

Electron spectrum of a double-wall carbon nanotube within the frame of the nonlinear Schrödinger equation

H.A. Ishkhanyan

Moscow Institute of Physics and Technology, 141700, Dolgoprudny, Russia

Institute for Physical Research, 0203, Ashtarak-2, Armenia

E-mail: hishkhanyan@gmail.com

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Abstract text The electron spectra of single and double wall carbon metallic nanotubes are analyzed. The interaction of a free electron with atomic ions and bound electrons is approximated by an attractive delta-function potential in the single-particle Schrödinger equation written in the cylindrical coordinates. The interaction of an electron with other free electrons is presented by the Gross-Pitaevskii nonlinear repulsive potential.

References

- [1] P.J.F. Harris, *Carbon nanotubes and related structures: new materials for the twenty-first century* (Cambridge University Press, Cambridge, 2004).
- [2] Paul L. McEuen et al., *IEEE Transactions on Nanotechnology*, Vol. **1**, Issue 1, 78 (2002).
- [3] Erik T. Thostenson et al., *Composites Science and Technology* **61**, 1899 (2001).
- [4] Mintmire, J.W. et al., *Phys. Rev. Lett.* **68**, 631 (1992); Saito, R., et al., *Phys. Rev. B* **46**, 1804 (1992); Hamada, N., et al., *Phys. Rev. Lett.* **68**, 1579 (1992).
- [5] Wildoer J.W.G. et al., *Nature* **391**, 59 (1998); Ph. Collins et al., *Science* **292**, 706 (2007).
- [6] M.J. O'Connell et al., *Science* **297**, 593 (2002); J. Lefebvre, Y. Homma, and P. Finnie, *Phys. Rev. Lett.* **90**, 217401 (2003).
- [7] A.A. Abrikosov, Jr., D.V. Livanov and A.A. Varlamov, *Phys. Rev. B* **71**, 165423 (2005).
- [8] L. Pitaevskii and S. Stringari, *Bose-Einstein Condensation* (Oxford University Press, Oxford, 2003).