

הנדך מוזמנות/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ד'
30.05.2018 (טז' בסיון, תשע"ח), בניין דן קאהן, אודיטוריום 1, 13:30.

מרצה: אלחנן מגיד

מנחה: פרופ' ארז חסמן

על הנושא:

Photonic spin-controlled metasurfaces

The seminar will be given in Hebrew

תקציר ההרצאה:

The shared-aperture phased antenna array developed in the field of radar applications is a promising approach for increased functionality in photonics. The alliance between the shared-aperture concepts and the geometric phase phenomenon arising from spin-orbit interaction provides a route to implement photonic spin-control multifunctional metasurfaces. We adopted a thinning technique within the shared-aperture synthesis and investigated interleaved sparse nanoantenna matrices and the spin-enabled asymmetric harmonic response to achieve helicity-controlled multiple structured wavefronts such as vortex beams carrying orbital angular momentum. We used multiplexed geometric phase profiles to simultaneously measure spectrum characteristics and the polarization state of light, enabling integrated on-chip spectropolarimetric analysis. The shared-aperture metasurface platform opens a pathway to novel types of nanophotonic functionality.

Disordered structures give rise to intriguing phenomena owing to the complex nature of their interaction with light. We report on photonic spin-symmetry breaking and unexpected spin-optical transport phenomena arising from subwavelength-scale disordered geometric phase structure. Weak disorder induces a photonic spin Hall effect, observed via quantum weak measurements, whereas strong disorder leads to spin-split modes in momentum space, a random optical Rashba effect. Study of the momentum space entropy reveals an optical transition upon reaching a critical point where the structure's anisotropy axis vanishes. Incorporation of singular topology into the disordered structure demonstrates repulsive vortex interaction depending on the disorder strength. The photonic disordered geometric phase can serve as a platform for the study of different phenomena emerging from complex media involving spin-orbit coupling.

Disorder-induced optical transition from spin Hall to random Rashba effect, Science 358, 1411 (2017).

Photonic Spin Controlled Multifunctional Shared-Aperture Antenna Array, Science 352, 1202 (2016).

בברכה,

פרופ' נ"א אתי סאס

מרכז הסמינרים