

# Topological quantum computers and modular categories

Pieter Naaijken

May 7, 2009

Quantum computers can perform certain tasks, most notably factoring of integers, with significant lower complexity than classical computers. However, one faces many technical difficulties trying to build a quantum computer. One of the major problems is decoherence: interactions with the environment affect the calculation.

In this talk I will describe an alternative model for a quantum computer, which might solve the problem of decoherence. Namely, that of a topological quantum computer. In short, such a quantum computer would allow one to do calculations by braiding particles.

I will give a quick introduction to quantum computing, and indicate how a topological quantum computer works. It turns out that the structure of such a quantum computer can be elegantly described by a modular tensor category. In the last part of my talk I will discuss this connection. No prior of knowledge of any of the subjects is assumed.