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Theory of quadruple plasmon in doped carbon nanotubes KENICHI SASAKI, NTT Basic Research Laboratories, SHUICHI MURAKAMI, Tokyo Institute of Technology — A single-wall carbon nanotube possesses two different types of plasmons specified by wavenumbers in the azimuthal and axial directions. In this presentation we show that the azimuthal plasmons consist of underdamped oscillations forming electric dipoles inside a nanotube and overdamped oscillations forming magnetic dipoles. These, originating from the surface plasmons of graphene, are of prime importance in the optical properties of doped "metallic" tubes, such as depolarization effect and relaxation of photo-excited carriers. The axial plasmons also consist of underdamped and overdamped oscillations which are inherent in the cylindrical waveguide-structures of nanotubes and relevant to optics and transport. We discuss the exact configurations of the electromagnetic fields in connection with Aharonov-Bohm effect and point out a possibility of the generation of transient energy band gaps in metallic nanotubes.

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