



Lattice permutations and Poisson-Dirichlet distribution of cycle lengths

Stefan Grosskinsky, Alexander A. Lovisolo, Daniel Ueltschi

(Submitted on 26 Jul 2011 (v1), last revised 19 Mar 2012 (this version, v2))

We study random spatial permutations on Z^3 where each jump $x \rightarrow \pi(x)$ is penalized by a factor $\exp(-T \|x - \pi(x)\|^2)$. The system is known to exhibit a phase transition for low enough T where macroscopic cycles appear. We observe that the lengths of such cycles are distributed according to Poisson-Dirichlet. This can be explained heuristically using a stochastic coagulation-fragmentation process for long cycles, which is supported by numerical data.

Comments: 18 pages, 14 figures

Subjects: **Statistical Mechanics (cond-mat.stat-mech);**
Mathematical Physics (math-ph)

MSC classes: 60K35, 82B20

Journal reference: J. Statist. Phys. 146, 1105-1121 (2012)

DOI: [10.1007/s10955-012-0450-9](https://doi.org/10.1007/s10955-012-0450-9)

Cite as: [arXiv:1107.5215](https://arxiv.org/abs/1107.5215) [cond-mat.stat-mech]

(or [arXiv:1107.5215v2](https://arxiv.org/abs/1107.5215v2) [cond-mat.stat-mech] for this version)

Submission history

From: Daniel Ueltschi [[view email](#)]

[v1] Tue, 26 Jul 2011 13:49:52 GMT (1005kb,D)

[v2] Mon, 19 Mar 2012 15:16:57 GMT (204kb)

[Which authors of this paper are endorsers?](#)

Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

cond-mat.stat-mech

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1107](#)

Change to browse by:

[cond-mat](#)

[math](#)

[math-ph](#)

References & Citations

- [NASA ADS](#)

Bookmark ([what is this?](#))

