

Project overview: Phonon mechanics in graphene membranes

Frederik Grunnet Kristensen (s164003),^{*} Christoffer Vendelbo Sørensen
(s163965),[†] and Rasmus Kronborg Finnemann Wiuff (s163977)[‡]

Technical University of Denmark[§]

(Dated: 28/9-2017)

Background Since the isolation and characterisation of Graphene in 2004 by Andre Geim and Konstantin Novoselov, scientists have marvelled over the physical properties and potential application of Graphene. Being a relatively new material, many aspects and ideas are being investigated and researched at all times. Graphene yield extreme tensile strength as well as extreme electric conductivity, yet its structure is fairly simple. Graphene consists solely of carbon atoms thus making it, as carbon atoms are greatly understood in terms of chemical bonding, easy to simulate using specialised software. As graphene is a very versatile material the possibilities for research in simulation environments are virtually limitless. Therefore it is basically possible to make experiments limited only by imagination, in order to discover new properties and possible applications of graphene. This saves resources before entering the lab, where where the simulated reality is tested.

Purpose By constraining a graphene layer on top of a substrate with different sized and shaped holes, it is possible to simulate phonons in the graphene atop of these holes. The purpose of this project is to simulate phonons in graphene membranes and find the optimal conditions for producing phonons in the terahertz spectrum.

Method The method for building the foundation will be through theoretic work, mostly simulation. Different set-ups will be tested in a simulation environment in order to find the optimal conditions for practical implementation, while satisfying the constraints and goals of the set-up.

^{*} E-mail at s164003@student.dtu.dk

[†] E-mail at s163965@student.dtu.dk

[‡] E-mail at s163977@student.dtu.dk

[§] Homepage of the Technical University of Denmark <http://www.dtu.dk/english>