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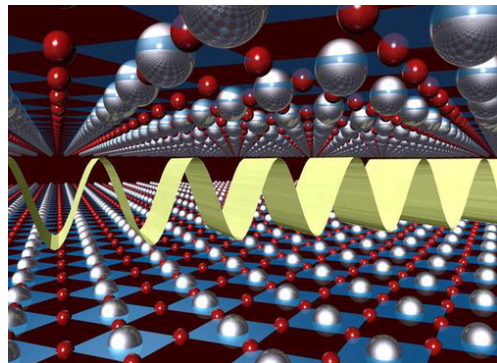
**Séminaire d'axe Matériaux et Dispositifs Quantiques (MDQ)
Lundi 29 Avril, 13h30-14h30, CONF IV**

Terahertz cavity Josephson plasmonics in high-T_c superconductors

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High-T_c superconducting cuprates are layered materials that can be viewed as a stack of superconducting planes separated by insulators. In this context, Josephson tunneling between the superconducting planes gives rise to coherent plasma excitations, namely Josephson plasma waves or “Josephson plasmons”, that propagate with low dissipation and exhibit strong nonlinearities at Terahertz (THz) frequencies [1].



In this presentation, I will discuss the coherent manipulation of Josephson plasmons with ultrashort pulses of THz light and show how these can be used to parametrically amplify and/or de-amplify the Josephson plasmons [2]. In addition, by strongly coupling the native Josephson plasma excitations to the vacuum field of THz cavities, it becomes possible to tune extensively their characteristics and to engineer relevant properties such as their frequencies and dispersion [3]. This approach may open up a path towards the realization of a wide range of tunable and nonlinear optical phenomena at THz frequencies based on the Josephson effect in cuprates.

[1] Y.Laplace and A. Cavalleri, *Advances in Physics: X* Vol. 1, Iss. 3 (2016)

[2] S. Rajasekaran, E. Casandruc, Y. Laplace, D. Nicoletti, G. D. Gu, S. R. Clark, D. Jaksch and A. Cavalleri, *Nature Physics*, 12, 1012–1016 (2016)

[3] Y. Laplace, S. Fernandez-Pena, S. Gariglio, J.-M. Triscone and A. Cavalleri, *Phys. Rev. B* 93, 075152 (2016)