# Strain engineering of two-dimensional materials: the case of graphene

Lucian Covaci
University of Antwerp,
Antwerp, Belgium

Lucian Covaci is a candidate for a faculty position in the department.

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**ABSTRACT**: The advent of two-dimensional crystals during the last decade has provided a rich playground at the border between soft and hard condensed matter. Although strain engineering has been extensively used to modify the electronic properties of semiconductors, the possibility to reversibly manipulate atom thick elastic membranes is tantalizing.

In this talk I will describe how the strain engineering of monolayer graphene can induce exotic electronic properties. This comes about because of the peculiar band structure of graphene, i.e. the linear Dirac dispersion and the existence of two inequivalent Fermi surfaces around two Dirac points. For this purpose I will first show how strain in graphene manifests itself as a gauge field, with opposite sign in the two Dirac cones. Even more fascinating, by carefully manipulating the strain into specific inhomogeneous configurations, a fictitious pseudo-magnetic field is generated and strongly affects the electronic properties. In the second part of my talk I will show examples of how the pseudo-magnetic field can affect electronic correlations and even promote broken symmetry states. I will also briefly describe the numerical methodology needed to efficiently describe such structures with large unit cells. Finally, I will conclude by showing the research prospects in strain engineering of other 2D materials, i.e. hybrid structures, multilayer graphene, silicene or MoS2.

ALL ARE WELCOME!!!