Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Design of additive quantum codes via the codeword-stabilized framework[1] LEONID P. PRYADKO, ILYA DUMER, ALEXEY A. KOVALEV, UC, Riverside — Codeword stabilized (CWS) construction defines a quantum code by combining a classical binary code with some underlying graph state. In general, CWS codes are non-additive but become additive stabilizer codes if derived from a linear binary code. Generic CWS codes typically require complex error correction; however, we show that the CWS framework is an efficient tool for constructing good stabilizer codes with simple decoding. We start by proving the lower Gilbert-Varshamov bound on the parameters of an additive CWS code which can be obtained from a given graph. We also show that cyclic additive CWS codes belong to a previously overlooked family of single-generator cyclic stabilizer codes; these codes are derived from a circulant graph and a cyclic binary code. Finally, we present several families of simple stabilizer codes with relatively good parameters, including a family of the smallest toric-like cyclic CWS codes which have length, dimension, and distance as follows: $[[t^2 + (t + 1)^2, 1, 2t + 1]]$, $t = 1, 2, \ldots$

[1] A. A. Kovalev, I. Dumer, and L. P. Pryadko, preprint arXiv:1108.5490 (2011).

[1]Supported in part by the ARO grant W911NF-11-1-0027 (LP & ID), and by the NSF grant 1018935 (LP)

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Date submitted: 17 Nov 2011 Electronic form version 1.4