# FINDING TIGHT HAMILTON CYCLES IN RANDOM HYPERGRAPHS FASTER

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Abstract. In an $r$-uniform hypergraph on $n$ vertices a tight Hamilton cycle consists of $n$ edges such that there exists a cyclic ordering of the vertices where the edges correspond to consecutive segments of $r$ vertices. We present a first deterministic polynomial time algorithm, which finds a.a.s. tight Hamilton cycles in random $r$-uniform hypergraphs with edge probability at least $C \log^3 n/n$.

Our result partially answers a question of Dudek and Frieze [Random Structures & Algorithms 42 (2013),374-385] who proved that tight Hamilton cycles exists already for $p = \omega(1/n)$ for $r = 3$ and $p = (e + o(1))/n$ for $r \geq 4$ using a second moment argument. Moreover our algorithm is superior to previous results of Allen, Böttcher, Kohayakawa and Person [Random Structures & Algorithms 46 (2015), 446-465] and Nenadov and Škorić [arXiv:1601.04034] in various ways: the algorithm of Allen et al. is a randomised polynomial time algorithm working for edge probabilities $p \geq n^{-1+\varepsilon}$, while the algorithm of Nenadov and Škorić is a randomised quasipolynomial time algorithm working for edge probabilities $p \geq C \log^8 n/n$.

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