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Entanglment assisted zero-error codes WILLIAM MATTHEWS, LAURA MANCINSKA, DEBBIE LEUNG, MARIS OZOLS, AIDAN ROY, University of Waterloo — Zero-error information theory studies the transmission of data over noisy communication channels with strictly zero error probability. For classical channels and data, much of the theory can be studied in terms of combinatorial graph properties and is a source of hard open problems in that domain. In recent work, we investigated how entanglement between sender and receiver can be used in this task. We found that entanglement-assisted zero-error codes (which are still naturally studied in terms of graphs) sometimes offer an increased bit rate of zero-error communication even in the large block length limit. The assisted codes that we have constructed are closely related to Kochen-Specker proofs of non-contextuality as studied in the context of foundational physics, and our results on asymptotic rates of assisted zero-error communication yield non-contextuality proofs which are particularly 'strong' in a certain quantitive sense. I will also describe formal connections to the multi-prover games known as pseudo-telepathy games.

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