



University of Crete  
Department of Physics

## *Physics Colloquium*

Thursday, 16 November 2023 | 17:00 – 18:00, Seminar Room 3<sup>rd</sup> Floor

# **Controlling Electromagnetic Waves with Chiral and Parity-Time (PT) Symmetric Metamaterials**

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### **ABSTRACT**

Metamaterials, i.e. artificially structured materials composed of sub-wavelength resonant building blocks, often called meta-atoms, have become in recent years a topic of major scientific attention; this is due to the novel properties they entail and the resulting great promise in a large variety of applications, including telecommunications, imaging, sensing, energy harvesting and others. One of the most appealing metamaterial categories is that of chiral metamaterials, which are composed of meta-atoms lacking any mirror symmetry plane. Chiral metamaterials are associated with chirality parameters 4-5 orders of magnitude higher than those of natural chiral media, having thus the ability to provide large polarization rotation and large circular dichroism response from ultrathin structures, abilities of high value for wave polarization control applications. In the talk I will summarize our activities in the study of chiral metamaterials, emphasizing more on their combination with active media as to create chiral parity-time symmetric systems. Combining chirality and Parity-Time-symmetry in a single metamaterial structure, as our studies have shown, one can achieve a variety of novel propagation and scattering characteristics. These characteristics include mixed PT-related phases, multiple exceptional points, asymmetric reflection, asymmetric optical activity, and others. In the talk I will discuss the above characteristics along with the potential to tailor them and exploit in a variety of applications related with electromagnetic wave polarization control.