

# STATISTICAL PHYSICS SEMINAR

February 27th, 2019.

Wednesday, 11.00

ELTE TTK Northern Building 2.54

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## **Locality, short-time behavior and reconstruction of Hamiltonians of continuous time quantum walks**

Experimentally realizable dynamical evolution of systems with sparse Hamiltonians can always be recognized as continuous time quantum walks (CTQWs) on finite graphs. Here, we analyze the short-time asymptotics of CTQWs. In two recent studies, it was shown that for small times, the continuous time classical diffusion process uses the graph's shortest paths for propagation of high probability: The short-time asymptotics of the transition probabilities follow power laws whose exponents are given by the usual combinatorial distances of the nodes. Borrowing their arguments, we analyze the short-time asymptotics of the CTQW both in closed and open systems. Furthermore, we derive explicit error bounds not relying on the Lieb-Robinson bound for the Hamiltonian reconstruction of CTQW via short-time measurements. Whenever the measurements of the reconstruction process are local, these error bounds reproduce the previous results concerning their scaling: The error of each individual measurement does not grow with growing system size. Here, not only the scaling is demonstrated, but the quantitative relationship between the sparsity of the Hamiltonian and the error bounds are obtained.

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**Room 2.54**

<http://glu.elte.hu/~statfiz/index.html>