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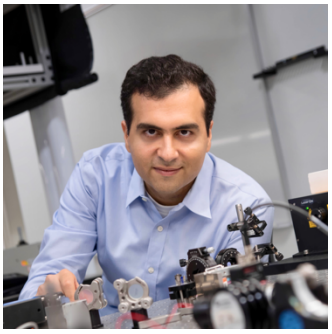
Photonics Seminar



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Integrated Nonlinear Photonics: New Opportunities in the Nanometer and Femtosecond Scales

Tuesday, November 9, 2021
EEB 132
1:30 PM – 2:30 PM
Zoom Link:
https://usc.zoom.us/j/91808071892?pwd=VUwyK3NSNW5rSzVLQzFKSGdPc05yUT09

Abstract: Evident from more than 50 years of table-top nonlinear optics, utilizing strong quadratic nonlinearities in integrated photonics can significantly expand the potentials of photonics for applications ranging from sensing to computing. In the past few years, nanophotonic lithium niobate (LN) has emerged as one of the most promising integrated photonic platforms with strong quadratic nonlinearity. In this talk we present some of our recent experimental results on realization and utilizing of dispersion-engineered and quasi-phase-matched devices in nanophotonic LN for intense optical parametric amplification [1], ultrafast ultra-low-energy all-optical switching [2], and ultra-low-energy broadband sources in the mid-infrared [3]. We also present some recent experimental and numerical results on how resonators with only strong quadratic nonlinearities exhibit phase transitions in the spectral domain [4], and pulse compression. We show a path for realization of such nonlinear resonators at the wavelength-scale [5] and discuss how networks of such resonators can lead to topological [6] and non-Hermitian dynamics [7] in the classical and quantum regimes.

Biography: Alireza Marandi is an Assistant Professor of Electrical Engineering and Applied Physics at Caltech. He received his PhD from Stanford University in 2013. Before joining Caltech, he held positions as a postdoctoral scholar and a research engineer at Stanford, a visiting scientist at the National Institute of Informatics in Japan, and a senior engineer in the Advanced Technology Group of Dolby Laboratories. Marandi is a Senior Member of OSA and IEEE and has been the recipient of NSF CAREER award, the AFOSR YIP award, and the Young Scientist Prize of the IUPAP. He is named the 2019 KNI-Wheatley Scholar.

Hosts: Faculty-Wade Hsu, Mercedeh Khajavikhan, Michelle Povinelli, Constantine Sideris, and Wei Wu
Students-Max Lien and Raymond Yu
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