ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ
ΤΜΗΜΑ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ ΥΛΙΚΩΝ

ΠΑΡΟΥΣΙΑΣΗ ΜΕΤΑΠΤΥΧΙΑΚΟΥ ΔΙΠΛΩΜΑΤΟΣ ΕΙΔΙΚΕΥΣΗΣ

Τίτλος

«Localized States in Graphene Nanoribbons»

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Τετάρτη 04/09/2019

13:00

Αίθουσα Α2 (Α115)
Κτίριο Τμήματος Επιστήμης Υπολογιστών,

Πανεπιστήμιο Κρήτης

ABSTRACT

The isolation of a single atomic layer of carbon and other atomically thin sheets from layered materials has generated enormous interest in 2D crystals. Intense efforts to use these materials in optoelectronics, energy, catalysis and other applications shift focus from gapless graphene to related nanostructures such as graphene nanoribbons (GNRs). Depending on their structure, GNRs exhibit non-zero electronic band gap and several interesting electronic properties, including edge states. In this thesis, using a simple tight-binding model with the addition of nonlinear terms to account for interactions, we study electron propagation on GNRs by solving the Discrete Nonlinear Schrödinger equation. We examine the time evolution of initially localized wave packet excitations in periodic and disordered zigzag and armchair nanoribbons and for various nonlinearities. Our results show how Anderson localization and nonlinear self-trapping affect electron transport in GNRs. We also present unexpected localized states along the infinite direction. Besides graphene nanostructures, our results are relevant to other honeycomb lattice systems such as coupled optical waveguides.