Quantum and nonlocal phenomena in plasmonic nanoparticles

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The field of plasmonics is widely explored with a classical mindset, while recent experimental efforts now reveal plasmon phenomena beyond expectations rooted in classical electrodynamics [1]. In particular, intrinsic length scales of the electron gas are anticipated to manifest in a nonlocal plasmonic response [2] and other quantum corrections to the light-matter interactions [3]. I will discuss theory and experimental efforts to understand nonlocal dynamics (size-dependent frequency shifts and damping) in metallic nanoparticles with true nanoscale dimensions [4], providing also a link between the observed spectral shifts and the fraction of electromagnetic energy attributed to quantum degrees of freedom [5].