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**Dynamical and thermodynamical control of Open Quantum Walks**[1] FRANCESCO PETRUCCIONE, ILYA SINAYSKIY, University of KwaZulu-Natal and National Institute for Theoretical Physics — Over the last few years dynamical properties and limit distributions of Open Quantum Walks (OQWs), quantum walks driven by dissipation, have been intensely studied [S. Attal et. al. J. Stat. Phys. 147, Issue 4, 832 (2012)]. For some particular cases of OQWs central limit theorems have been proven [S. Attal, N. Guillotin, C. Sabot, "Central Limit Theorems for Open Quantum Random Walks," to appear in Annales Henri Poincaré]. However, only recently the connection between the rich dynamical behavior of OQWs and the corresponding microscopic system-environment models has been established. The microscopic derivation of an OQW as a reduced system dynamics on a 2-nodes graph [I. Sinayskiy, F. Petruccione, Open Syst. Inf. Dyn. 20, 1340007 (2013)] and its generalization to arbitrary graphs allow to explain the dependance of the dynamical behavior of the OQW on the temperature and coupling to the environment. For thermal environments we observe Gaussian behaviour, whereas at zero temperature population trapping and "soliton"-like behaviour are possible. Physical realizations of OQWs in quantum optical setups will be also presented.

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