

## Monitored recurrence of unitary quantum walks

Recurrence of quantum walks on an infinite line, i.e. return of the walker to the initial vertex, is investigated. The return of the walker is monitored by performing a partial measurement after each step, and the evolution continues only if the walker is not found. We briefly review the approach of monitored recurrence of unitary quantum walks [1] and the results for the Hadamard walk, including the experimental realization [2]. We then focus on the recurrence of a one-parameter set of three-state quantum walks [3], which exhibit a more complicated behaviour. We show that the Polya number (i.e. the site recurrence probability) depends on the coin parameter and the probability that the walker is initially in a particular coin state for which the walk returns to the origin with certainty. Finally, we present a brief investigation of the exact quantum state recurrence.

### References

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- [3] M. Štefaňák: *Monitored Recurrence of a One-parameter Family of Three-state Quantum Walks*. Physica Scripta 98, 064001 (2023).