Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

A recursive construction of noiseless subsystem for qudits[1]
UTKAN GÜNGÖRDÜ, Kinki University, CHI-KWONG LI, College of William & Mary, MIKIO NAKAHARA, Kinki University, YIU-TUNG POON, Iowa State University, NUNG-SING SZE, The Hong Kong Polytechnic University — The noiseless subsystem is a method of using the inherent permutation symmetry of the noise to protect a subsystem against errors. Its construction becomes a formidable task with the growing number of qudits. In this work, we describe a recursive way of constructing noiseless subsystem for qudits, that is robust against collective noise of the form $W^{\otimes n}$, where n is the number of qudits and W is the Kraus operator acting on a single site. This kind of error appears when the wavelength of an environmental disturbance is much larger than the size of the quantum system, which makes it natural to assume all the qubits in the register suffer from the same error operator. The presented recursive scheme is a direct generalization of the recursive scheme described in *Phys. Rev. A,* **84***, (2011) 044301* for qubits. We show that the quantum error correction rate, i.e., the ratio of correctable qudits and the number of transmitted qudits, approaches $1/d$ as n goes to infinity in this recursive scheme.

[1]UG is grateful to JSPS (Japan Society for the Promotion of Science) for partial support from Grant-in-Aid for Scientifc Research (Grant Nos. 23540470 and 24320008). UG acknowledges the financial support of the MEXT.

Utkan Güngördü
Kinki University

Date submitted: 15 Nov 2013 Electronic form version 1.4