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Optical spectra with spin-orbit effects on gold nanostructures[1]
ALDO ROMERO, CINVESTAV, México, ALBERTO CASTRO, Institut fur Theoretisch Physik, Freie Universitat Berlin, MIGUEL MARQUES, Universitè Lyon, France, MICAEL OLIVEIRA, University of Coimbra, Portugal, ANGEL RUBIO, ETSF, Universidad del País Vasco, Spain — The quest for more efficient optoelectronic devices requires a thorough understanding of the intrinsic properties of the metallic nanostructures such as the optical spectra. Many optoelectronic devices are based upon gold nanostructures but even though, there is a large set of experimental studies, little is known theoretically. Between the concerns, it is important to identify where the spin-orbit effect has influences on the optical spectra on those nanostructural materials. We report here the analysis of the effect of the spin-orbit interaction on the shape of the photoabsorption cross section of small gold clusters (Au_n $n \leq 8$ and $n = 20$) and small nanowires ($n \leq 7$). As it is shown, the spin-orbit coupling has a strong effect on the absortion spectra mainly for nanowires and much less effect on static properties such as the dipole static polarizability. This has strong implications on transport calculations where no spin-orbit effects are considered.

[1]CONACYT, México (J-59853-F), Deuts. Fors. (SFB 658), MEC (FIS2007-657-C02-01), Eur. Com. ETSF, FCT (SFRH/BD/12712/2003).

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