MOCCA ESRs' Newsletter

About Us

MOCCA ESRs before joining MOCCA!

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Our Projects

Four projects on photonics!

Read more on page 2-3.

Find out more about MOCCA EID project

https://mocca.astonphotonics.uk/

Or follow us on

@MOCCA_EID

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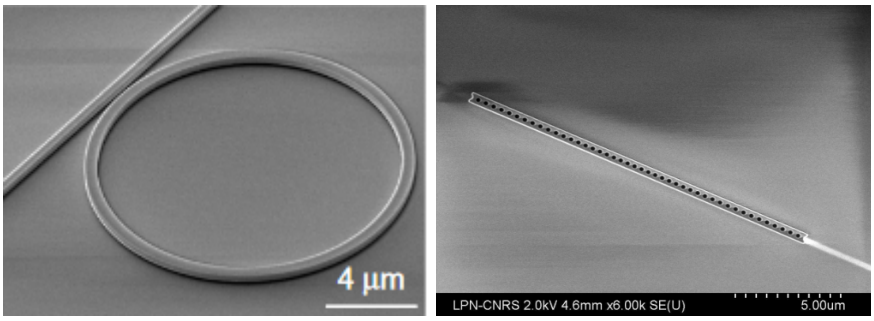
ABOUT US AND OUR PROJECTS

Loredana Maria Massaro obtained the Bachelor's and the Master's degree in Physics from the University of Rome "La Sapienza". In her bachelor thesis, she discussed the theoretical bases of quantum information technologies.

In 2019 she earned her master's degree with an experimental thesis in the field of complex photonics. In particular, her research topic focused on the characterization of the Random Laser emission from a Rhodamine-6G/doped mat of disordered electrospun filaments.

Loredana works on a project on **"Nonlinear semiconductor platforms for optical microcomb Generation"**

The goal of her project is to model, fabricate and characterize experimentally a frequency comb source in an integrated circuit. While frequency comb generation has already been achieved thanks to integrated ring microresonators, the underlying idea of her project is to generate such a frequency comb using photonic crystal cavities.



Microring and photonic crystal SEM images.

Images : Ring resonator : Chang, L., Xie, W., Shu, H. et al. Ultra-efficient frequency comb generation in AlGaAs-on-insulator microresonators. Nat Commun 11, 1331 (2020). https://doi.org/10.1038/s41467-020-15005-5 Photonic crystal cavity : Alexandre Bazin, III-V Semiconductor Nanocavitieson Silicon-On-Insulator Waveguide: Laser Emission, Switching and Optical Memory.

Avinash Kumar obtained his Bachelor's degree in Engineering Physics from Indian Institute of Technology Delhi (IITD), New Delhi in 2016. Then he joined Europhotonics Master Program for studying Optics and Photonics. He received his European Master's degree from Aix-Marseille University (France) and Universitat Politècnica de Catalunya (Spain) in 2019 under the Europhotonics Program.

The title of Avinash's project is "**Integrated Frequency Combs"**

The project aims to generate new frequencies from visible to mid-IR spectrum and utilizing them for high precision spectroscopy through comb generation. At AMO, we are developing the above-mentioned technology on a well-established & sustainable CMOS platform.

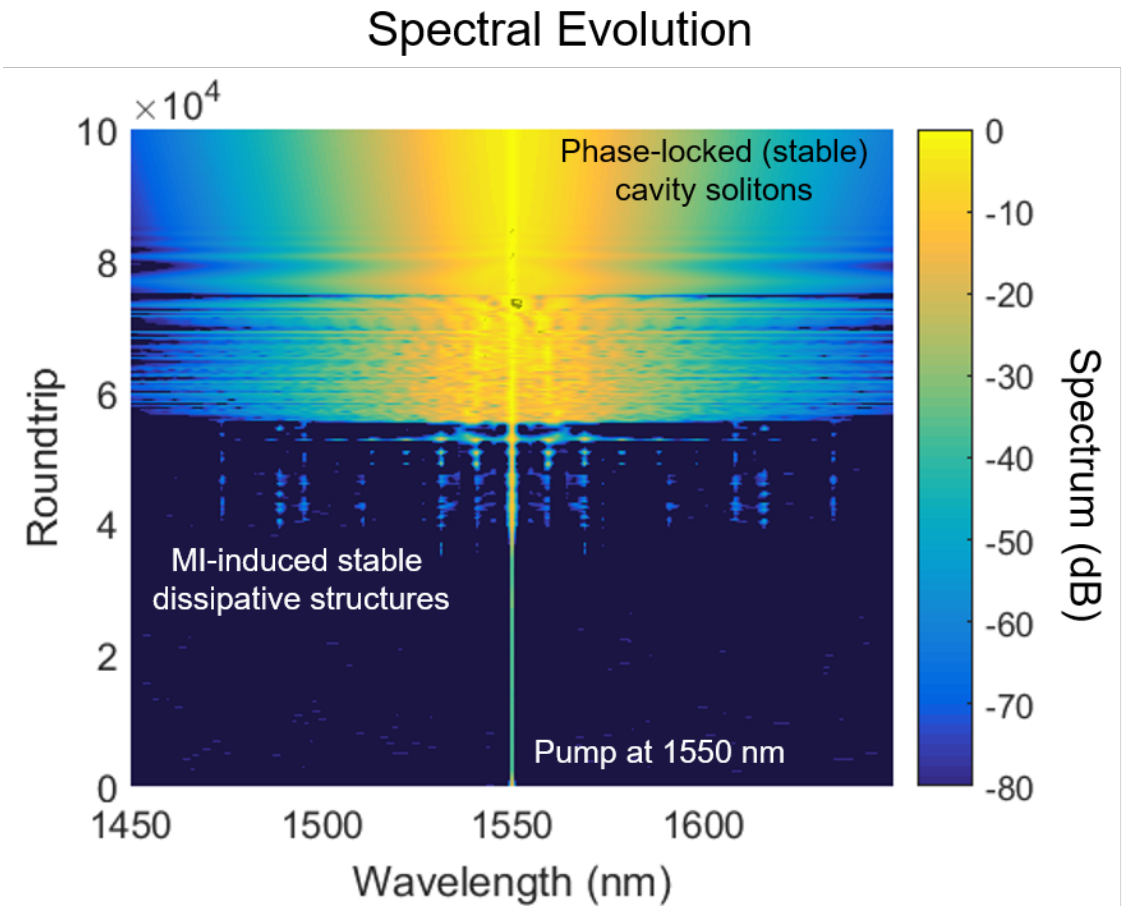


Image: LLE simulated micro-comb dynamics over 100,000 roundtrips.

Visit his project blog for more!!

Avinash's Blog - Horizon2020_EID_MOCCA (astonphotonics.uk)

Francesco Rinaldo Talenti obtained his master degree from the flemish university of Brussels, the Vrije Universiteit Brussel (VUB), graduating in Physics and Astronomy in July 2019. Here he discovered the fascinating field of nonlinear and quantum optics, finding interest in the several applications attainable from the state of the art research, as well as in the rich physics behind the observable phenomena. During his internship he joined the INO Institute of Pozzuoli, close to Naples, where he studied the locking technique and the thermal effects of an optical cavity for frequency comb. Francesco carried out his thesis at the B-phot team of the applied physics and photonics group, at the faculty of engineering of the VUB. Here he studied the spectral broadening of a chirped pulse propagating through nonlinear waveguides, considering also the case of a graphene top lay.

The title of Francesco's project is "**Optical Microcombs Dynamics for Novel Microcomb Sources**"

Frequency combs are optical sources with many applications in fields such metrology, molecular spectroscopy, telecommunications, astronomy or atomic clocks. From year to year the technology behind their experimental set ups has been developed and improved, typical devices miniaturized and integrated. Nowadays is possible to generate frequency comb on-chip with input powers, at the state of the art, of few tens of μWs. In this project the dynamics of comb generation is studied and novel schemes for comb generation are proposed. We study the dynamics of comb formation in novel devices such as photonic crystal (PhC) cavities.

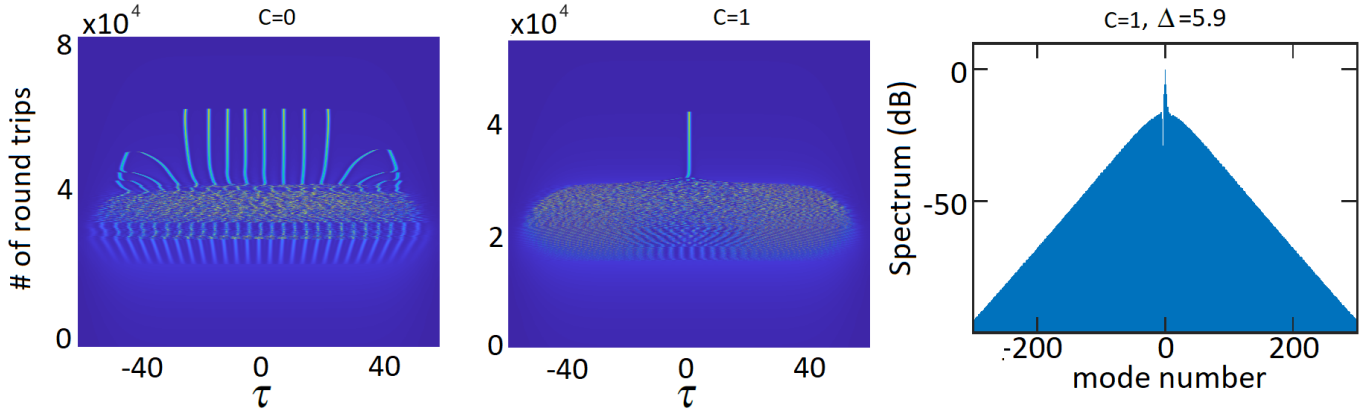


Image: Dynamical study of kerr cavity solitons frequency combs. From left: in the first two panels we report multi- and single solitons dynamics controlled by a chirped pulse driven field. On the right the comb spectrum of a single soliton state.

Victor Vassiliev obtained a diploma from St. Jerome's Faculty of Sciences at the Aix-Marseille University in Marseille, France. He joined the European Industrial Doctorate project MOCCA in 2019 as an Early-Stage Researcher. His research focuses on optical frequency comb generation in microresonators.

The title of Victor's project is "**New concepts for microresonator comb generation**". Its aims are the design and fabrication of SNAP bottle microresonator-based optical frequency comb generator and the theoretical and experimental characterisation of SNAP bottle microresonator-based optical frequency comb generator.

You can follow the progress of our research on our blogs and social media:
See https://mocca.astonphotonics.uk/blog/

Loredana's work is on Instagram! Follow mocca_c2n

Avinash's blog can be followed here: https://mocca.astonphotonics.uk/avinashs-blog/

MOCCA's Partners:

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