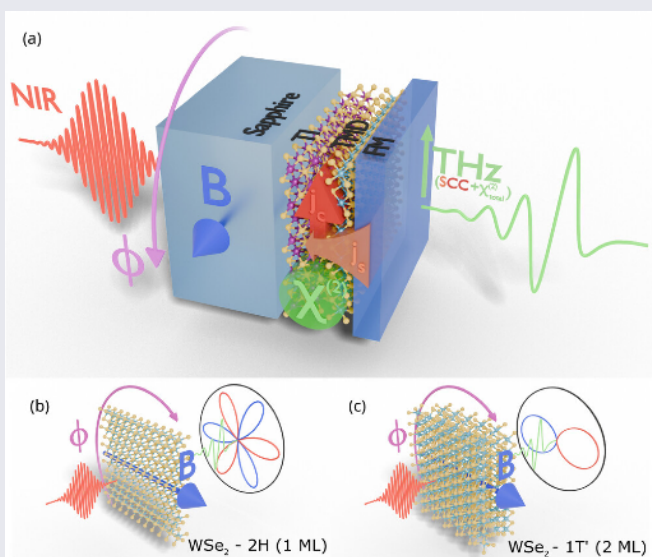




🕒 1:30pm - 2:30pm 📍 Amphi E030 - Bâtiment E1 (EMA site)

On-chip two-level systems in graphene double quantum dots and resonators for THz quantum technologies



Quantum technologies have progressed rapidly at microwave and optical frequencies, yet their development in the terahertz (THz) spectral range remains limited, referred to as the *THz quantum gap*. This regime nevertheless holds considerable promise such as high temperature quantum computing and long-range quantum communication. In this context, developing a novel technology to realize condensed-matter two-level quantum systems at THz frequencies compatible with direct on-chip integration would represent a major breakthrough.

In this talk, I will present a two-level system based on graphene double quantum dots with a tunable transition at THz frequencies. I will discuss the extremely large interaction strength between graphene quantum dots and THz photons, which gives rise to strong THz electric dipole moments. Together, these properties establish graphene double quantum dots as a promising building block for THz quantum devices. I will then present recent developments on THz resonators specifically designed for coupling with discrete quantum systems, featuring high quality factors and strong confinement of THz modes in all three spatial dimensions. Coupling graphene double quantum dots to these resonators opens a route towards the generation and detection of non-classical THz light states, a key milestone for future THz quantum technologies.

Upcoming GREMAN seminars:

Thursday
4
June

1:30pm - Maxime HARNOIS
Seminar (EMA site)

Tuesday
16
June

11am - Blois Internship
presentation (A&P site)