



Solid State Institute
המכון למצב מוצק

TECHNION
Israel Institute
of Technology



הטכניון
מכון טכנולוגי
לישראל

SPECIAL SEMINAR

סמינר מיוחד

Towards diamond-assisted magnetic resonance imaging (MRI):

Room-temperature nuclear polarization enhancement in bulk diamond

Ran Fischer

Physics Department and Solid State Institute, Technion

Nuclear spins are a natural choice for applications requiring long relaxation times due to their immunity to unwanted perturbations from the environment. Among the many applications are magnetic resonance-based bio-sensing and quantum computing. However, thermal polarization of nuclear spins, determined by the Boltzmann factor, is particularly low, especially at room temperature. This limitation results in poor sensitivities, requiring methods that achieve an enhancement over thermal polarization.

In this work we report on strongly enhanced bulk nuclear polarization of ^{13}C in diamond at room-temperature. We implement two polarization techniques based on the transfer of optically pumped electron spin polarization of nitrogen-vacancy color centers, to the nuclear spins. The first method relies on anti-crossing between the electronic energy levels to facilitate the electron- nucleus spin polarization transfer. The second method employs resonant microwave excitation to directly transfer the spin polarization. Both methods are characterized experimentally by optical detection of magnetic resonance due to single electron-single spin exchange as well as by nuclear magnetic resonance (NMR) detection of the entire bulk diamond.

ההרצאה תתקיים ביום רביעי, ה-16.7.14 בשעה 12:30

בבניין המכון למצב מוצק, בחדר הסמינרים

The lecture will take place on Wednesday, 16.7.14 at 12:30

at the Solid State Institute, seminar room

Ph.D. Student of Professors David Gershoni and Amiram Ron