Solid State Institute
המכון למצב מוצק

TECHNION
Israel Institute
of Technology

הטכניון
מכון טכנולוגי
לישראל

SEMINAR

סמינר

Towards supersensitive optical phase measurement using deterministically generated multi-photon entangled states

Giora Peniakov
Department of Physics and The Solid State Institute,
Technion

Abstract

When light passes through a thin transparent medium, it gains a phase that usually depends on the width of the film, its refractive index, its birefringence. Measuring this phase with high precision is beneficial for many technological applications, such as in phase-contrast microscopy. It has been suggested that entangled light can provide better accuracy in phase measurement compared to classical light. Using N independent photons, the error in the phase measurements scales as shot noise, $1/\sqrt{N}$, while entangling all the N photons in a cluster- (GHZ-) state provides the ultimate precision of $1/N$, a factor of $\sqrt{N}$ better. In my talk, I will describe generation of a multi-photon entangled GHZ state using an anchored spin in a self-assembled semiconductor quantum dot. I will then demonstrate the use of the GHZ state for precision enhanced optical phase measurements.

Our entangled photon production is deterministic, therefore it can be easily scaled up to many entangled photons, where the precision gain becomes more and more significant. I will discuss the technological barriers standing between our first proof of principle demonstration and genuine use of entangled light for lower noise optical measurements.

ההרצאה תתקיים ביום רביעי, ה-24.11.21 בשעה 12:30
באודיטוריום המכון למצב מוצק, קומת כניסה
The lecture will take place on Wednesday, 24.11.21 at 12:30
at the Solid State Institute auditorium, entrance floor

Ph.D. Student of Professor David Gershoni