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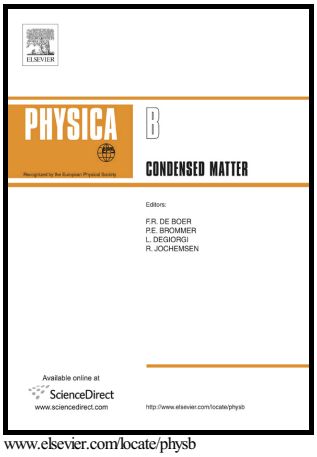

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Disorder-Driven Insulator to Semi-Metallic Transition in a Graphene Nanoribbon

J. Ziaei[a,*], S. Behnia, H. Molaei Nasab, F. Rahimi

Department of Physics, Urmia University of Technology, Urmia, Iran

[a]*javid.ziaei@gmail.com*

Abstract

We investigate the effects of disorder on the electron transport properties of graphene nanoribbons (GNs) with armchair edges described in tight-binding (TB) model. We try to compare the electronic properties of armchair graphene nanoribbons (AGNs) subjected to two types of disorder with different distributions. In this regard, the tight-binding model of electron transport in the presence of hopping to nearest and next-nearest neighbors is investigated. With the aid of the spectral and multifractal analyses, we find that for the case of ordered distribution of disorder the AGNs acts as an insulator and for disordered distribution AGN behaves as a semi-metal. Our results can report different regimes of conductivity and addresses the transition between semi-metallic and insulator phases.

Keywords: Nanodevice; Graphene Nanoribbons; Electronic Transport; Tight-binding Model; Spectral Statistics; Multifractality

*Corresponding author