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**Atomistic spin-orbit effects on the electronic structure of T-shaped quantum wires** JAVIER AIZPURUA, Donostia Intl Physics Center, Donostia, Spain, GARNETT W. BRYANT, NIST, Gaithersburg, MD — The electronic structure and optical properties of GaAs/AlGaAs T-shaped quantum wires are studied by use of an empirical tight-binding method (ETB). This model allows us to study atomistic effects on the electronic structure of wires that have a complicated geometrical cross section. We find that the electronic structure for electrons is similar to that described by effective mass models whereas the electronic structure for holes shows important modifications when spin-orbit coupling is included in the atomistic model. The binding energies of the holes in a T-wire agree with previous effective mass model calculations. However, we find that asymmetries in the spatial distribution of these hole states are induced by atomistic spin-orbit effects. Moreover, the atomistic tight-binding model predicts complex band crossings for hole states that are not predicted by simpler effective mass theories. Consequences for the optical response of T-wires and for excitonic and electron-hole plasma phases in T-wires are discussed.

Javier Aizpurua  
Donostia Intl Physics Center, Donostia, Spain

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