Πρόσκληση σε Δημόσια Παρουσίαση της Διδακτορικής Διατριβής του

κ. Χαράλαμπου Μαβίδη

(Σύμφωνα με το άρθρο 41 του Ν. 4485/2017)

Τη **Δευτέρα 11 Απριλίου 2022** και ώρα **10:00** στην **αίθουσα Τηλε-εκπαίδευσης Ε130,** στο κτήριο του **Τμήματος Μαθηματικών και Εφαρμοσμένων Μαθηματικών** του Πανεπιστημίου Κρήτης, θα γίνει η δημόσια παρουσίαση και υποστήριξη της Διδακτορικής Διατριβής του υποψήφιου διδάκτορα του Τμήματος Επιστήμης και Τεχνολογίας Υλικών κ. Χαράλαμπου Μαβίδη με θέμα:

« Electromagnetic Wave Propagation in Photonic Crystals and Metamaterials »

Abstract

The great advancements in nanotechnology during the 20th century unveiled numerous, previously unattainable, applications involving electromagnetic wave propagation and control. This led to the emergence of man-made composite structures with engineerable properties through proper structuring, allowing the exploration of previously unexplored light-matter interaction aspects. Characteristic examples are Photonic Crystals and Metamaterials/Metasurfaces. In this thesis, three different photonic systems are investigated:

(i) The position dependence of Local Density of States inside a finite 3D photonic crystal is calculated, for different trajectories inside the crystal, and a model was derived to obtain a physical understanding of the calculated response.

(ii) The conditions for perfect absorption for planar structures comprised of a dielectric between a thin resistive film and a metallic back-reflector are derived, based on a proper extension of the Transfer Matrix Method. Three distinct cases are investigated, where the resistive thin film is a: (a) uniform metal film; (b) graphene layer; (c) metasurface showing both electric and magnetic surface conductivities.

(iii) The scattering properties of multilayered infinitely-long cylinders are calculated, based on Mie theory combined with a Transfer Matrix Method formulation, for cylinders incorporating metasurfaces at their interfaces, and a previously established effective medium model is extended for systems/metamaterials of such cylinders. Three relevant systems are investigated: (a) single-layered polaritonic cylinders; (b) multi-layered graphene-based nanotubes; and (c) metasurface-based cylinders. We found the parameters required for different electromagnetic phases in those systems, including hyperbolic dispersion, double negative response, epsilon near zero response, etc.