

Conférence - CEISAM - UMR CNRS 6230

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Salle Marie Curie

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SECOND HARMONIC SCATTERING FROM LIQUIDS TO INTERFACES AND BULK MATERIALS

Hyper-Rayleigh Scattering (HRS), called also Harmonic Light Scattering (HLS) or Second Harmonic Scattering (SHS), is the nonlinear analogue of the well-known Rayleigh scattering. While Rayleigh scattering involves only linear interaction, resulting in scattering at an identical frequency as the impinging radiation, for the description of hyper-Rayleigh scattering it is necessary to allow for the generation of new frequency components from the original frequencies on the incident radiation. HRS can be considered as one of the most important experimental techniques in molecular second-order nonlinear optics. It can be used to determine molecular nonlinearities, to characterize nonlinear optical switches [1], but probably more important, it has proven to be a very powerful technique to determine molecular and supramolecular symmetries. Through chosen examples, I will show that HLS is a powerful selective method for characterizing not only molecules but also (dielectric) nanoparticles [2] and we have recently shown that polarization-resolved HLS is a unique tool to probe complex multipolar symmetry structures of elementary structural units (ESU) in isotropic materials, like ionic liquids [3], and even bulk glasses [4].

[1] Castet, F.; Rodriguez, V.; Pozzo, J.-L.; Ducasse, L.; Plaquet, A.; Champagne, B. *Acc. Chem. Res.*, 2013, 46, 2656.

[2] J. Daniel, F. Bondu, F. Adamietz, M. Blanchard-Desce, V. Rodriguez, *ACS Photonics*, 2015, 2, 1209.

[3] V. Rodriguez, J. Grondin, F. Adamietz, Y. Danten, *J. Phys. Chem. B*, 2010, 114, 15057.

[4] V. Rodriguez, *J. Raman Spectros.*, 2012, 43, 627-636.