. (2017)] that cannot be explained by classical physics. While the neo-classical model does not extend beyond the specifics of the experiment, it provides an indication of what a weak value ontology could look like.

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