



Solid State Institute
המכון למצב מוצק

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Lighting them all up, coherently

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Abstract

Topological insulators in condensed matter physics are phases of matter that are insulating in their bulk and have robust conductance on their edge, which is immune to disorder and defects. The topological protection of this conductance is known to be a ubiquitous phenomenon, occurring in many physical settings, such as photonics, cold atoms and mechanical or electrical systems. Recently, these ideas were extended beyond their original context, introducing the concepts of topological insulators to non-Hermitian systems, with gain or loss, and even to nonlinear settings. A particularly promising development in this field is the topological insulator laser, invented by our group: an array of semiconductor lasers utilizing fundamental features of topology to force injection locking, which makes all emitters act as a single coherent laser. However, thus far, all topological insulator lasers emitted light in the same plane as the topological transport mechanism locking them together.

I will present the topological insulator Vertical Cavity Surface Emitting Laser (VCSEL) array. The topological properties of this VCSEL array are inherited from the geometry of the crystalline model. The inter-cavity coupling lies in a plane perpendicular to the propagation direction of the light in the microcavities, which permits the emitters to be organized in a few-wavelengths structure. The light spends most of its time oscillating vertically, but the small in-plane coupling enabling topologically-protected transport suffices to force the emitters to act as a single coherent laser.

ההרצאה תתקיים ביום רביעי, ה-6.4.22 בשעה 12:30
באודיטוריום המכון למצב מוצק, קומת כניסה

The lecture will take place on Wednesday, 6.4.22 at 12:30
at the Solid State Institute auditorium, entrance floor

Ph.D. student of Distinguished Professor Mordechai Segev