Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Topological Photonics for Continuous Media[1] MARIO SILVEIRINHA, University of Coimbra — Photonic crystals have revolutionized light-based technologies during the last three decades. Notably, it was recently discovered that the light propagation in photonic crystals may depend on some topological characteristics determined by the manner how the light states are mutually entangled. The usual topological classification of photonic crystals explores the fact that these structures are periodic. The periodicity is essential to ensure that the underlying wave vector space is a closed surface with no boundary. In this talk, we prove that it is possible calculate Chern invariants for a wide class of continuous bianisotropic electromagnetic media with no intrinsic periodicity. The nontrivial topology of the relevant continuous materials is linked with the emergence of edge states. Moreover, we will demonstrate that continuous photonic media with the time-reversal symmetry can be topologically characterized by a Z_2 integer. This novel classification extends for the first time the theory of electronic topological insulators to a wide range of photonic platforms, and is expected to have an impact in the design of novel photonic systems that enable a topologically protected transport of optical energy.

[1]This work is supported in part by Fundacao para a Ciencia e a Tecnologia grant number PTDC/EEI-TEL/4543/2014.

Mario Silveirinha
University of Coimbra

Date submitted: 05 Nov 2015 Electronic form version 1.4