



**UNIVERSITÉ
DE GENÈVE**

FACULTÉ DES SCIENCES

LE DEPARTEMENT DE CHIMIE PHYSIQUE

a le plaisir de vous inviter à la

CONFERENCE

Intitulée

**HOW VIBRATIONAL EXCITATION SHAKES UP
UV/VIS SPECTRA
AND HOW THIS CAN BE USED IN NOVEL
SPECTROSCOPIES**

donnée par

Prof. Dr. Jens BREDEBECK

JOHANN WOLFGANG GOETHE UNIVERSITY

INSTITUTE FOR BIOPHYSICS

le MARDI 14 AVRIL à 16h30

SALLE 1S059

Sciences III

30 quai Ernest-Ansermet ou 4 bld d'Yvoy

Responsable : Dr. Ricardo J. Fernández-Terán

Abstract :

Manipulating UV/VIS spectra through vibrational pre-excitation is opening new avenues for spectroscopy and microscopy. Techniques such as VIPER-2D-IR spectroscopy (Vibrationally Promoted Electronic Resonance) employ an initial IR excitation to modify the electronic spectrum of a sample and shift it into resonance with a subsequent off-resonant UV/VIS pulse. The vibrationally pre-selected molecules can thus be promoted to a higher electronic state.

Because IR spectra are highly sensitive to subtle structural differences, VIPER excitation enables the selective addressing of molecular sub-ensembles, such as conformers, isotopomers, or molecules in different local environments. This selectivity allows targeted investigation of their photochemistry and -physics as well as measurements of spectral diffusion and chemical-exchange kinetics.

Using two-dimensional vibrational–electronic (2D-VE) spectroscopy, we explore how IR pre-excitation can manipulate electronic spectra in a variety of systems, including fluorophores, catalysts, photoswitches, and photoreceptor proteins. In particular, we investigate the mode dependence of the UV/Vis modulation and the role of vibrational dynamics such as intramolecular vibrational energy redistribution (IVR) and vibrational coherences. These studies provide important insights for designing spectroscopic experiments that exploit IR-induced modulation of electronic spectra with a broad range of applications.