# R. Carbone, F. Girotti, A. M. Hernandez: On a Generalized Central limit Theorem and Large Deviations for Homogeneous Open Quantum Random Walks

Referee report

The authors prove a central limit theorem and a large deviations principle for the position process of a homogeneous open quantum random walk. To this end, the techniques of Ref. [10] for the irreducible case are combined with the rather recent results in Ref. [8] on absorption operators and associated decomposition of the local channel. Some illustrative examples are also presented.

This paper considerably extends previously known results for the HOQRW. Previous works of some of the authors are put together in a clever way and yield a quite complete picture of the limit properties of the position process. I am happy to recommend the paper for publication. Some minor remarks dealing mainly with the presentation are given below.

**Overall remarks:** The paper is written very carefully, nevertheless I found it rather difficult to read. It would be good to reorganize the paper somewhat to make it more accessible. For example, the authors could reveal the strategy of the proofs beforehand, so that the reader can go through the technical lemmas more easily. It seems that the proofs in Ref. [10] are very closely followed at some places while some other parts are left out, which makes the paper less understandable for readers not so familiar with the details of [10].

**Some specific comments**

1. Lemma 3.2: this lemma has part 1. and 2., but there seem to be parts 1.,2. and 3. in the proof.

2. It would be good to write explicitly that $\tilde{p}_{\mathcal{V}} L_i = \tilde{p}_{\mathcal{V}} L_i \tilde{p}_{\mathcal{V}}$ (since $\ker(A(\mathcal{V}))$ is an enclosure). Maybe it is mentioned somewhere, in that case it seems to be overlooked easily.