Quantum Error Correction Beyond Completely Positive Maps
DANIEL LIDAR, ALIREZA SHABANI, University of Southern California — We present a generalized theory of quantum error correction (QEC) that applies to any linear map, in particular maps that are not completely positive (CP). This theory of “linear quantum error correction” is applicable in cases where the standard and restrictive assumption of a factorized initial system-bath state does not apply. For linear maps that preserve positivity and/or Hermiticity, we find that standard QEC based on CP recovery maps still applies. Other linear maps generally require non-CP recovery operations. We illustrate our findings with examples of QEC for non-CP maps.

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