Control of Light at the Atomic Scale

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Plasmons in atomic-scale structures exhibit intrinsic quantum phenomena related to both the finite confinement that they undergo and the small number of electrons on which they are supported. Their interaction with two-level emitters is also evidencing strong quantum effects. In this talk we will discuss several salient features of plasmons in atomic-scale materials, such as graphene and atomic layers of noble metals. In particular, we will explore their ability to mediate ultrafast heat transfer [1], the generation of high harmonics [2], their interaction with molecules and quantum emitters [3], and their extreme nonlinearity down to the single-photon level [4]. We will further analyze intriguing details in the plasmonic response of atomically-thin crystalline films of silver, the plasmons of which have been recently revealed experimentally [5].

References

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