Quantum Convolutional Coding with Entanglement Assistance[1]

MARK WILDE, TODD BRUN, University of Southern California — We have recently developed quantum convolutional coding techniques for both entanglement distillation and quantum error correction. These techniques assume that the two parties participating in the communication protocols possess prior shared entanglement. Using these methods, we can import arbitrary classical binary or quaternary convolutional codes for use in quantum coding, with no requirement that these codes be self-orthogonal. Moreover, high-performance classical convolutional codes lead to high-performance quantum convolutional codes. We explicitly show how a convolutional entanglement distillation protocol operates, and how to encode and decode a stream of quantum information in an entanglement-assisted quantum convolutional code.

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