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Quantum electron dynamics with spin orbit interaction in one dimensional periodic sequences RAMON CARRILLO, Universidad Automoma de Baja Californina(UABC), FERNANDO ROJAS, Centro de Ciencias de la Materia Condensada(UNAM) — The electron dynamics in one-dimensional periodic crystals presents important effects such as ballistic motion, Bloch oscillations and dynamic localization. We are interested in evaluate how these effects are modified if ones includes the spin degree of freedom. In this work, we study the electron dynamics with spin orbit interaction (SOI) in one-dimensional periodic crystals, using the single-band tight-binding model. The model includes besides the nearest neighbors tunneling, the spin-orbit interaction through a spin rotation when hopping the electron. We determine the time dependence of the probability per site, the mean–square displacement, the magnetization per site and the Shannon entropy for each spin (up and down). The mean-square displacement per spin shows coherent oscillations between up and down band superposed to the ballistic behavior characteristic of the case without SOI. The total mean square displacement is proportional to the square of the SOI plus tunneling amplitudes. We also found that the coherent oscillation between spin bands is also present in the other properties. We also study the effect of SOI on Bloch oscillations due the presence of an dc- electric field and calculate the same properties. The work is supported by DGAPA project IN114403 and CONACyT project 43673-F

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