K. Nakahira: Quantum process discrimination with restricted strategies (revised)

Referee report

The manuscript has improved greatly, compared to the previous version. It is now much more readable and the value and importance of the obtained results is more clear. In my opinion, the paper can now be published in PRL.

The problem of discrimination of quantum processes appears very often in quantum information theory. The question of optimality under some restrictions on the allowed strategies is timely and of high importance also in many applications. The problem is solved in a general setting, largely extending previous results obtained mostly in some particular situations or under no restriction on the testers, in which case the SDP methods are applied. Here the author shows that in general the optimal success probability can be formulated as a convex programming problem with zero duality gap. The solution of the dual problem can be much simpler and this formulation leads to further results such as characterizing general optimality of a restricted tester or a relation to robustness measures.

In the present version, the main text is very accessible and the main results and their importance can be appreciated by non expert readers. The usefulness of the proposed method is demonstrated on a simple but illuminating example. The supplemental material provides all the technical details necessary for the proofs as well as more examples and results.

Specific comments

1. It might be remarked that, in theory, there are cases not covered by the present result, such as discrimination of multiple uses of channels by testers with indefinite causal order.

2. In SM: there are some inconsistencies in the use of hats (hats for maps, no hats for the Choi-Jamiolkowski matrices), e.g. in the first paragraph of p.2

3. SM, part III.B: the title of this section is "Derivation of Eq. (2)". In the main text, Eq. (2) gives the general form of the closed convex hull of the set of allowed testers, but the present section deals with proving this form in the case of sequential strategies, with a specific cone $\mathcal{C}$ and

set $\mathcal{S}$. This is not clarified in the text, and it is also not clear which $\mathcal{C}$ and $\mathcal{S}$ are meant here. This should be clarified, perhaps numbering some equations in the main text and referring to them.

4. SM, part III (but maybe also elsewhere): there are some references to unrelated or non-existing equations (perhaps left from the previous version?)