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Inverse spin-galvanic effect in topological-insulator graphene heterostructures.[1] MARTIN RODRIGUEZ-VEGA, The College of William and Mary , GEORG SCHWIETE, JAIRO SINOVA, Institut fur Physik, Johannes Gutenberg Universitat Mainz, ENRICO ROSSI, The College of William and Mary
— We study theoretically the inverse spin-galvanic effect in heterostructures formed by a layer of a three dimensional strong topological insulator (TI) and a graphenic layer (single layer graphene, and bilayer graphene). We also consider trilayer structures in which a ferromagnetic thin film is added on top of the graphenic layer. We consider the cases of coherent, and random tunneling between states in the TI and the graphenic layer. We obtain the strength of the inverse spin-galvanic effect, taking into account both intraband and interband contributions, as a function of the system's parameters both for the case in which the disorder is short-range and for the case in which the disorder is long-range as when charge impurities are the dominant source of disorder. We find that for a large range of system's parameters the presence of the graphenic layer enhances the strength of the inverse spin-galvanic effect. Finally, we discuss the relevance of our results for recent experiments.

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