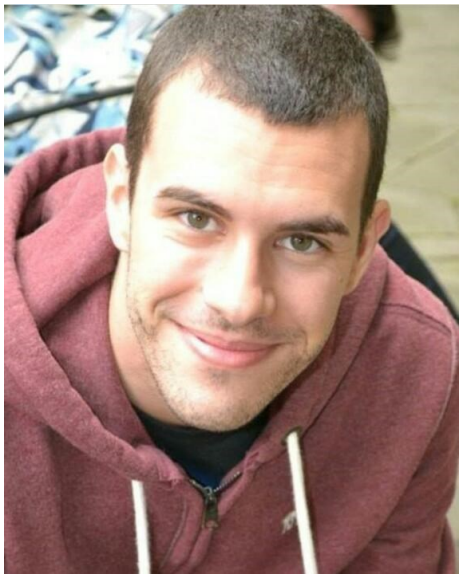
SPIE Student Seminar Series



Fabrizio Riminucci

(University of Salento & Lawrence Berkeley National Lab)

Enhancement of Parametric Effects in Dipolar Exciton-Polariton Waveguides

Tuesday, Oct. 13, 2020

12:00 pm ~ 1:00 pm (EST)

ZOOM ID: 996 1450 5800

Abstract: Exciton-Polaritons are elementary excitations arising from the strong coupling between a photonic mode and an exciton resonance. Their hybrid light-matter properties allow them to take advantage of both excitonic nonlinearities and the extremely low effective mass of a photon in a microcavity. Although they are mainly studied in vertical microcavities, their potential has recently been demonstrated in horizontal waveguides for possible future applications spanning from integrated polaritonic circuits to low threshold coherent light sources.

In this talk I will present the self-phase modulation parametric effect achieved in a GaAs/AlGaAs waveguide that supports fast propagating, highly interacting exciton-polaritons. By applying an external electric field, a further degree of freedom is introduced to enhance the interactions between polaritons; leading to the generation of the so-called dipolar polaritons. By fitting the experimental results with a dissipative Gross-Pitaevskii equation we were able to estimate the dipolar interaction enhancement which will play an important role in future polaritonic devices. In closing, I will present some progress where these interactions are estimated in the strong coupling regime at room temperature in new materials such as transition metal dichalcogenides and 2D perovskites.

Bio: Fabrizio Riminucci is a 2nd year PhD student at University of Salento, Lecce, in Physics and Nanoscience . For the past year, he has been an affiliate at the Lawrence Berkeley National Laboratory, developing and studying devices that exploit the interacting nature of exciton-polaritons in planar waveguides. From August 2017 to August 2018 he was an affiliate at the LBNL working on plasmonic photocathodes for Ultrafast Electron Diffraction. He received his M.Sc. degree in Nanotechnology Engineering and his B.Sc. degree in Electrical Engineering from University of Rome "La Sapienza".

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