Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Topological stability of q-deformed quantum spin chains CHARLOTTE GILS, ETH Zurich, EDDY ARDONNE, Nordita, SIMON TREBST, Microsoft Research, Station Q, ANDREAS LUDWIG, UC Santa Barbara, MATTHIAS TROYER, ETH Zurich, ZHENGHAN WANG, Microsoft Research, Station Q — Quantum mechanical systems, whose degrees of freedom are so-called $su(2)_k$ anyons, form a bridge between ordinary spin systems and systems of interacting non-Abelian anyons. Such a connection can be made for arbitrary spin-S systems, and we explicitly discuss spin-1/2 and spin-1 systems. Anyonic spin-1/2 chains exhibit a topological protection mechanism that stabilizes their gapless ground states and which vanishes only in the limit ($k \to \infty$) where the system turns into the ordinary spin-1/2 Heisenberg chain. For anyonic spin-1 chains we show that their phase diagrams closely mirror the one of the biquadratic spin-1 chain. This includes generalizations of the Haldane phase, of the AKLT point, and the appearance of several stable critical phases described by (super)conformal field theories.

Charlotte Gils
ETH Zurich

Date submitted: 20 Nov 2008 Electronic form version 1.4