



Solid State Institute
המכון למצב מוצק

TECHNION
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סמינר

Towards Deterministic Initialization of Negatively Charged Nitrogen Vacancy Center in Diamond

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Abstract

The nitrogen-vacancy (NV) color-center in diamond forms a long lived and coherent electronic spin system even at room temperature. Negatively charged NV^- centers can be quite easily initialized, controlled and readout by optical means. Therefore, it is used as a matter quantum bit (qubit) in many proposals for quantum information processing realizations.

One of the main drawbacks of the NV center relates to the control of its charge state. Under optical illumination, the center can rapidly change its charge state probabilistically between a negatively charged center (NV^-) and a neutral (NV^0) one. Naturally, such a probabilistic process prevents scaling up quantum protocols based on NV centers.

Despite recent efforts to better control the NV charge state by varying the optical wavelength, intensity and timing of excitations, deterministic optical initialization of the negatively charged NV^- state has yet to be shown.

I will present experimental study performed on a single NV center demonstrating negative charge state initialization probability which exceeds 99%. Moreover, I will show that this initialization procedure can be applied simultaneously to many NV centers.

Our experimental studies of the spectral, intensity and polarization dependence of the charged initialization probability will be compared quantitatively with a theoretical model that we developed.

ההרצאה תתקיים ביום רביעי, ה-8.1.25 בשעה 12:30

באודיטוריום המכון למצב מוצק, קומת כניסה

The lecture will take place on Wednesday, 8.1.25 at 12:30
at the Solid State Institute auditorium, entrance floor

Ph.D. Student of Professor David Gershoni