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Quantum transport through a carbon nanotube under a time-dependent electric field. MONICA PACHECO, Universidad Santa Maria, Valparaiso, Chile, PEDRO ORELLANA, Universidad Catolica del Norte, Antofagasta, Chile — We investigate quantum transport through single-wall carbon nanotubes (CNT) connected to leads in the presence of an externally imposed time-dependent transverse electric field. A time-oscillating potential uniform in space induces the apparition of side-bands in the spectrum and therefore the tunneling current is drastically modified. To obtain the conductance and the density of states of the CNT, we adopt the equation of motion approach and we calculate the retarded and advanced Green's function defined in terms of the creation and annihilation operator of the electron in the CNT. We analyze the conductance spectra as a function of the frequency and amplitude of the external time-varying potential. We found that above a critical value of the electric field intensity, an enhancement of the conductance, or suppressed resistance, as a function of the electric field strength occurs. This effect can be explained in terms of photon-assisted transport. The conductance increases displaying oscillations which amplitude shows a strong dependence on the frequency of the electric field. For low frequencies, in the microwave range, the oscillations evolve to a structure of well defined steps. The steps in the normalized resistance as a function of the field strength appear for energies corresponding to the Van Hove singularities of the LDOS of the CNT.

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