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Certification of incomaptible measurements and entangled subspaces using quantum steering

In recent times, nonlocality has been extensively explored for various device-independent certification tasks. Despite the success of these certification schemes towards verifying huge class of states, the avenue for certification of measurements is not well explored. It remains a highly nontrivial problem to propose a device independent scheme which could certify arbitrary pairs of incompatible measurements. Here we address this problem and propose a one-sided device independent protocol which could certify arbitrary d-outcome incompatible measurements along with entangled subspaces of local dimension d. We characterize the class of measurements which be used to certify the maximally entangled state of local dimension d. We find the robustness of our self-testing statement for a large class of incompatible measurements using a new analytical technique which might be helpful to find robustness bounds for various other self-testing statements. We further find a new steering inequality which can be used to self-test d dimensional schmidt states.

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