



Universidade Federal da Paraíba  
Centro de Ciências Exatas e da Natureza  
Programa de Pós-Graduação *Stricto Sensu* em Física

# Colóquio

## “Casimir interactions with graphene”

**RESUMO:** Graphene is a two-dimensional sheet of carbon atoms which finds diverse applications in nanotechnology and other fields due to its unusual electrical, mechanical and optical properties. At low energies, quasiparticles in graphene are described by the massless Dirac equation, but move with a Fermi velocity, rather than with the velocity of light. As a potential element of nano- and micro-electromechanical devices, graphene can be separated by distances of the order of tens or hundreds nanometers from the other elements. These are the distances at which the van der Waals and Casimir forces caused by the zero-point and thermal fluctuations of the electromagnetic field become dominant. We present recently obtained results on how to describe the van der Waals and Casimir interaction between two graphene sheets, between a graphene sheet and a plate made of ordinary material and between graphene-coated material substrates. This requires the development of new methods allowing to construct the reflection coefficients expressed via the dielectric permittivity describing usual materials, on the one hand, and the polarization tensor, describing graphene, on the other hand. The comparison between theory and the first experiment on measuring the Casimir force from graphene coated substrates is demonstrated.

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