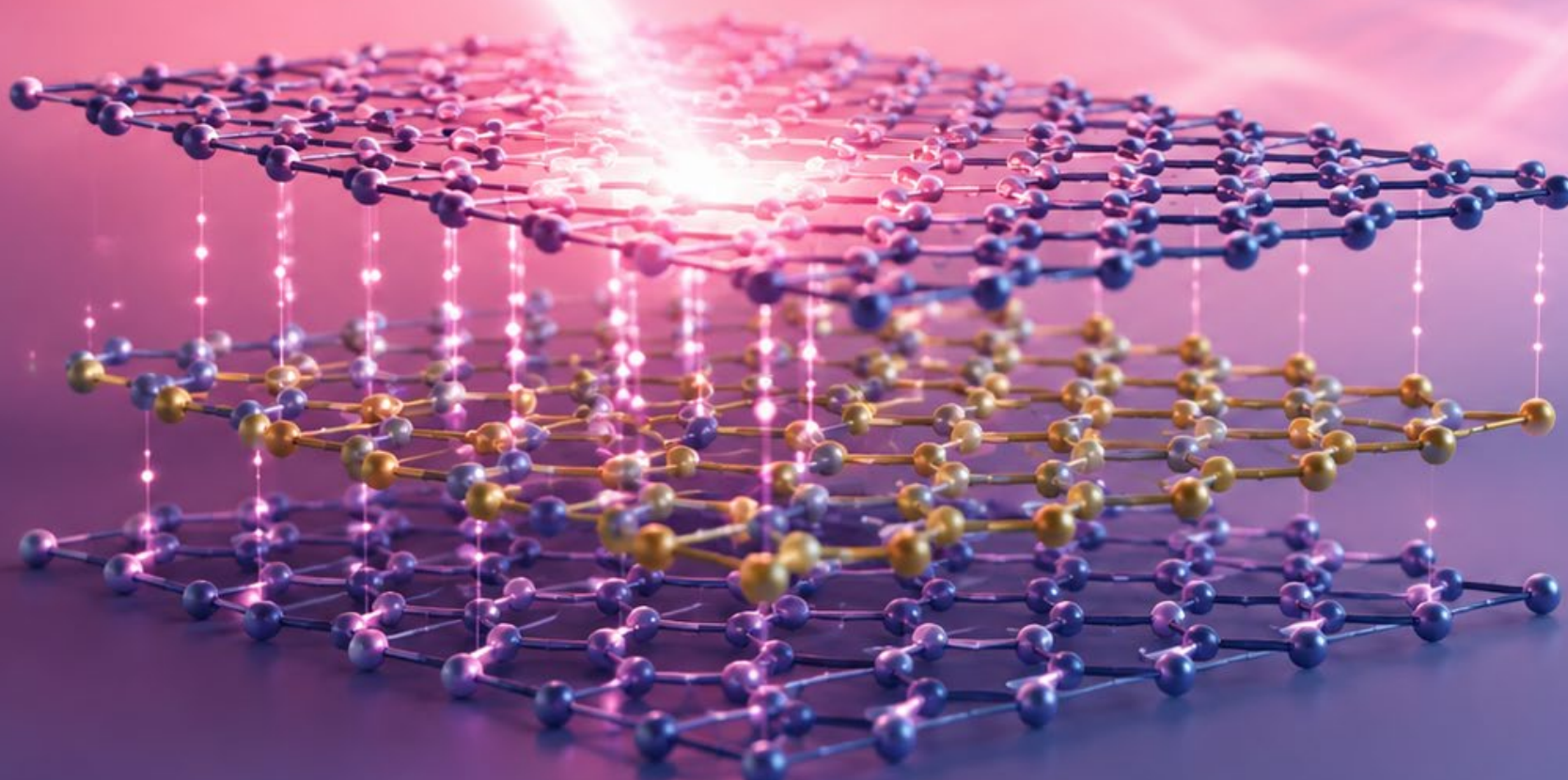


Event organized within the framework of the
Engineering Physics Colloquia



Ca' Foscari
University
of Venice
Department of
Molecular Sciences
and Nanosystems

Prof. **Ioannis Paradisanos**
IESL-FORTH and University of Crete (Greece)

Tailoring light-matter interactions in layered van der Waals materials

17th September 2026, 11:00 am
Room Delta 0A, Delta Building

The seminar will also be
accessible remotely via the
following link: [https://unive.
zoom.us/j/83518419483](https://unive.zoom.us/j/83518419483)
Password: seminar1

Organized by
Domenico De Fazio

Two-dimensional (2D) materials —such as graphene and monolayers of transition metal dichalcogenides (TMDs)— exhibit exceptional light-matter interactions due to their reduced dimensionality and unique crystal symmetries. While only a few dozen layered compounds have been experimentally synthesized, theoretical predictions suggest that over 5,000 stable 2D materials await discovery, with properties ranging from semiconducting to magnetic and topological. By stacking or twisting different layers, we can form van der Waals heterostructures and moiré patterns that offer new ways to control their behavior. This tunability has led to the rapidly growing field of twistronics. In this talk, I will present

insights from our recent optical studies of atomically thin semiconductors, focusing on how excitons —bound electron-hole pairs created after light absorption— govern many of their optical properties. I will discuss how the energies of these excitonic states can be tuned using electric and magnetic fields or by adjusting the twist angle between layers. I will also highlight strategies for confining and guiding excitons, which could support future excitonic circuits for information processing. Finally, I will briefly show how carrier density, mechanical strain, alloying, and coupling to photonic nanoantennas provide additional routes for tailoring light-matter interactions in these materials.