Contribution ID: **50** Type: **Poster**

Exploring indefinite causal order effects in thermal devices powered by generalized measurements

A quantum-controlled device may produce a scenario in which two general quantum operations can be performed in such a way that it is not possible to associate a definite order for their application. Such an indefinite causal order can be explored to produce nontrivial effects in quantum thermal devices. In this poster, we discuss a measurement-powered thermal device that consists of generalized measurement channels with adjustable intensity parameters, where energy is exchanged with the apparatus in the form of work or heat. The measurement-based device can operate as a heat engine, a thermal accelerator, or a refrigerator, according to a measurement intensity setting. By employing the quantum switch of two measurement channels, we explore a thermal device fueled by an indefinite causal order. To this end, we will focus our analysis on the value of a particular set of parameters in which work extraction for the heat engine mode is possible only due to the lack of definite causal order for the application of the measurements.

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Session Classification: Poster Session 1