

סמינר כימיה פיסיקלית ואנליטית

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נושא:

**CHARGE TRANSPORT-INDUCED
RECOIL AND DISSOCIATION IN
DOUBLE QUANTUM DOTS**

This study was conducted under the supervision of
Prof. Efrat Lifshitz and Uri Peskin

ההרצאה תתקיים בחדר הסמינרים הפקולטי



לפני ההרצאה



Charge Transport-Induced Recoil and Dissociation in Double Quantum Dots

Abstract

Colloidal quantum dots (CQDs) are free-standing nanostructures with chemically tunable electronic properties. The combination of properties offers intriguing new possibilities for nano-electromechanical devices that were not explored yet. In this talk, we consider a new scanning tunneling microscopy setup for measuring ligand-mediated effective interdot forces and for inducing motion of individual CQDs within an array. Theoretical analysis of a double quantum dot (DQD) structure within this setup reveals for the first time voltage-induced interdot recoil and dissociation with pronounced changes in the current. Considering realistic microscopic parameters, our approach enables correlating the onset of mechanical motion under bias voltage with the effective ligand-mediated binding forces. In addition to that, theoretical analysis of the unique connectivity of the STM tip - DQD - surface setup, in which the tip is coupled to a single dot and the coupling to the surface is shared by both dots, reversals a unique Negative Differential Resistance (NDR) effect. This NDR, attributed to destructive interference during charge transfer from the DQD to the surface, can be used as a sensitive probe for inter-dot interactions in DQD arrays.

