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## Spin and charge transport in graphene devices in the classical and quantum regimes

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*Document Version*

Publisher's PDF, also known as Version of record

*Publication date:*

2015

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Diniz Guimaraes, M. H. (2015). *Spin and charge transport in graphene devices in the classical and quantum regimes*. [Thesis fully internal (DIV), University of Groningen]. [S.n.].

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# Propositions

accompanying the dissertation

## Spin and Charge Transport in Graphene Devices in the Classical and Quantum Regimes

1. When studying the spin transport in a diffusive system it is important to take into account all of its components. While local charge transport probes only a certain region of a device, diffusive spin transport allows the electronic spin to gather information from the different regions of the device.
2. Unexpectedly, electric field modulation of the spin information in graphene is possible. This fact combined to the excellent spin transport properties of graphene give good prospects for graphene spintronics.
3. Reduced dimensionality and quantum effects should be further explored in the view of graphene spintronics. It not only allows the understanding of the effect of miniaturization on the spin transport but can also lead to novel device architectures that, for example, use quantum effects to increase the spin signal in the device.
4. Although the fabrication of graphene spintronic devices with specific high quality transport regions is possible, it is difficult to rule out the contribution of the lower quality regions on the spin transport.
5. The current lack of relation between the momentum and the spin relaxation time in graphene is one of the biggest puzzles in the field.
6. It is important for an experimentalist to understand his/her experimental setup to the point where he/she can take the set up apart and put it back together if needed to. The knowledge of what a piece of equipment can/cannot do also helps the experimentalist to design new types of samples or experiments.
7. Science should be performed and studied in a global perspective, and reported in a way that others can reproduce the results. Sadly, this is often not true due to the "publish or perish" practices and other academic pressures.
8. Due to the prompt availability of information, new researchers tend to ask others or search for the solution for problems, even if they could answer the problems themselves faster by thinking about it.
9. Even though science is crucial for our society, most people do not practice scientific thinking. A lot of problems can be avoided if careful questioning of the information we receive is constantly exercised.

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