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Towards Widely Deployable Travelling Wave Tube Amplifiers for Millimeter-through-THz Frequencies: A Convergent Research Approach

FRANCESCA CAVALLO, PH.D.

Assistant Professor

Wed, Mar 30
5:30pm

ZOOM VIRTUAL MEETING

Free and Open to the Public
Pre-registration required

https://unm.zoom.us/j/99869214065

Dr. Francesca Cavallo is an assistant professor of Electrical and Computer Engineering and an investigator at the Center for High Technology Materials at the University of New Mexico (UNM). Her research focuses on synthesis, assembly, fundamental properties, and applications of inorganic sheets. Dr. Cavallo has twenty years of experience in nanoscale materials science and technology with complementary capabilities in electronics, optoelectronics, and electromagnetics. Her expertise spans nanosheets synthesis and processing, nanostructured origami, strain-engineering, electrical-transport phenomena in multi-carrier systems, THz devices, and light-matter interactions. Dr. Cavallo has co-authored over 60 peer-reviewed publications in high-profile journals, filed 11 patents, and published numerous conference abstracts and proceedings. She is a recent recipient of an NSF CAREER Award. At UNM, Dr. Cavallo has raised 3,300,000 $ in funding from the U.S. Department of Defense, the U.S. Department of Energy, and the National Science Foundation. Dr. Cavallo is also a strong promoter of equitable and inclusive learning practices and course-based undergraduate research.

IEEE Albuquerque WIE Affinity Group
Chair: Khandakar Nusrat Islam
Advisor: Prof. Eirini Eleni Tsiropoulou

Abstract:

I will present a transformative route to obtain mass-producible helical slow-wave structures for operation in beam-wave interaction devices at millimeter-through-THz frequencies. The approach relies on guided self-assembly of conductive nanomembranes. The work coordinates simulations of cold helices (i.e., helices with no electron beam) and hot helices (i.e., helices that interact with an electron beam) with scalable fabrication and advanced characterization techniques. The theoretical study determines electromagnetic fields, current distributions, and beam-wave interaction in a parameter space that has not been explored before. These parameters include microscale diameter, pitch, tape width, and nanoscale surface finish. Informed by the simulation results, we design, fabricate, and characterize prototype helices that will potentially form the basis for affordable and widely deployable millimeter-through-THz vacuum electronic devices.

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