MQ Photonics Research Centre Seminar

MACQUARIE University

Speaker: A/Prof Stefano Palomba

Title: Comparative plasmonic waveguide design for nanoscale lasing and four-wave mixing

Modern optical integrated devices are limited by the diffraction of light, which can be overcome by implementing structures based on plasmonic waveguide platforms. Plasmonic nanolasing and nonlinear optical generations, such as four-wave mixing, developed separately due to their different physics, although both used metal-based configurations. Both fields are currently at an impasse. In order to break this impasse, we developed a unified theoretical approach. We find that the waveguide design for both lasing and degenerate four-wave mixing in lossless and in plasmonic waveguides can be described by a single theoretical framework, in spite of the distinct physics. We perform a global comparison of plasmonic waveguide configurations and show that the results to be essentially the same, though nanolasers require an additional buffer layer to eliminate quenching. Not only do we confirm the performance of configurations in the literature but also, we exploit innovative designs with even better performance, and that may also solve the long-standing objective of low-threshold electrically pumped plasmonic nanolasers.

When: Wednesday 10 July 2019
Time: 2pm
Where: Multipurpose room, 2.300 7WW

Bio: A/Prof Stefano Palomba is an Experimental Physicist in Nanophotonic and Plasmonic technologies, aimed to design and develop the next generation of integrated optical devices. He completed his Laurea degree in Optoelectronic Engineering at the Politecnico di Milano (Italy - 2002) and a Nanotechnology specialization course at the Universita' degli Studi (Italy - 2003). He earned a PhD degree in Nanoscale Physics from the Nanoscale Physics Research Laboratory at the University of Birmingham (UK - 2007). He worked as Postdoctoral Fellow at the University of Rochester (NY, USA), the University of California, Berkeley (USA), and KLA-Tencor Corporation, Milpitas (California, USA). In 2013 he was appointed as Senior Lecturer and promoted A/Prof in 2018 at the University of Sydney, where he now runs a new Nanophotonic and Plasmonic Advancement Lab (NPAL).