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**Danial Dervovic\*** ([d.dervovic@cs.ucl.ac.uk](mailto:d.dervovic@cs.ucl.ac.uk)). *For every quantum walk there is a (classical) lifted Markov chain with the same mixing time.*

Quantum walks on graphs have been shown in certain cases to mix quadratically faster than their classical counterparts. Lifted Markov chains, consisting of a Markov chain on an extended state space which is projected back down to the original state space, also show considerable speedups in mixing time. Here, we construct a lifted Markov chain on a graph with  $n^2T^3$  vertices that mixes to the average mixing distribution of a quantum walk on any graph with  $n$  vertices over  $T$  timesteps. Moreover, we prove that the mixing time of this chain is  $T$ , the number of timesteps in the quantum walk. As an immediate consequence, for every quantum walk there is a lifted Markov chain with the same mixing time.

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