Local-TQO and Stability of Frustration-Free Hamiltonians

JUSTYNA PYTEL, Oregon State University, SPYRIDON MICHALAKIS, California Institute of Technology — The attention of the condensed matter and mathematical physics communities has recently focused on Hamiltonians with low-energy sectors exhibiting some form of topological order. In our work [1], we present a generalization of the result of Bravyi et al. [2,3] on the stability of topological quantum order for Hamiltonians composed of commuting projections with a common zero-energy subspace. In particular, the commutativity condition can be removed: We prove stability of the spectral gap for gapped, frustration-free Hamiltonians under general, quasi-local perturbations. Also, we will discuss the "Local Topological Quantum Order" and "Local-Gap" conditions sufficient for proving stability.

[1] S. Michalakis and J. Pytel, *Stability of Frustration-Free Hamiltonians.* arXiv:1109.1588 (2011).
[2] S. Bravyi and M.B. Hastings, *A short proof of stability of topological order under local perturbations.* arXiv:1001.4363.
[3] S. Bravyi, M.B. Hastings, and S. Michalakis, *Topological quantum order: stability under local perturbations.* J. Math. Phys. **51**, 093512 (2010).

Justyna Pytel
Oregon State University

Date submitted: 09 Dec 2011   Electronic form version 1.4