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Non-repeating Open Quantum Walks

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A model of a non-repeating quantum walk is formulated in 2D using the formalism of Open Quantum Walks (OQWs) [1]. During the non-repeating quantum walk, the particle changes direction at every step and does not go to an already visited site. To achieve this dynamics of the walker all visited sites are recorded using a memory system. In the model which we developed "quantum coins" are composed of Kraus operators of the corresponding OQW. The non-repeating OQW is implemented using the unraveling of the corresponding master equation. Quantum trajectories for various number of steps have been generated (20-2000 steps of the walk). The distributions of non-repeating open quantum walks, non-reversal open quantum walks [2] and open quantum walks are produced using the same randomly generated coins (set of Kraus operators) and compared. It is observed that the non-repeating open quantum walks have the largest spread of all three.

[1] S. Attal, F. Petruccione, C. Sabot, and I. Sinayskiy, J. Stat. Phys. 147, 832 (2012).

[2] Y.H. Goolam Hossen, I. Sinayskiy and F. Petruccione, Open Sys. & Inf. Dyn. 25, 4 (2018)

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Apply to be
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Yes

Level for award
 (Hons, MSc,
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PhD

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