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Introduction to the quantum first detection problem

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We consider quantum dynamics on a graph, with repeated strong measurements performed locally at a fixed time interval τ . For example a particle starting on node x and measurements performed on another node x' . From the basic postulates of quantum mechanics the string of measurements yields a sequence no,no,no, \dots and finally in the n -th attempt a yes, i.e. the particle is detected. Statistics of the first detection time $n\tau$ are investigated, and compared with the corresponding classical first passage problem. Dark states, Zeno physics, a quantum renewal equation, winding number for the first return problem (work of A. Grunbaum et al.), total detection probability, detection time operators and time wave functions are discussed.

Summary

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