

Weak measurements with operational constraints

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Weak values are a useful characteristic of quantum systems with past (pre selected) and future (post selected) boundary conditions. Operationally they are effective interaction coefficients for *weak measurements*. The standard weak measurement scheme, however, cannot be used to measure all weak values due to operational constraints. These range from conceptual constraints such as locality [1, 2] to implementation constraints such as the inability to perform projective measurements in ensemble systems[3].

In this talk I will outline a new method for directly coupling to a wide range of weak values that correspond to observables that cannot be observed using the von Neumann scheme. As an example I will introduce the *four path paradox* - a variant of the *three box paradox* [4] and show how it could be implemented as a quantum algorithm. Unlike the three box paradox the four path paradox involves measurements of sequential operators that cannot be measured in the standard scheme. The result boosts the significance of weak values related to non-local and sequential observables.

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