

Symmetry and Topology of Nano Structures for Controlling Light

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During the last two decades, our ability to nanostructure materials has led to a better understanding of the role of electromagnetic multipoles in the control of light-matter interaction. I will discuss how the control of the symmetries and interactions between multipoles enables the construction unique electromagnetic composites. In the first part of the talk, I will discuss how the spectral overlap of multipoles of specific symmetries enables on demand electromagnetic materials parameters or enhanced sensors operated at exceptional points. In the second part of the talk, I will discuss how the band structure of periodic systems can exhibit topological effect at optical frequencies and unique optoelectronic devices that can be created.

Bio:

Boubacar Kanté's multidisciplinary research interests are in the areas of wave-matter interaction, from microwave to optics and related fields such as nanophotonics, nanoscale photon management, and biophysics. He is particularly interested in the theoretical modeling, fabrication and characterization of metamaterials for application in information science. Kante's recent research has focused on artificial electromagnetic composites -- metamaterials. He demonstrated the first non-magnetic metamaterial invisibility cloak, introduced the notion of index for a meta-surface, and, the notion of symmetry/parity of ring resonators. Prof. Kante also demonstrated, from symmetry consideration, that closed rings, previously believed incapable of producing artificial magnetism, can make ultra-broadband negative index.

Boubacar Kanté received the 2017 Office of Naval Research (ONR) Young Investigator Award, the 2016 National Science Foundation (NSF) Career Award, the 2015 Hellman Fellowship, the Richelieu Prize in Sciences from the Chancellery of Paris Universities for the best Ph.D in France in Engineering, Material Science, Physics, Chemistry, Technology in 2010, the Young Scientist Award from the International Union of Radio Science (URSI) in Chicago in 2007, the Fellowship for excellence from the French Ministry of Foreign Affairs in 2003 for his undergraduate studies, a Research Fellowship from the French Research Ministry for his Ph.D studies. (Excerpted from the EECS Faculty Directory)