



**UNIVERSITÉ
DE GENÈVE**

FACULTÉ DES SCIENCES

LE DEPARTEMENT DE CHIMIE PHYSIQUE

a le plaisir de vous inviter à la

CONFERENCE

Intitulée

**SELECTIVE VIBRATIONAL TRACKING OF EXCITED STATES
IN PHOTOSYNTHETIC ANTENNAS**

donnée par

Dr. Manuel LLANSOLA-PORTOLES

I2BC UNIVERSITÉ PARIS-SACLAY

1^{er} MARDI 22 SEPTEMBRE à 15h30

**SALLE 1S059 Tissières
Sciences III**

30 quai Ernest-Ansermet ou 4 bld d'Yvoy

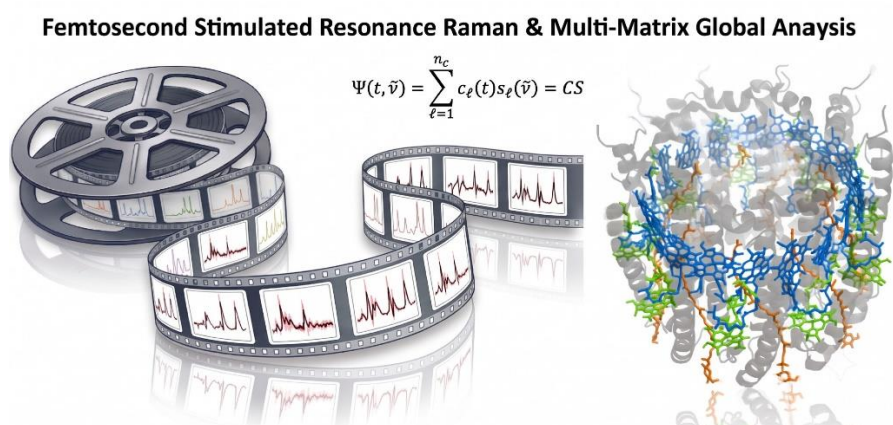
Responsable : Dr. Ricardo J. Fernández-Terán

Abstract:

When a molecule absorbs light, it is promoted to an excited state, from which a range of different processes can follow: energy transfer, charge separation within or between molecules, internal conversion, etc... The more complex the molecule, or the environment it sits in, the harder it becomes to identify these processes with precision.

Photosynthetic energy harvesting is an extreme example. Photosynthetic antennas contain hundreds of pigments, typically chlorophylls and carotenoids, tightly packed together. Under optimal conditions, these systems transfer the energy of a single photon over several nanometres, through tens of individual transfer steps, and just as efficiently dissipate that energy harmlessly when too many photons arrive. Despite being one of the most studied biological systems, the overlapping signals of femtosecond transient absorption (fsTA) and two-dimensional electronic spectroscopy (2DES) make it impossible to follow these steps one at a time. Femtosecond stimulated Raman spectroscopy (FSRS) has been a valuable complement, since vibrational modes carry rich structural information, but routine probing in the near-infrared has not brought any selectivity.

We have combined our group's expertise in resonance Raman spectroscopy, which brings selectivity, with FSRS, using a tunable Raman pump whose resonance condition selects the state under observation. This approach lets us detect signals from, and determine the nature of, excited states that could not be described before. We have used it to characterise the nature and symmetry of several dark states in carotenoids, and are now extending it to photosynthetic complexes. In this talk, I will use photosynthetic complexes as the working example, but the technique and its underlying principles apply to any molecular system.



Romero, J. J. *et al.* The origin of carotenoid triplets in purple photosynthetic bacteria. *arXiv preprint arXiv:2608.07390* (2026).

Bercy, R. *et al.* Reassessing Carotenoid Photophysics: Shedding Light on Dark States. *J. Am. Chem. Soc.* **148**, 23976-23985, doi:10.1021/jacs.6c03864 (2026).