



ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

PHYSICS COLLOQUIUM

Thursday, 30 May 2013

17:00 -18:00

3rd Floor Seminar Room

“Optical Implementation of 1D and 2D Quantum Walks”

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Abstract

Quantum walks represent an excellent playground for explaining, modelling and testing a wide range of physical processes and effects. Quantum walks are defined as generalizations of classical walks. The simplest models of walks – discrete quantum walks on a line – are based on the combination of the dynamics of the internal degree of freedom and the condition shift in the position space (step operator). The time evolution of the walk is given by the repeated application of the resulting evolution operator. Both pieces of the evolution can suffer from imperfections and this leads to deviations from the ideal situation and additional interesting phenomena. We discuss a simple and efficient way to implement one and two dimensional quantum walks. In addition we discuss the effects of imperfections in the actual experiments.

[1] Y. Aharonov, L. Davidovich, N. Zagury, Phys. Rev. A 48, 1687 (1993)

[2] A. Schreiber, K. N. Cassemiro, V. Potoček, A. Gabris, P.J. Mosley, E. Andersson, I. Jex, Ch. Silberhorn, Phys. Rev. Lett. 104, 050502 (2010)

[3] A. Schreiber, K. N. Cassemiro, V. Potoček, A. Gabris, E. I. Jex, Ch. Silberhorn, Phys. Rev. Lett. 104, 050502 (2011)

[4] A. Schreiber, A. Gabris, P. P. Rohde, K. Laiho, M. Štefaňák, V. Potoček, C. Hamilton, I. Jex, Ch. Silberhorn, Science 336, 55 (2012)