QUANTUM REVIVALS AND ZITTERBEWEGUNG IN GRAPHENE

ELVIRA ROMERA

Instituto Carlos I de Física Teórica y Computacional,
Universidad de Granada, Fuentenueva s/n, 18071 Granada, Spain.
eromera@ugr.esl

Revivals of electric current in graphene in the presence of an external magnetic field are described. It is shown that when the electrons are prepared in the form of wave packets assuming a Gaussian population of only positive (or negative) energy Landau levels, the presence of the magnetic field induce revivals of the electron currents, besides the classical cyclotron motion. When the population comprises both positive and negative energy Landau levels, revivals of the electric current manifest simultaneously with zitterbewegung and the classical cyclotron motion. We relate the temporal scales of these three effects and discuss to what extent these results hold for real graphene samples.

Moreover, we study the time-evolution of localized wavepackets in graphene quantum dots under a perpendicular magnetic field, focusing on the quasiclassical and revival periodicities, for different values of the magnetic field intensities in a theoretical framework. We have considered contributions of the two inequivalent points in the Brillouin zone. The revival time has been found as an observable that shown the break valley degeneracy.

References

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