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Local Detection of Quantum Correlations with a Trapped Ion MICHAEL RAMM, THANED PRUTTIVARASIN, University of California, Berkeley, MANUEL GESSNER, University of California, Berkeley / University of Freiburg, HARTMUT HAEFFNER, University of California, Berkeley, HAEFFNER GROUP TEAM — Usually, detection of quantum correlations between two systems requires access to both of those systems. We present a method for detecting correlations between an open quantum system and its environment by acting only locally on the open system. Implementation of this method involves removing the correlations with a dephasing operation on the local system. By comparing the subsequent time evolution of the local system with and without the correlations, we are able to witness the correlations of the initial state. We can identify these correlations as quantum discord in the case of mixed states and entanglement for pure states. We discuss how this method can be implemented with trapped ions and present our experimental efforts towards this goal.

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