Quantum Computing Seminar

Title: "On the computational complexity of approximating the Jones polynomial of a knot."

Speaker: Peter Shor, MIT

Date: Monday, November 12, 2007

Time: 4:00 pm

Location: Room A-10, Jadwin Hall

Sponsor: Princeton Center for Theoretical Physics (PCTP) and The MITRE Corporation

Website calendar: http://www.pctp.princeton.edu/pctp/index.html

Organizers: William Brinkman & Shivaji Sondhi, Robert Calderbank, and Gerald Gilbert

Abstract: The one-clean qubit model of quantum computation assumes that the quantum computer is initialized with one qubit in a pure state, and all the other qubits in the completely mixed state. It then asks what can be computed in this scenario using unitary transformations and one final measurement of the quantum state. We show that approximating the Jones polynomial of the trace closure of a knot is complete for the one-clean qubit model. Friedman, Kitaev, Larsen and Wang have shown that approximating the Jones polynomial of the plat closure of a knot is complete for BQP (polynomial-time quantum computation). These two results are not contradictory, as they pertain to different degrees of approximation. We will explain these results. This is joint work with Steve Jordan.