Abstract Submitted
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Carbon Nanotubes in Helically Modulated Potentials PAUL MICHALSKI, EUGENE MELE, University of Pennsylvania — We study the low energy electronic spectrum of metallic and semi-conducting carbon nanotubes (CNTs) under an applied, helically symmetric potential using the long-wavelength, continuum approximation. We find that the effects of the external potential depend on the strength of the potential and on the dimensionless ratio of the nanotube circumference to the pitch of the helical potential, and we explore the system's response as these two parameters are varied. We find that for semi-conducting CNTs the band gap is always reduced. For metallic CNTs the Fermi velocity is reduced, and in very strong fields two small gaps appear at the Fermi surface in addition to the gapless Dirac point. We develop a simple model to estimate the magnitude of the potential strength and its effect on the spectrum of a DNA-CNT complex in aqueous solution.

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