SEMINAR: Design and fabrication of nanophotonic devices for spectrally-selective and polarization-dependent mid-infrared detection

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12:00 to 13:30
Seminar Room

There is growing interest in mid-wave infrared (MWIR) sensing and imaging technologies with improved sensitivity, reduced size, and lower weight. These advances are important for bolometry, thermal imaging, and hyperspectral remote sensing. The ability to manipulate the spectral response of a MWIR detector is essential for selectively detecting wavelengths associated with specific materials, temperature signatures, or chemical species. Controlling the polarization response of the detector can yield additional capabilities for applications. At the same time, reducing the volume and thermal mass of the absorbing material remains critical, encouraging the use of thin-film photonic platforms. In this context, metal films and two-dimensional materials such as graphene have shown strong potential for infrared detection.

This talk explores two novel approaches to MWIR detection. The first approach introduces ultra-thin, sub-wavelength perforated metal-film absorbers for bolometric sensing, demonstrating low-thermal-mass devices with polarization-dependent response. We further expand our studies to achieve multi-resonant responses.

The second approach explores novel tunable graphene-based platforms, including angle-independent absorption modulation using continuous graphene layers and spectral engineering of graphene nanoribbons to produce multiple absorption peaks.

Hosted by: Prof. Dr. Valerio Pruneri