Solid State Institute
המכון למצב מוצק

TECHNION
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הטכניון
מכון טכנולוגי
לישראל

SPECIAL SEMINAR

סמינר מיוחד

Towards quantum computation with ultracold fermi atoms

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Abstract

In quantum mechanics, the dimension of the Hilbert space grows exponentially with the system size. Therefore, a classical calculation of many-body quantum states becomes practically impossible for already a small number of particles. Richard Feynman was the first to suggest a different paradigm to overcome this difficulty - a quantum computational machine ("Quantum Computer"). The quest to build a quantum computer has been going on for more than 20 years but so far no single experimental platform emerged as technologically superior. I will present our suggestion for a new platform based on ultracold ^{40}K fermionic atoms held in an optical microtrap. In our scheme, quantum information can be stored in the internal states of these atoms or in vibrational states of the trap. Single qubit gates are implemented by coupling the atom to an external field, and a universal two-qubit $\sqrt{SWAP}$ gate is implemented by a novel protocol that takes advantage of our ability to precisely control the tunnelling energy and the interaction energy between two atoms at two adjacent traps. I will present numerical simulations of the qubits and gates, and report on our progress in the lab towards testing our ideas in real life.

ההרצאה תתקיים ביום חמישי, 6 לאפריל 2017 בשעה 12:30
בבניין פיסיקה, חדר 318

The lecture will take place on Thursday, 6h April 2017 at 12:30
at the Physics Building, room 318

M.Sc. Student of Assistant Professor Yoav Sagi