The manuscript under review derives an uncertainty principle for interactive measurements. An interactive measurement is designed to probe an evolving quantum system, referred to by the authors as a 'dynamical process'. The quantum system undergoes an interaction at a time t_1 with an ancilla system. At a time t_2 a joint measurement is performed on the ancilla and original system. The structure seems to be The manuscript proposes an uncertainty principle which is relevant to measurements of this kind. In the final section, they show how this result can be used to derive a trade-off for distinguishing common-cause from direct-cause processes.

The key result in the paper is the aforementioned uncertainty principle for interactive measurements. The authors initially claim that they are deriving 'the' uncertainty principle for interactive measurements, however acknowledge they are looking at just one among many possible choices. I think, for this reason, that the result is not quite general enough to merit publication in PRL. As an analysis of one specific bound in the field of measurement uncertainty principles, however, it is not uninteresting and I would support a regular article submission to another Physical Review journal, such as Physical Review A.

Specific observations and comments:

1) The interactive measurements discussed in this paper seem to be a form of 'quantum comb'. I wondered how tightly the two formalisms are connected.

2) Theorem 1 in the main body of the text is introduced as the main result, but isn't proven anywhere. As far as I can tell, it is a more general result from elsewhere which is used as a stepping stone to further calculation, but I'm still unclear. Can the authors be more

explicit about where this result comes from?

3) Similarly, Equation 2 in the main body (Theorem 1 of the supplementary materials) is proved with just one line of text, and it's not obvious which assumptions are going in to the calculation. I think this proof could be unpacked a bit more, so that the steps are clear to the reader.

4) Physical Review articles should be accessible to a wide audience, so I think a more general overview of uncertainty principles and interactive measurements should be included.

5) In general, a lot of material that's required to navigate the paper has been put into the Supplemental Material. I think a reorganization of material would make the paper much more readable.

6) Some (not particularly important) typos I found: Page 1 Column 1 "Could such a fundamental uncertainty principle also exist when multiple preceding interventions (see Fig. 1)?" is not a full sentence.

Page 1 Column 1 "We explore these questions by deriving the uncertainty principle for interactive measurements. These principles…". Change from singular to plural 'principle', leaving the meaning unclear.

Page 1 Column 1 "Our results…. encompasses". Subject/verb disagreement.

Page 4 Column 1 "they saturates" subject/verb disagreement

Page 3 Column 2 "a specific parametrized quantum circuits". It seems circuit should be singular.

Page 4 Column 1 "entropic uncertainty relations that governs" subject/verb disagreement

Page 4 Column 1 "In context of" should be "In the context of"

Page 4 Column 2 "merge is other settings" should be "merge in"