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סמינר

## "Fractal Diffraction Signatures and Applications"

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### Abstract

Fractal and aperiodic diffractive elements such as gratings, lenses, zone plates, photon sieves and axicons are being suggested as excellent replacements for regular optical elements in image forming devices. We report two important properties of Cantor diffractals (waves emanating from fractals), namely that of *redundancy* and *robustness*. The Fraunhofer diffraction pattern comprises of several bands, each containing the complete information about the fractal aperture. Redundancy allows for a faithful reconstruction of the fractal grating by an inverse Fourier transformation of an arbitrary band. This redundancy can be useful in many applications, when restoration from partial information is required. Robustness provides a bound for the inherent manufacturing defects that can be tolerated to keep the imaging capabilities of optical elements intact.

Aperiodic (quasiperiodic) gratings contain fractal signature and are characterized by a fractal dimension. They exhibit novel characteristics such as redundancy and robustness that keep their imaging capabilities intact even when there is a significant loss of information. These aperiodic gratings may be better replacement than their fractal and periodic counterparts for polychromatic imaging. We used the Fourier transform procedure to characterize the roughness of deposited thin films, since fractal morphology is unavoidable due to its very nature of deposition. Our study provides a fresh outlook to interpret experimental data from such deposits and films. They also provide an ideal platform to verify the theoretically predicted anomalous transport in fractal substrates.

ההרצאה תתקיים ביום רביעי, ה-11.1.2017 בשעה 12:30  
בבניין פיסיקה, חדר 620

The lecture will take place on Wednesday, 11.1.2017 at 12:30  
at the Physics Building, Room 620

Host: Associate Professor Oren Cohen