



Solid State Institute
המכון למצב מוצק

TECHNION
Israel Institute
of Technology



הטכניון
מכון טכנולוגי
לישראל

SPECIAL SEMINAR

סמינר מיוחד

Laser field-based electron control: from two-color physics at metal needle tips to the photonics-based particle accelerator

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Abstract

A good eight years ago, we have shown that the processes central to strong-field and attosecond physics can be observed at the apex of nanometer sharp needle tips. Furthermore, we have shown high-visibility quantum path interference in photoemission when two-color laser fields are incident on these tips, so far in the perturbative regime. Now we have entered the strong-field regime in two-color laser emission from needle tips and will show intriguing effects, well matched by simulation results. In the second part of the talk, I will discuss photonics-based particle acceleration research. A few years ago, we have demonstrated efficient electron acceleration with laser light at a photonic structure based on phase-synchronous acceleration - the exact same method as the one used in conventional microwave particle accelerators for more than 80 years, but orders of magnitude larger driving frequencies. Meanwhile, we could show various elements needed to build a photonics-based particle accelerator, such as all-optical deflectors, focusing elements and beam position monitors. Moreover, we have entered the regime of complex dynamical electron phase space control. First results comprise the generation of sub-300 attosecond short electron bunches as well as alternating phase focusing, a scheme that will allow, in principle, infinitely long particle transport and acceleration. Because dielectrics can withstand accelerating fields at optical driving fields reaching 10 GV/m, we expect a millimeter long accelerator on a chip to become of interest for science and medical applications alike.

10:00 ההרצאה תתקיים ביום רביעי, ה-11.12.19 בשעה

באודיטוריום המכון למצב מוצק, קומת כניסה

**The lecture will take place on Wednesday, 11.12.19 at 10:00
at the Solid State Institute auditorium, entrance floor**

Host: Profs. Michael Krueger and Ido Kaminer