



How Thin Film Photonics Unlocks the Power of Fano Resonance and Extreme Optomechanics

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Zoom Link: <https://purdue-edu.zoom.us/j/96544298478>

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Abstract:

In recent years, significant interest has emerged in the inverse design of artificial layered heterostructures for photonic applications. Specifically, the unique optical properties of near-zero permittivity (ENZ) metamaterials have enabled the exploration of novel physical effects and mechanisms. In this presentation, Prof. Strangi will delve into how thin film photonics harnesses the potential of Fano resonances and extreme optomechanics. By layering metal-dielectric thin films, they can create a distinct type of optical coating that exhibits photonic Fano resonance, referred to as a Fano-resonant optical coating (FROC). They extend the concept of coupled mechanical oscillators to thin-film nanocavities, shedding light on semi-transparent FROCs that can both transmit and reflect the same color, akin to a beam splitter filter. This remarkable property is beyond the capabilities of conventional optical coatings. In the latter part of the presentation, he will discuss recent theoretical and experimental efforts aimed at exploring optomechanics based on epsilon-near-zero materials.

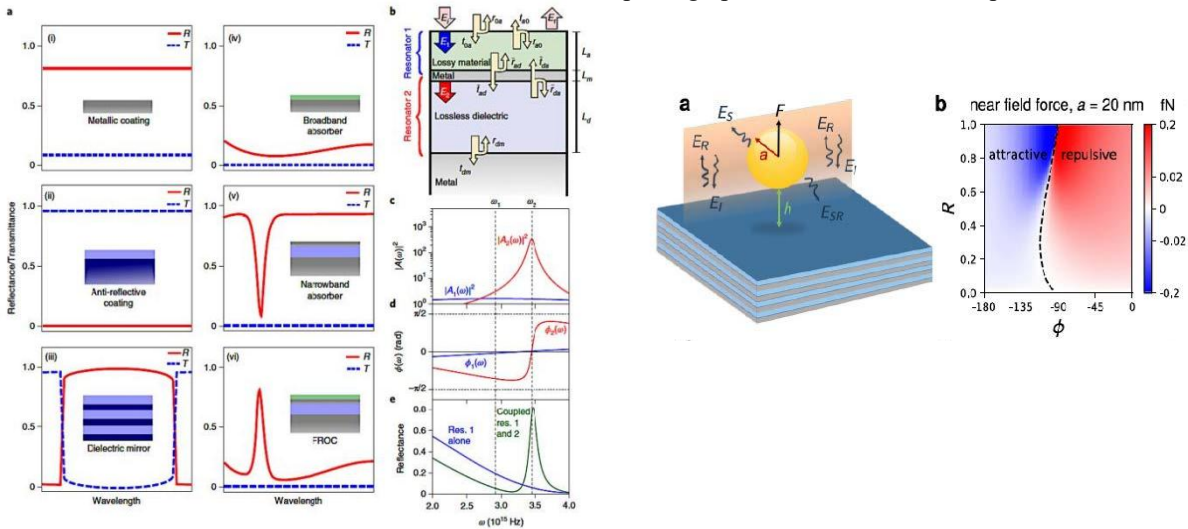


FIGURE. *Left:* Fano Resonance Optical Coatings (FROCs). *Right:* Epsilon-Near-Zero based Optomechanics.

Biography:

Giuseppe Strangi is a Professor of Physics and Ohio Research Scholar at Case Western Reserve University (CWRU), where he leads the Nanoplasma Labs. He also serves as Research Director of the Nanoscience Laboratory for Human Technologies (NLHT- Italy). Dr. Strangi is the General Chair of the International Conference - NANOPLASM.

His research interests encompass condensed matter physics, nanophotonics, plasmonics, and cancer nanotechnology. Dr. Strangi is a Fellow of the Institute of Science of the Origins (ISO), The European Physical Society (EPS) and Optica (formerly OSA). His work focuses on investigating the physics of waves and fields in nanostructured metamaterials, which are composite materials with unique electromagnetic properties induced by atomic and molecular organization at sub-wavelength scales. This research has implications for the design and application of advanced optical materials in various fields.