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TITLE: `Particle partition entanglement of one dimensional spinless fermions`

Referee report

The authors study the particle partition entanglement entropy of interacting fermions on a lattice. Most of their analysis is numerical, based on exact diagonalization results for spin chains of up to 28 sites, but they also provide a few basic calculations relying on known results of Luttinger liquid theory.

The results are correct and the presentation is clear. It is easy to follow what the authors are doing, and I appreciate the fact that they provide access to their computes codes, which presumably makes it easy to reproduce their numerical results, should anyone be interested in doing that.

Perhaps the main weakness of the paper is that the results are not very surprising; at least, they should not be surprising to anyone who has worked on entanglement in low-dimensional systems in the past decade (and thats a large community). Nevertheless, as far as I know, the particular quantities that the authors calculate have not been calculated elsewhere; so this paper may be useful to some people.

My opinion is therefore that the draft can be published as it is (up to a few typos or remark below).

- abstract: '[...] points to its utility in future studies of quantum liquids'. This sentence sounds a bit strange, since partition entanglement has been used quite a lot already to investigate quantum liquids (in particular in the context of Fractional Quantum Hall liquids, but also Luttinger Liquids), as the authors recall in their introduction. So, rather than 'point to its utility', I would say 'confirms its utility'

- page 2, typo 'theses issue' → 'these issues'

- page 2, typo 'as individual of identical particles'

- page 11, typo 'interactions introduces'