Centre de Nanosciences & de Nanotechnologies

Seminar

Thursday June 9th - 14h00

A003

“Cavity optomechanics with exciton-polaritons condensates”

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Hybrid systems combining both cavity electrodynamics and cavity optomechanics have been theoretically proposed, with predictions of cooling at the single-polariton level. Cavity optomechanics with exciton-polariton Bose-Einstein condensates opens intriguing perspectives, particularly in view of the potential access to an optomechanical strong-coupling regime, and the possibility of using vibrations to actuate on such a macroscopic quantum fluid. These ideas are at the backbone of our main research in collaboration with the Paul Drude Institut in Berlin. Here I will discuss some of the collaboration experimental and theoretical latest results in which phonon-lasing [1], a parametric oscillator for phonons [2,3], and polariton lattices’ neighbor sites showing phonon-induced asynchronous locking [4], are demonstrated.

[1] Polariton-driven phonon laser, D. L. Chafatinos, A. S. Kuznetsov, S. Anguiano, A. E. Bruchhausen, A A. Reynoso, K. Biermann, P. V. Santos, A. Fainstein, Nat. Commun. 11, 4552 (2020).

[2] Optomechanical parametric oscillation of a quantum light-fluid lattice, A. A. Reynoso, G. Usaj, D. L. Chafatinos, F. Mangussi, A. E. Bruchhausen, A S. Kuznetsov, K. Biermann, P. V. Santos, A. Fainstein, Phys. Rev. B 105, 195310 (2022), Featured in Physics and Editors' Suggestion.

[3] A parametric Oscillator for phonons, M. Stephens, Physics 15, s20 (2022).

[4] Metamaterials of Fluids of Light and Sound, D. L. Chafatinos, A. S. Kuznetsov, P. Sesin, I. Papuccio, A. A. Reynoso, A. E. Bruchhausen, G. Usaj, K. Biermann, P V. Santos, A. Fainstein, arXiv:2112.00458 (2021)