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Electron Transport in Gated Nanodevices

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Abstract

Atomically-thin materials and systems have provided theorists with new perspectives to exploit the electronic structure under direct and indirect interactions. For example, the electron response to static electric field, bias voltage, or even by including the spin-orbit coupling may lead to the discovery of new phenomena, as well as interesting electronic properties at low dimensions [1,2]. As is well known in condensed matter, conduction properties are sensitive to the material extension and can be controlled by an external electric or magnetic field. Furthermore, electron and spin transport properties can be tuned as a function of the size for a characteristic dimension of the material. In this direction, we have investigated how these interactions exhibit close relationships with several electronic properties in different systems and devices. In this communication, we explore the electronic properties of gated quasi-one-dimensional devices and two-dimensional materials. Our computational methodology is based on density functional theory combined with the finite-field approach and the Keldysh nonequilibrium Green's function technique.

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References

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