

Abstract Submitted
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The Study of Electron-Electron Interactions in Semi-Conducting Carbon Nanotubes Using a Numerical Renormalization Group ROBERT KONIK, Brookhaven National Laboratory — We present a non-perturbative, numerical renormalization group (NRG) based technique for the study of the spectrum of semi-conducting single-walled carbon nanotubes in the presence of electron-electron interactions. This technique permits a full many-body treatment of the system. As our starting point, we model a single walled semi-conducting carbon nanotube as four gapped Dirac fermions in the presence of interactions. Focusing on a poorly screened carbon nanotube where the interactions are strongest in the forward scattering direction, the nanotube can be equivalently modeled as four Luttinger liquids coupled together with a quadratic gap term. The NRG based technique then is readily able to determine non-perturbatively the effects of the gap term upon the four Luttinger liquids. Using this approach we are able to obtain results for both the excitonic and single particle spectra of the nanotube.

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