AI LABORATORY & LAB FOR COMPUTER SCIENCE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

THEORY OF COMPUTATION PHYSICS OF COMPUTATION JOINT SEMINAR

Date: Monday, October 21, 1996
Time: Refreshments at 4:00pm
Talk at **4:15pm**
Place: NE43, 3rd-floor Lounge

Fault tolerant Quantum Computation with constant error

Dorit Aharonov
Hebrew University of Jerusalem
Institute of Computer Science

Quantum computation is now believed to be more powerful than classical computation. However, it was not clear what is the effect of errors and noise on the computational power of quantum computers.

In the past year many developments have taken place in the area of quantum error correction. Recently Shor showed how to perform a fault tolerant quantum computation when the probability for a fault per qubit or gate is $1/\text{polylog}(n)$ where n is the circuit's size.

In this lecture I will present a way to improve this bound on the error result, giving a scheme for fault tolerant quantum computation where each quantum bit or quantum gate has a constant probability for a fault at each time step. This scheme uses concatenated quantum codes. The cost is logarithmic in time and space.

This is joint work with Michael Ben Or, the Hebrew University, Jerusalem. No prior knowledge about quantum computation will be assumed.

Host: Shafi Goldwasser

This talk is part of a seminar series on adapting computers and computations to the constraints of, and opportunities afforded by, microphysics; and on the development and application of the physical theory of computation and information. If you would like to receive electronic notice of these seminars, send email to "poc@im.lcs.mit.edu."