

**Daniel Reitzner**

**Title: Decoherence in Quantum Walk Searches**

**Abstract:**

Decoherence in quantum(-walk) searches has been studied in several different settings. The noise models used, were, however, predominantly non-localized, affecting either the oracle, or the whole state space. In this presentation we study Grover search under the influence of localized partially dephasing noise. As an example in quantum walk searches on physical graphs, part of a graph can be affected by the noise. In these settings we find, that in the case when the size of the affected subspace is rather small, the quadratic speedup can be retained, while for uncorrelated noise on large subspaces, the algorithm in its actual form does not help any more. We also provide a general criterion for search efficiency in the terms of the size of the affected subspace and the noise rate. Presented are first order approximations obtained by a technique of invariant subspaces adapted to mixed states.