Nanorings driven by a laser field

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We present the dynamics of an electron constrained over an 1D ring with radius of 0.142 nm driven by a laser field. The temporal evolution of the system is evaluated by a semi-analytical solution of the full quantum time dependent Schrödinger equation. In our calculation the gap energy between the ground and the first excited state of the nanoring is three times the photon energy laser (0.63 eV) and the laser intensity is $4 \cdot 10^{14}$ W/cm^2. Our analysis is performed by considering different polarization states of the incident laser. Our attention is mainly focused on the study of the High Harmonic Generation (HHG), the energy and the angular momentum absorbed by the driven system. We observe 1) that the harmonic yield is strongly dependent upon the pump polarization field and almost vanishes for circular polarization and 2) that the ring can be left in a state with average angular momentum different than zero. In figure we show the time average of the absorbed angular momentum (in atomic units) versus polarization angle ($\theta = 0°$ and $\theta = 90°$ correspond to linear polarization along x and y axes respectively; $\theta = 45°$ corresponds to circular polarization).