FNM 2016 Program Committee cordially invites people to submit abstracts for The International Workshop on Functional and Nanostructured Materials to be held in Tbilisi, Georgia 6th -10th September 2016.

Lattices of Quantized Vortices in Polariton Superfluids

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Microcavity polaritons, the half-light-half-matter particles arising from the strong coupling between excitons and photons, behave like weakly interacting composite bosons. Due to their excitonic part they exhibit non-linear interaction while their photonic part allows creating and detecting them optically. In this sense the polaritons are part of a wider family of systems where an effective photon-photon interaction can be engineered, resulting in a hydrodynamical-like behavior. Such systems are labeled as quantum fluids of light [1]. These ingredients make polariton systems a unique platform to study quantum fluid effects in a semiconductor chip and to evidence properties very difficult to access in other systems.

In this talk I will focus on the description of the recent studies conducted in our group, in the quest for the observation of lattices of quantized vortices in polariton superfluids. In particular I will show how the implementation of optical traps for polaritons allows for the realization of vortex-antivortex lattices in confined geometries and how the development of flexible all-optical methods to inject a controlled orbital angular momentum (OAM) in such systems results in the observation of patterns of same sign vortices [2, 3]. These results constitute a significant step forward in our understanding of the quantum fluids of light and open the way to the study of Abrikosov-like physics and new vortex collective phenomena in these systems.

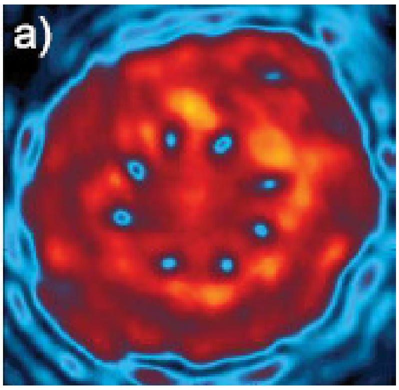

Fig.1: Chain of same sign vortices

[1] I. Carusotto and C. Ciuti, *Quantum Fluids of Light*, Rev. Mod. Phys. 85, 299 (2013).
[2] T. Boulier, H. Terças, D. D. Solnyshkov, Q. Glorieux, E. Giacobino, G. Malpuech and A. Bramati, *Vortex chain in a resonantly pumped polariton superfluid*, Scientific Reports 5, 9230 (2015).
[3] T. Boulier, E. Cancellieri, N.D. Sangouard, Q. Glorieux, A. V. Kavokin, E. Giacobino, A. Bramati, *Injection of orbital angular momentum and storage of vortices in polariton superfluids,* Phys. Rev. Lett., 116, 116402 (2016).

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