



MECHANICAL ENGINEERING STUDENT SEMINAR

Wednesday, October 26 2022 at 13:30

Online: <https://technion.zoom.us/j/96587948764>

Spin-valley Rashba monolayer laser

Dror Reichenberg

Adviser: Prof. Erez Hasman

Direct-bandgap transition metal dichalcogenide monolayers are appealing candidates to construct atomic-scale spin-optical light sources owing to their unique valley-contrasting optical selection rules. Here, we report on a spin-optical monolayer laser by incorporating a WS₂ monolayer into a heterostructure microcavity supporting high- Q spin-valley resonances. Inspired by the creation of valley pseudospins in monolayers, the spin-valley modes are generated from a photonic Rashba-type spin splitting of a bound state in the continuum, which gives rise to opposite spin-polarized $\pm K$ valleys due to emergent photonic spin-orbit interaction under inversion symmetry breaking. The Rashba monolayer laser shows intrinsic spin polarizations, high spatial and temporal coherence, and inherent topological protection features, enabling valley coherence in the WS₂ monolayer upon arbitrary pump polarizations at room temperature. Our monolayer-integrated spin-valley microcavities open avenues for further classical and non-classical coherent spin-optical light sources exploring both electron and photon spins.

Note: the seminar will be given in English