



Contribution ID: 325

Type: **Poster Presentation**

Quantum optical implementation of open quantum walks – a generalized approach

Tuesday, 26 June 2018 15:00 (2 hours)

Open quantum walks (OQWs) are a new type of quantum walks, where the “walker” is driven by dissipation [J. Stat. Phys. 147 (2012) 832]. Recently, a quantum optical scheme for the experimental realization of OQWs was proposed [Int. J. Quant. Info. 12, 1461010 (2014)]. In the proposed quantum optical scheme, a two level atom plays the role of the “walker” and the Fock states of the cavity mode correspond to the lattice sites of the OQW. Using the small unitary rotations approach and rotating wave approximation the effective dynamics of the system is shown to be an OQW. The presence of spontaneous emission in the system was the key ingredient for obtaining an OQW. However, the spontaneous emission leads to an uncompensated and continuous loss of energy by the system, which is reflected in the relatively poor dynamics of the “walker”. To overcome this problem, an external driving term of the cavity mode or two level systems was added to the system to pump in energy and drive the “walker” in both directions.

Keywords: Open quantum walks; quantum optics; quantum dynamics engineering.

Please confirm that you have carefully read the abstract submission instructions under the menu item “Call for Abstracts” (Yes / No)

Yes

Consideration for student awards Choose one option from those below. N/A Hons MSc PhD

PhD

Supervisor details If not a student, type N/A. Student abstract submission requires supervisor permission: please give their name, institution and email address.

Prof. Francesco Petruccione, University of KwaZulu-Natal, email: petruccione@ukzn.ac.za

Primary author: Mr ZUNGU, Ayanda (Sol Plaatje University / University of KwaZulu-Natal)

Co-authors: Prof. PETRUCCIONE, Francesco (UKZN); Dr SINAYSKIY, Ilya (School of Physics and NITheP, University of KwaZulu-Natal)

Presenter: Mr ZUNGU, Ayanda (Sol Plaatje University / University of KwaZulu-Natal)

Session Classification: Poster Session 1

Track Classification: Track G - Theoretical and Computational Physics