Information disturbance tradeoff in bidirectional QKD

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Abstract Making use of the Quantum Network formalism of Phys. Rev. A, 82 (2010) 062 305, we present the case for quantum networks with finite outcomes, more specifically one which could distinguish only between specific unitary operators in a given basis for operators. Despite its simplicity, we proceed to build a network derived from the optimal strategy in Phys. Rev. A, 82 (2010) 062 305 and show that the information-disturbance tradeoff in distinguishing between two operators acting on qubits, selected from mutually unbiased unitary bases is equal to the case of estimating an operator selected randomly from the set of SU(2) based on the Haar measure. This suggests that such strategies in distinguishing between mutually unbiased operators is not any easier than estimating an operator derived

from an infinite set. We then show how this network can be used as a natural attack strategy against a bidirectional quantum cryptographic protocol.

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