NEW YORK CITY COLLEGE OF TECHNOLOGY
Physics Department
Center for Theoretical Physics

Hyperbolic Metamaterials: Towards Broadband Control of Light-Matter Interaction

Presented by:
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Abstract

The interaction of light with matter can be engineered by controlling the photonic density of states (PDOS). I will discuss our recent work on optical topological transition in strongly anisotropic metamaterials that can be used to engineer the PDOS [1]. The transition in the topology of the iso-frequency surface from a closed ellipsoid to an open hyperboloid resulting in hyperbolic dispersion manifests itself in increased rates of spontaneous emission of emitters positioned in the near-field of the metamaterial. Being a non-resonant effect, this enhancement is observed over wide spectral bandwidth. Approaches to enhance light extraction from such structures as well as anomalous cavity scaling observed in cavities fabricated using such metamaterials will be discussed. Finally, we will also discuss metal-free and tunable hyperbolic metamaterial structures.

[1] "Topological transitions in metamaterials," H. Krishnamoorthy, Z. Jacob, E. Narimanov, I. Kretzschmar, and V. M. Menon, Science 336, 205 (2012).

Light refreshments will be served.