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MagnetoResistance of Graphene-based spin valves. LUIS BREY, ICMM-CSIC (Spain), HERBERT FERTIG, Indiana University — In this work we present a detailed study of the conduction properties of wide graphene strips, with two different models for the source and drain leads. We reconfirmed that for undoped graphene, the system can be described by a *conductivity* in the $L \to \infty$ limit even when defects are absent from the system, and examined this behavior with respect to a broad range of lead parameters. Our results indicate that the conductance is relatively insensitive to the electronic structure of the leads. We then compute the conductivity of a simple three stripe spin-valve device with graphene acting as the non-magnetic material between the ferromagnetic leads. Two types of ferromagnetic lead systems were considered: one with a single (s) orbital for each spin state, with band centers separated in energy to induce spin polarization, and another with a narrow d band which was taken to be spin-polarized. We find that the conductivity depends only weakly on the relative spin orientations of the leads, and therefore the magnetoresistance is rather small for most circumstances, largely due to the insensitivity of the conductivity with respect to conditions in the leads. Our results indicate that, although graphene has properties that make it attractive for spintronic devices, the performance of a graphene-based spin-valve is likely to be poor.

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