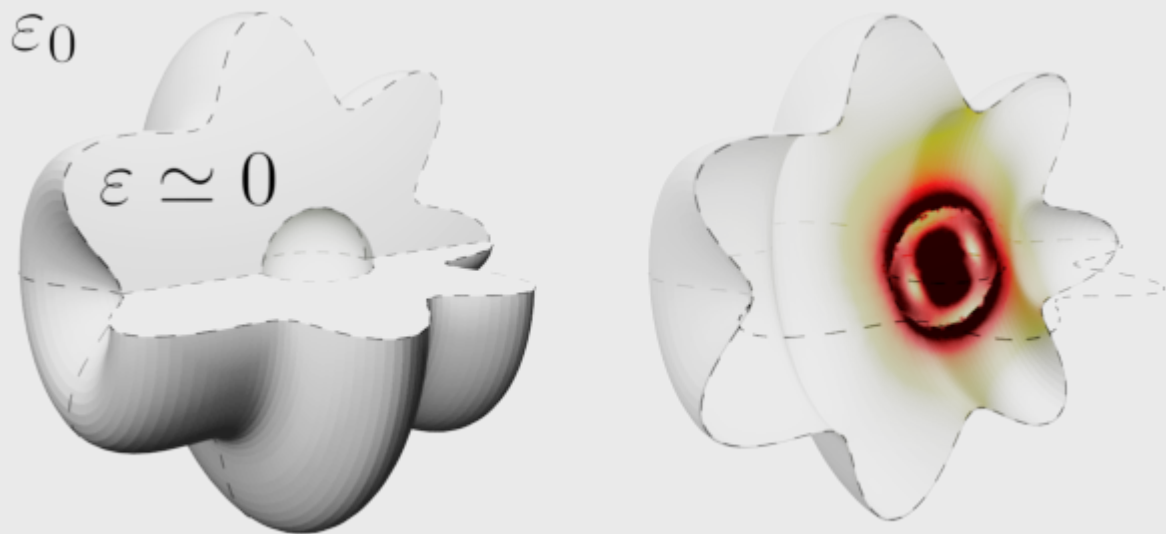


Geometry-invariant Phenomena in Near-zero-index Media



Title: Geometry-invariant Phenomena in Near-zero-index Media.

When: Friday, December 15, (2017), 12:00.

Place: Department of Theoretical Condensed Matter Physics, Faculty of Science, Module 5, Seminar Room (5th Floor).

Speaker: Iñigo Liberal, Department of Electrical and Electronic Engineering, Public University of Navarre, Pamplona, Spain & Department of Electrical and Systems Engineering, University of Pennsylvania, Philadelphia, USA.

Continuous media and metamaterials with a near-zero refractive index (NZI media) provide alternative pathways for the control and manipulation of light-matter interactions. The exotic behavior of NZI media is rooted in the fact that the wavelength gets effectively stretched as the refractive index vanishes. This allows for pathological solutions to the wave equation, including spatially static fields distributions which nevertheless dynamically oscillate in time. This paradoxical behavior gives access to a regime of qualitatively different wave dynamics, where the importance of the geometry is lessened, and certain observables are invariant with respect to geometrical deformations, even including changes in the topology of the system.

In this talk, I'll review and discuss some of the geometry-invariant phenomena related to near-zero-index media. Examples will include: (i) transmission (tunneling) of waves through deformed waveguides. (ii) Unconventional resonators supporting modes whose eigenfrequency is independent of the geometry of their external boundary. (iii) Violation of effective medium theory geometrical restrictions, enabling, for example, single unit-cell metamaterials. (iv) Existence of bound states in open 3D compact resonators with arbitrarily shaped boundaries.

Different technological applications and implementations of these concepts will be

discussed.