

## סמינר - SEMINAR

הנדך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב' 25.11.2019  
(כ"ז בחשוון תש"פ), בניין דן קאהן, אודיטוריום 1, 14:30.

**מרצה:**

**Dr. Adi Pick**

Postdoc at the EE and Chemistry departments  
Technion

**על הנושא:**

### **Novel Applications of Exceptional Points in Optical, Atomic, and Mechanical Systems**

The seminar will be given in English

**להלן תקציר ההרצאה:**

Elementary quantum mechanics deals mainly with closed systems, which are isolated from their environment. However, most physical systems are open, in the sense that they exchange energy and particles with their environment. One can find examples of open systems from all areas of physics and engineering but, from a theoretical viewpoint, they have something in common: they can be described by non-Hermitian operators. Non-Hermitian systems have intriguing properties and one notable example is that they can have exceptional points (EPs) — special degeneracies where several normal modes of the system have the same energy and spatial distribution. Due to their counterintuitive properties and recent realizations, EPs have been the focus of immense attention. In this talk, I will present three new applications of EPs: (I) Enhancing spontaneous emission with special optical cavities [1-3], (II) Controlling ionization from atoms and molecules by applying external control fields [4], and (III) Creating topological mode converters in quantum-optical systems [5]. I will conclude by explaining how these principles can be applied to discover new phenomena in mechanical systems .

[1]A Pick, B Zhen, OD Miller, CW Hsu, AW Rodriguez, M Soljacic, and SG Johnson, “General theory of spontaneous emission near exceptional points,” Opt. Express. 25, 12325(2017)

[2]Z Lin, A Pick, M Loncar, and AW Rodriguez, Inverse design of third-order Dirac exceptional points in photonic crystals. Phys. Rev. Lett. 117, 107402(2017)

[3]A Pick, Z Lin, and, AW Rodriguez, “Enhanced nonlinear frequency conversion and Purcell enhancement at exceptional points,” Phys. Rev. B 96, 224303(2017)

[4]A Pick, PR Kapralova-Zdanska, and N Moiseyev, “Ab-initio theory of photoionization via resonance,” JCP, 150, 204111(2019)

[5]A Pick, S Silberstein, N Moiseyev, N Bar-Gill, “Topological mode switches in NV centers using exceptional points,” Phys. Rev. Research, 1 (1) 013015(2019).

**מארח :** פרופ"מ גל שמואל

בברכה,

פ"פ 190 א' אית' סאס

מרכז הסמינרים