## Abstract Submitted for the MAR09 Meeting of The American Physical Society

Operator Theoretic Quantum Fault **Tolerance**<sup>1</sup> GERALD GILBERT, YAAKOV S. WEINSTEIN, MITRE Quantum Information Science Group, VANEET AGGARWAL, Dept. of Electrical Engineering, Princeton University, A. ROBERT CALDERBANK, Depts. of Mathematics and Electrical Engineering, Princeton University — We outline the advantages of an operator approach to quantum fault tolerance. Operator quantum fault tolerance is based on an explicitly stated halting condition, exact solutions of quantum error correction code dynamics, and as accurate and realistic descriptions as possible of the error models. This allows the proper integration of error correction and concatenation strategies with the system dynamics so as to better allocate quantum computational resources such as qubits, quantum gates, and computation time for quantum circuit design. We demonstrate these characteristics of the operator approach with an example of an asymmetric error model.

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