# O 41: Overview Talk Javier Aizpurua

Time: Wednesday 9:30–10:15 Location: HE 101

**Invited Talk** O 41.1 Wed 9:30 HE 101

**Extreme interaction of photons and electrons in metallic nanocavities and STM tunnelling gaps** — •Javier Aizpurua — Donostia International Physics Center, San Sebastian, Spain — Ikerbasque, Basque Country, Spain — University of the Basque Country (UPV/EHU), Spain

A meta-insulator-metal cavity is an ideal configuration to explore light-matter interaction in extreme spatiotemporal regimes. The interplay between optical and transport properties in metallic nanogaps provides new capabilities to produce photocurrents induced by ultrashort photon pulses, for instance, or to obtain light emission from single molecules driven by tunneling DC currents. We adopt a combination of theoretical approaches to address aspects of these dynamical processes. A description of the electron dynamics in nanogaps based on time-dependent density functional theory serves to unveil the origin of photoinduced currents and asses their behavior with photon intensity and carrier envelope phase. Furthermore, a quantum description of excitons in single organic molecules, interacting with a picocavity formed in a tunneling gap, provides an adequate framework to understand intramolecular resolution of molecular light emission in STM. The rich interaction between photons and electrons at the surface of metallic nanocavities brings optoelectronics to the realm of the atomic scale.