



Solid State Institute  
המכון למצב מוצק

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## Photonic Time-Crystals

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### Abstract

Photonic time-crystals (PTC) are photonic systems with refractive index varying periodically in time:  $n(t) = n(t+T)$ . When the electromagnetic parameters of a material, permittivity or permeability, change in time, new waves emerge, resulting from time-reflection and time-refraction. For example, an initial plane wave refracts into a propagating and a counter-propagating plane wave. Such systems conserve momentum (wavenumber  $k$ ) but not energy (frequency  $\omega$ ), implying that the frequency of both time-reflected and time-refracted waves is different than the original frequency.

In my talk, I will review the fundamental physical mechanisms and conservation laws of PTCs as well as several aspects of PTC we studied in our group. I will begin by discussing the topology of PTCs, how to define the topological constant and its physical observables. The second topic will be disordered PTCs – PTCs that vary in time in a random fashion, and underpin the similarities and differences from Anderson localization. Finally, I will discuss spatiotemporal photonic crystals – photonic systems varying periodically in both time and space, exhibiting entirely new physics.

**12:30** ההרצאה תתקיים ביום רביעי, ה-10.11.21 בשעה

באודיטוריום המכון למצב מוצק, קומת כניסה

The lecture will take place on Wednesday, 10.11.21 at **12:30**  
at the Solid State Institute auditorium, entrance floor

Ph.D. student of Distinguished Professor Moti Segev