Spin switches and spin lattices with optically trapped exciton-polariton condensates

H. Ohadi[1], Y. del Valle-Inclan Redondo[1], A. Dreismann[1], Y. G. Rubo[2], F. Pinsker[3], S. I. Tsintzos[4], Z. Hatzopoulos[4], P. G. Savvidis[1,4] and J. J. Baumberg[1]

[1]Department of Physics, Cavendish Laboratory, University of Cambridge, Cambridge CB3 0HE, United Kingdom
[2]Instituto de Energías Renovables, Universidad Nacional Autónoma de México, Temixco, Morelos, 62580, Mexico
[3]Clarendon Laboratory, University of Oxford, Parks Road, Oxford OX1 3PU, United Kingdom
[4]CCQCN, Department of Physics, University of Crete, Heraklion, Greece

In the first part of my talk I will introduce the concept of spontaneous magnetization and spin bifurcation in optically trapped exciton-polariton condensates, where we observe stochastic formation of left- or right-circularly polarised condensates under linear excitation [1]. I will describe how we exploit this new phenomenon to demonstrate a sub-femtojoule field-effect polariton spin switch [2]. In the second part of my talk, I will show how we find tunable spin correlations between two neighbouring magnetized trapped condensates [3]. Building on this finding, I will give a prospect for the realization of spin lattices in the driven-dissipative Bose-Hubbard model.

[1] H. Ohadi *et al.* Phys. Rev. X 5, 031002 (2015).
[2] A. Dreismann *et al.* Nature Mat. (2016).
[3] H. Ohadi *et al.* Phys. Rev. Lett. 116, 106403 (2016).