

ICTP-SAIFR/IFT-UNESP PHYSICS DISCUSSIONS



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**QUANTUM COMPUTERS
AND MANY-BODY SYSTEMS**

Quantum many-body systems are very hard to simulate, as computational resources (time and memory) typically grow exponentially with system size. However, quantum computers or analog quantum simulators may perform that task in a much more efficient way. In this talk, Prof. Cirac will review some of the quantum algorithms that have been proposed for this task and then explain the advantages and disadvantages of analog quantum simulators. In particular, he will describe methods to simulate the dynamics, to find ground states, or compute physical properties at finite temperatures.

IGNACIO CIRAC is one of the pioneers of the field of quantum computing and quantum information theory. He is the recipient of the 2006 Prince of Asturias Award in technical and scientific research. Since 2001, Prof. Cirac is director of the Max Planck Institute of Quantum Optics.

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