# Spin Transport and Proximity-Induced Magnetism in Graphene-Based van der Waals Structures

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# Propositions

accompanying the dissertation

## Spin Transport and Proximity-Induced Magnetism in Graphene-Based van der Waals Structures

1. The combination of different two-dimensional materials allows the creation of heterostructures with novel properties. The key challenge to bring this platform towards application is to realize devices reliably on a wafer-scale. (This thesis)

2. Spin transport is the most accurate technique to characterize small energy scales in the band structure of graphene. (Chapters 4, 5 and 7)

3. A discrepancy of three orders of magnitude between theory and experiment emphasizes the relevance of modeling the actual device structure in *ab initio* calculations. (Chapters 4, 5 and 7)

4. Reliable tunnel barriers are vital for all kinds of spin transport experiments in graphene. They can be realized by using two or three monolayers of the two-dimensional insulator hexagonal boron nitride. (Chapters 5 – 7)

5. The coupling between the spin and valley degree of freedom in pristine bilayer graphene results in spin-lifetime anisotropies comparable to TMD/graphene heterostructures. However, bilayer graphene has two orders of magnitude larger spin-lifetimes. This unique combination makes bilayer graphene an appealing platform for spintronic applications. (Chapter 7)

6. In hindsight, you can find countless reasons why your well-designed experiment did not work. However, it is more efficient to foresee why it actually could work. (Chapter 6)

7. Lab discipline is vital since the sloppiest person determines the reliability of all processes with shared equipment.

8. Speaking the same language is a necessary but not sufficient condition for efficient communication.

9. Success in (PhD student)life is not just a matter of luck but also of seizing opportunities.

10. No individual is perfect, but a team can be.

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