Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Criteria for dynamically stable decoherence-free subspaces R. KARASIK, BQIC and Applied Science & Technology, Univ. of Califonia, Berkeley, K.-P. MARZLIN, B.C. SANDERS, IQIS, Univ. of Calgary, Canada, K.B. WHALEY, BQIC and Dept. of Chemistry, Univ. of California, Berkeley — A decoherence-free subspace (DFS) is a collection of states for a system that is impervious to dominant noise effects created by the environment. The DFS approach provides an important strategy for quantum information processing because it would allow quantum circuit simplification by reducing the need for quantum error correction and providing stable quantum memory. Experimental demonstrations of DFSs show the efficacy of this approach. We analyze similarities and differences between various approaches to DFSs present in the literature and show that an excessively restrictive assumption on immunity from decoherence for an arbitrary initial environment state can be relaxed for practical DFS cases. In the important class of systems whose dynamics is described by Markovian master equations, we provide necessary and sufficient conditions for the existence of a dynamically stable DFS. We also present examples that show why previous work in this direction was not sufficient.

R. Karasik
BQIC and Applied Science & Technology, Univ. of Califonia, Berkeley

Date submitted: 02 Feb 2007 Electronic form version 1.4