



INSTITUT DE SCIENCE ET D'INGENIERIE SUPRAMOLECULAIRES

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Enhancement of nonlinear light-matter interaction in inorganic semiconductor-based photonic micro-and nano-cavities

Nonlinearities are inherent to many systems in nature, which contributes to make them among the most interesting and fascinating phenomena in physics. Light-matter interaction represents a fundamental field of research, which is nowadays deeply exploring the quantum realm, thanks also to the great advances in nanofabrication techniques happened over the last twenty years. Optical resonators provide the ideal environment to enhance nonlinear optical phenomena. In particular, semiconductor-integrated photonic micro-cavities can offer a huge enhancement of the optical field compared to bulk materials. In this talk, a few classical and quantum experiments of nonlinear emission of light from semiconductor-integrated photonic cavities, either in weak or strong coupling regime, will be presented. Furthermore, a novel type of hybrid metal/semiconductor micro-resonators without cavity will also be introduced, based on Tamm plasmon resonance. A few effects of a 3D confinement of these modes on their emission properties in lasing regime will be shown. Finally, recent experimental results about the coupling between the Tamm plasmon and the surface plasmon resonance will be discussed.

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