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Inversion of light polarization for absorption in doped carbon nanotubes KEN-ICHI SASAKI, NTT Basic Research Laboratories — A carbon nanotube (CNT) exhibits absorption peaks of light with linear polarization parallel to the tube's axis, but not for the polarization perpendicular to it. We proposed that in a previous paper[1] the polarization dependence changes with charge doping; when a CNT is heavily doped, many of the absorption peaks of parallel polarized light disappear due to the Pauli exclusion principle, and this causes an absorption peak of a perpendicularly polarized light to appear in the near-infrared region, which accounts for experimental results. However, because this theoretical conclusion was derived using the Drude model for the dynamical conductivity which takes into account intraband electron-hole pairs only, we could not get quantitative estimation regarding doping and chirality dependencies of the absorption spectrum. In this presentation we elucidate these dependencies using Kubo formula that includes both intra and interband electron-hole pairs. Some interesting interplay between them is found and sizable chirality dependence is observed. [1] K. Sasaki et al., Applied Physics Letters 108, 163109 (2016).

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