HL 22: Invited Talk Salvatore Savasta

Time: Tuesday 9:30–10:00 Location: ER 164

Invited Talk HL 22.1 Tue 9:30 ER 164

Ultrastrong coupling regime of excitons interacting with microcavity photons or localized surface plasmons — •Salvatore Savasta — Dipartimento di Fisica e di Scienze della Terra, Università di Messina, Italy

Exciton-polaritons are quasiparticles that arise from the strong coupling of photons and excitons in a semiconductor material [1]. One of the most intriguing extensions of such a light-matter interaction is the so called ultrastrong coupling (USC) regime [2-4]. It is achieved when the Rabi frequency reaches a considerable fraction of the emitter transition frequency. Here we discuss recent experiments in organic semiconductor microcavities where a Rabi splitting up to the 60% of the material band gap was achieved [5]. Strong light matter interaction is also achieved replacing conventional microcavities with metallic micro- or nano-structures supporting surface plasmons [6]. I also analyze the possibility to achieve the USC regime at nanoscale dimensions by exploting localized surface plasmons. I show, by accurate scattering calculations, that this regime can be reached in nanoshells constituted by a core of organic molecules surrounded by a silver or gold shell [7].

[1] Strong Light-Matter Coupling, Edited by: Auffèves et al., World Scientific, (2014). [2] G. Scalari et al., Science **335**, 1323 (2012). [3] Ridolfo et al. Phys. Rev. Lett. **109**, 193602 (2012). [4] Stassi et al. Phys. Rev. Lett. **110**, 243601 (2013). [5] Gambino et al. ACS Photonics **1**, 1042 (2014). [6] Vasa et al. Nat. Photon. **7**, 128 (2013). [7] Cacciola et al., ACS Nano **8**, 11483 (2014).