

Abstract Submitted
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Relative performance of ancilla verification and decoding in the $[[7,1,3]]$ Steane code¹ ALI ABU-NADA, BENJAMIN FORTESCUE, MARK BYRD, Southern Illinois University at Carbondale, SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE TEAM — We present numerical simulation results comparing the logical error rates for the fault-tolerant $[[7,1,3]]$ Steane code using standard ancilla verifications techniques vs. the newer method of ancilla decoding, as described in [1]. We simulate a realistic QEC procedure in which failed ancilla creation requires storing the data until a new ancilla can be created; we expect the decoding method, which avoids the need for such storage, to be advantageous when the failure probability is sufficiently high. For the $[[7,1,3]]$ code, we analyze the effect of both different syndrome extraction techniques and of different classes of physical error (initialization, measurement, hold etc.) on the relative performance of these two methods.

1. David P. DiVincenzo and Panos Aliferis, *Phy. Rev. Lett.* **98** 020501(2007).

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Ali Abu-Nada
Southern Illinois University at Carbondale

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