



Solid State Institute
המכון למצב מוצק

TECHNION
Israel Institute
of Technology



הטכניון
מכון טכנולוגי
לישראל

SPECIAL SEMINAR

סמינר מיוחד

Initialization and tomography of a novel non-precessing qubit in diamond NV centers

Guy Moshel

*Department of Physics and the Solid State Institute,
Technion*

Abstract

The Nitrogen-vacancy (NV) center in diamond is considered to be a promising candidate for quantum sensing and for quantum information processing. This is because at room temperature its $S=1$ electronics spin triplet is easily polarized to the $m_s = 0$ state by exposure to green light. The intensity of the resulting light emission provides a readout method for the degree of this spin polarization. The relatively long coherence time of the electronic spin can be utilized for quantum sensing of minute electromagnetic fields at the nanometer scale, as well as for quantum information processing. The natural splitting of 2.83 GHz between the $m_s = \pm 1$ and $m_s = 0$ state provides a tool for coherent control of the electronic spin using microwave radiation. Full control, requires, however, external magnetic field, which removes the degeneracy between the $m_s = \pm 1$ spin states. Moreover, for precise control, the magnetic field should be directed along the NV symmetry axis (111 and equivalent diamond crystallographic axes). We explore the use of polarized microwave radiation for coherent control of the $m_s = \pm 1$ spin states of the NV center, at vanishing external magnetic fields. This ability is important when working in amorphous samples of nano- or polycrystalline- diamonds or for other applications that require zero external magnetic fields. The polarized microwave radiation, provides means for selective addressing the $m_s = \pm 1$ levels using the $m_s = 0$ as auxiliary level. We demonstrate schemes for achieving universal gates, and study the decoherence time of this $m_s = \pm 1$ two level system (qubit).

ההרצאה תתקיים ביום חמישי, ה-24.5.2018 בשעה 12:30

באודיטוריום המכון למצב מוצק, קומת כניסה

The lecture will take place on Thursday, 24.5.2018. at 12:30

at the Solid State Institute auditorium, entrance floor

M.Sc. student of Professor David Gershoni