

Floquet phases via spin-orbit interactions and periodic lattice deformations

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We study the interplay between spin-orbit interactions and harmonically driven lattice deformations in a zigzag graphene-like nanoribbon. We find the remarkable result that for vanishing spin-orbit interaction, the emergence of coexisting insulating and conducting spin phases can be realized whereas in presence of finite spin-orbit of the Kane and Mele type, a phonon-assisted edge channel ensues at the boundaries of the sample. Using a low energy Hamiltonian we explicitly show, via the corresponding Chern number, that properly tuning the amplitude/frequency of the harmonic deformations, there is an enhancement of the number of conducting boundary spin channels within the driven scenario which might pave the road to manipulation of the electronic properties of graphene-like systems via lattice deformations.