Theory for graphene plasmonics

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Project type: Bachelor or Master

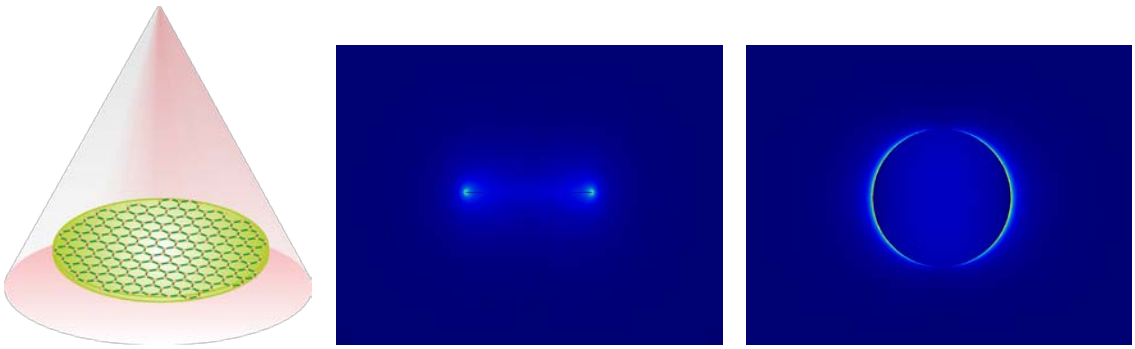
Project area: DTU Fotonik, Nanophotonics Cluster, SEM

Project description:
The plasmonics excitations in two-dimensional (2D) graphene nanostructures have attracted lots of attention recently. There are unique features comparing with plasmons in usual metallic systems. For example, the local field enhancement and propagation length has been demonstrated to be better than in metallic systems. Furthermore, the plasmonics resonance frequencies can be actively tuned by either chemical doping or electrostatic gating. All these indicate that graphene could be a good platform for plasmonics applications. In order to pave the way for plasmonics applications, it is in high demand to get a clearly physical understanding of plasmonics properties in graphene nanostructures. However, in the theoretical aspect, there are still some issues that are not well understood and need to be further studied.

The objective of this project is to study graphene plasmonics in different nanostructures and achieve different functionalities, for example light focusing and absorption. Both theoretical analysis and numerical modeling will be performed to demonstrate the proof of the concept.

In this project, your tasks could be focused on the following topics:

- Briefly review the recent progress of graphene plasmonics
- Design new plasmonics nanostructures for light focusing and absorption.
- Prove the idea by analytical approach and numerical modeling, for example COMSOL.
- Predict the potential application for the new device.



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