



**LCP-A2MC**

*Institut de Chimie Physique et Matériaux*

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## **Plasmonics in the THz Range Using Graphene: Physics and Applications**

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In the first part of my talk I will overview the most interesting properties of graphene, focusing on those relevant to its applications in plasmonics in the terahertz (THz) spectral range.

In the second part, surface plasmon-polaritons (SPPs) in graphene will be discussed along with several possible ways of their coupling to propagating electromagnetic waves in the THz range, such as: (i) the attenuated total reflection (ATR) method employing a prism, (ii) graphene-based gratings or graphene monolayers with periodically modulated conductivity or graphene nano-ribbons, (iii) a metallic stripe or a needle tip on top of the graphene layer. Potentially interesting for applications SPP effects, such as optical switching, electrically driven modulation and polarization of THz radiation and also the optical bistability of a graphene layer will be discussed.

The last part will be devoted to the use of graphene plasmons for sensing small amounts of molecules. Many molecules have a clear and specific spectroscopic signature in the THz and mid-IR, which can be identified by shining electromagnetic radiation on them. Due to the intense electromagnetic fields created by the SPPs, these specific spectroscopic resonances are boosted to become clearly visible in the excitation spectrum of the array of graphene nano-ribbons with appropriately chosen spatial period.

**Mercredi 11 juillet à 11h00**  
**Salle Réunion Chimie – I.C.P.M. - TECHNOPOLE**