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Spin-splitting induced by spin-orbit interaction in chiral nanotubes M.P. LÓPEZ-SANCHO, Instituto de Ciencia de Materiales de Madrid, CSIC, L. CHICO, Ciencias de Medio Ambiente, Universidad de Castilla-La Mancha , M.C. MUÑOZ, Instituto de Ciencia de Materiales de Madrid, CSIC — We show that chiral tubes present spin splitting at the Fermi level in the absence of magnetic field, whereas achiral tubes preserve spin degeneracy, as evidenced by electronic structure calculations with the inclusion of spin-orbit interaction. The nanotubes are modeled by the Slater-Koster empirical tight-binding Hamiltonian including sp^3 orbitals. These remarkably different behaviors of chiral and non-chiral nanotubes have a symmetry origin. Even though the spin-orbit interaction partially lifts degeneracy in achiral nanotubes, it does not affect the spin degenerate states, while in chiral tubes the lack of inversion symmmtry does not allow spin degeneracy. This result may provide a global explanation to recently reported spin-dependent transport experiments which were in apparent contradiction.

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