PhD course Feb. 2018 (12 hours):

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Linear and nonlinear light-matter interaction – potential applications in physics and biology

Linear optical properties **(6 Hrs)** *21-22 Feb. 2018*

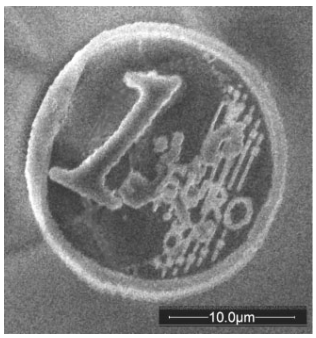
- several light-matter interactions will be briefly described: refraction, diffraction, scattering, absorption, and emission. The use of such phenomena towards characterizations of molecules and nano-platforms will be presented and discussed and especially concerning the absorption and emission (λ_{abs}, λ_{em}, Φ, τ).
- in the similar domain, the quite unusual dual emission phenomena and the related potential applications for example in the white luminescence.
- a brief introduction to Förster Resonant Energy Transfer (FRET) and/or energy transfer to quenchers will also be given together with related potential applications.
- this chapter will be concluded with an introduction to nonlinear phenomena and especially via a mechanical analogy

Second order nonlinear optics **(2 Hrs)** *26 Feb. 2018*

- second harmonic generation (SHG) phenomena and associated selection rules
- related molecular engineering
- applications in the imaging of membranes

Third order nonlinear optics **(4 Hrs)** *26-27 Feb. 2018*

- two-photon absorption phenomena
  principle and selection rules
- two-photon excited (2PE) imaging and photodynamic therapy (2PE-PDT, medicine)
  advantages of the technique concerning excitation wavelength and spatial resolution.
- two-photon-based optical power limiting (physics)
- two-photon induced polymerizations (materials)
  micro-fabrication of objects



Opt. Lett., **2002**, *27*, 1348