

Abstract Submitted
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Spin-Orbit Interaction for Cylindrical Nanotubes GODFREY

GUMBS, Hunter College of CUNY, YONATAN ABRANYOS, Hunter College of CUNY — When a gate voltage is applied perpendicular to the axis of nanotubes, this can lead to spin-orbit interaction (SOI) effects. This is of the same nature as the Rashba-Bychkov SOI at the interface of an asymmetric semiconductor heterojunction. We use a continuum model to obtain analytical expressions for the spin-split energy eigenstates for electrons on the surface of nanotubes in the presence of SOI. Each energy level could then be used to accommodate the two types of spin. For qubit functionality, one can use either one nanotube or a pair of coupled nanotubes. We investigate this scheme by calculating the exchange interaction energy and subsequently the entanglement of electron spins as they occupy allowed subbands. We also calculate the effect which SOI has on the plasma excitations since the exchange interaction can be mediated by long-range collective excitations.

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