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Graphene-metal contact: a momentum and spin filter[1] JESSE MAASSEN, WEI JI, HONG GUO, McGill University — We perform a first principles study of a graphene-metal contact using Cu, Ni, Co as the metallic leads. These metals have in-plane lattice constants that almost perfectly match that of graphene allowing the possibility of an atomically clean interface. Structural optimizations are carried out before calculating the nonequilibrium transport properties using a combination of density functional theory (DFT) and nonequilibrium Green's functions (NEGF). In the case of Cu, two Dirac-points are observed in the transmission resulting from electron doping of graphene from the Cu electrode. For the magnetic Ni and Co, significant spin filtering is predicted with efficiencies reaching 60% and 80% respectively. In all cases, near the Fermi level, electrons can travel only along specific directions depending on the orientation of the graphene.

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