Nov 7th, 3:00 PM - 4:00 PM

Plasmon-enhanced quadrupolar transitions with nanostructured graphene

Stephen Sanders
University of New Mexico, sanderss@unm.edu

Plasmon-enhanced quadrupolar transitions with nanostructured graphene

Keith Sanders
Alejandro Manjavacas
Department of Physics and Astronomy

Many important molecules have quadrupolar excitations which occur at much slower rates than the competing dipolar transitions and hence are termed forbidden. In this work, we propose a new approach to enhance quadrupolar transitions using graphene nanostructures. We provide a detailed investigation of the enhanced transition rate in the vicinity of graphene nanoislands and use rigorous computational methods to analyze how this quantity changes with the geometrical and material parameters of the nanoisland. To support these calculations we also provide a semi-analytic approach. Finally, we investigate the performance of arrays of graphene nanoribbons, which constitutes a suitable platform for the experimental verification of our predictions. This work opens new possibilities for the enhancement and control of quadrupolar transitions of molecules and can find application in the detection of relevant chemical species.