LABORATORY FOR COMPUTER SCIENCE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

PHYSICS OF COMPUTATION SEMINAR

Date: Friday, October 8, 1993
Time: 3:00pm
Place: 6-120

Qubits and Quantum Coding

Benjamin Schumacher
Department of Physics
Kenyon College

As Shannon demonstrated, the classical entropy is a measure of the physical resources (the number of binary digits) necessary to represent the output of a message source with high fidelity. It is possible to prove an analogous quantum-mechanical result that indicates the number of spin-1/2 systems (quantum bits, or *qubits*) that are necessary to represent faithfully the output of a quantum message source. This *quantum noiseless coding theorem* has many applications to quantum communication theory, quantum computation, and quantum cryptography.

Host: Norm Margolus

This talk is part of a new 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. This series is being sponsored by the MIT Information Mechanics Group (Lab for Computer Science), in conjunction with the MIT Physics and Media Group (Media Lab), the MIT Porous Flow Project (Earth, Atmospheric and Planetary Sciences), and the Mathematical Sciences Research Group at Thinking Machines Corporation.

545 TECHNOLOGY SQUARE; CAMBRIDGE, MASSACHUSETTS 02139 (617) 253-6054