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Local model of a qubit in the interferometric setup

We consider typical realisation of a qubit as a single particle in two-path interferometric circuits built from phase shifters, beam splitters and detectors. This framework is often taken as an illustration of various paradoxes and quantum effects, including non-locality. We argue that it is possible to simulate behaviour of such circuits in a classical manner using stochastic gates and two kinds of particles which interact only locally. The constructed model has built-in limited information gain and state disturbance in measurements. We show that predictions of the model are operationally indistinguishable from the quantum case and allegedly 'non-local' effects arise only on the epistemic level of description by the agent whose knowledge is incomplete due to the restricted means of investigating the system.

See arXiv: 1502.07308 [quant-ph]

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