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Current polarization in B-doped graphene nanoribbons: ab initio simulations ALEXANDRE ROCHA, Centro de Ciências Naturais e Humanas, UFABC, Santo André, Brazil, THIAGO MARTINS, ADALBERTO FAZZIO, ANTÔNIO J. R. DA SILVA, Physics Institute, University of São Paulo, São Paulo, Brazil — Single layer graphene has been recently isolated and can pave the way to a number of nanoscale technologies. One interesting possibility is to use the spin of the electron - instead of its charge - as information carrier in carbon-based systems where the spin coherence length can reach hundreds of nanometers. Up until now, spintronics devices have been assembled using magnetic electrodes as a source of spin polarized electrons. In this work we use a combination of density functional theory and non-equilibrium Green's functions techniques to study the electronic transport properties of graphene nanoribbons (GNRB) up to 500 nm long containing substitutional Boron atoms. We demonstrate that in realistic systems where the B atoms are randomly distributed along the GNRB, the polarization of the current can reach up to 100% and is independent of impurity concentration. These effects can be explained in terms of different scattering probabilities for majority and minority spins from a single B atom. This consequently leads to different Anderson localization lengths for each spin population.

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