APS physics

האוניברסיטה העברית בירושלים
The Hebrew University of Jerusalem

American Physical Society
Racah Institute of Physics

Workshop

Quantum computing: achievable reality or unrealistic dream

January 06, Tuesday, Danciger B building, seminar room, 4.00 pm
(06.01.15 at 16.00)

1. 16.00 – 16.10 Prof. M. Ya. Amusia **Introductory remarks**
2. 16.10 – 17.00 Prof. G. Kalai **What can we learn from a failure of quantum computers**
3. 17.00 – 17.50 Prof. N. Katz **Quantum information science - the state of the art**
4. 17.50 -18.15 - **General discussion**

All interested, including students, are welcomed.

Refreshments will be served in the lobby of Danciger B building, from 15.45

M. Ya. Amusia and R. Herber, APS Fellows

Prof. Gil Kalai
What can we learn from a failure of quantum computers

Abstract:
Quantum computers are hypothetical devices that enable us to perform certain computations hundreds of magnitude of order faster than digital computers. This feature, coined “quantum supremacy” by John Preskill, could be manifested by experiments in the near future through, for example, Boson sampling, a very simple setting of non-interacting bosons.
In the lecture I will explain the reasons why computationally superior quantum computers cannot work, what kind of modeling of quantum noise would not allow “quantum supremacy,” and what predictions on quantum physics are supported by the failure of quantum computers.

Prof. Nadav Katz
Quantum information science - the state of the art

Abstract:
Twenty years have passed since the explosion of interest in quantum computing and information processing began. Initially the experimental community was highly skeptical and the ideas were thought to be a theoretical fancy, exponentially sensitive to noise in practice. However, the advent of error threshold theorems proved a remarkable fact about quantum information - it is a unique amalgam of analog and digital information. Under reasonable error models, subtle correction protocols can be applied, leading to a scalable and optimistic prospect for quantum computing. Focusing on some key implementations, I will present a unified perspective of the experimental progress, which has been remarkable in the past decade. I will conclude with a discussion of fundamental sources of decoherence, and try to determine the ultimate limits which known physics places on quantum complexity, in the lab and in "wild" nature.