Codes for Simultaneous Transmission of Quantum and Classical Information

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Outline

Introduction

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- The simultaneous transmission of both quantum and classical information over a quantum channel was initially investigated in [2005] from an information theoretic point of view, and followed up by many others (see, e. g. [2005, Hsieh and Wilde [2010a], Hsieh and Wilde [2010b]]).

Background and Notations

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Our discussion is based on the theory of stabilizer quantum codes and its connection to classical error-correcting codes (see, e. g., Calderbank et al. [1998]). We use the following notations.

Results

Results (Code Search)

We perform a search for $\mathcal{C} = [\![n, k{:}m, d]\!]_2$ codes with distance $d \geq 3$.

Discussion

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- We have characterized hybrid quantum codes for the simultaneous transmission of quantum and classical information in terms of generalized Knill-Laflamme conditions.

Conclusions

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- We consider the characterization as well as the construction of quantum codes that allow to transmit both quantum and classical information, which we refer to as "**hybrid codes**".

Reference I

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Reference II

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Thank you!

Questions/Answers