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Absorption Coefficient for Cylindrical Nanotubes GODFREY GUMBS, ANTONIOS BALASSIS, Hunter College/CUNY — A self-consistent field theory is presented for calculating the absorption coefficient for a pair of coaxial tubules. The spatially nonlocal dynamic formalism is obtained in terms of the electrostatic potential produced by the charge density fluctuations and the external electric field. There are peaks in the absorption spectrum arising from plasma excitations corresponding either to plasmon or particle-hole modes. We calculate numerically the plasmon contribution to the absorption. The number of peaks depends on the radius of the inner as well as outer tubule. The height of each peak depends on the plasmon wavelength and energy. For a chosen wavenumber, the most energetic plasmon has the highest peak corresponding to the largest oscillator strength. Some of the less energetic plasmon modes have such weak coupling to an external electric field that they are not seen on the same scale. We plot the peak positions of the plasmon excitations on a pair of coaxial tubules. The coupled modes on the two tubules are split by the Coulomb interaction. The energies of the two highest plasmon branches increase with the radius of the outer tubule. On the contrary, the lowest modes decrease in energy as this radius is increased.

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