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Electron Orbital Filtering in Multiply Connected Carbon Nanotubes GUNN KIM, SANG BONG LEE, TAE-SUK KIM, JISOON IHM, School of Physics, Seoul National University, Seoul 151-747, Korea — An electronic state in atoms, molecules, or solids has a particular spatial character usually represented by an orbital or a linear combination of such orbitals well- established in quantum chemistry. Since an enormous number of different kinds of orbitals coexist and overlap in a real material, it is difficult to select or probe a particular orbital in real solids. Recently, as fabrication techniques of nanometer-sized material units such as carbon nanotubes are developed, control over individual electronic states in a material is improving quite remarkably. Here we report that, in a multiply connected carbon nanotube system with a mirror-reflection symmetry, we can produce an electron current of one particular orbital character (π orbital) and suppress the current flow of other electrons (π^* orbital) over a significantly wide range of energy.

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