Electronic Structure and Paramagnetic Response of Carbon Nanotori

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We have carried out the first-principle calculations for the carbon nanotori systems with various radii and helicity to study the strain effects in the electronic structure of carbon nanotori. A recent theoretical study of carbon nanotori, a carbon nanotube bent into a toroid, reported a possible paramagnetic response based on the results of simple tight binding model calculation. The existence of such large paramagnetic moment is claimed to be a consequence of the interplay between the toroidal geometry and the ballistic motion of the p electrons in the metallic nanotubes, which is related to the "selection rule" of the toroidal radii. Since, however, the nature of the metallicity or the presence of a gap is crucial for the determination of the magnetic response of the system, it is necessary to verify the electronic structure of carbon nanotori by fully taking account of the strain effect induced by the curvature of toroidal structure.