



## Joint LLC Seminar

Monday October 6, 15:15

Sal F, Dep. of Physics

**Michel Orrit**

Huygens-Kamerlingh Onnes Laboratory, Leiden University,  
The Netherlands

### **Optical microscopy and spectroscopy of single molecules and single plasmonic gold nanoparticles**

Optical signals provide unique insights into the dynamics of nano-objects and their surroundings [1]. I shall present some of our experiments of the last few years. i) We study single gold nanoparticles by photothermal and pump-probe microscopy. We recently studied the dynamics of vapor nanobubbles created in the liquid surrounding a single immobilized gold nanosphere. ii) Photothermal microscopy opens the study of non-fluorescent absorbers, down to single-molecule sensitivity [2]. Combining this contrast with photoluminescence, we can measure the luminescence quantum yield on a single-particle basis. The high signal-to-noise ratio of this technique enables uses of individual gold nanoparticles for local plasmonic and chemical probing [3]. iii) Gold nanorods generate strong field enhancements near their tips. Matching the rods' plasmon to a dye's spectra, we observe enhancements in excess of thousand-fold for the fluorescence of single Crystal Violet molecules [4]. This method generalizes single-molecule fluorescence to a broad range of weak emitters.

[1] F. Kulzer et al., *Angew. Chem.* 49 (2010) 854.

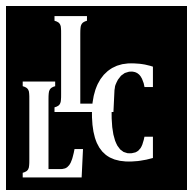
[2] A. Gaiduk et al. *Science* 330 (2010) 353

[3] P. Zijlstra et al., *Nature Nanotech.* 7 (2012) 379.

[4] H. Yuan et al., *Angew. Chem. Int. Ed.* 52 (2013) 1217-1221.

**The seminar is suited for a broad audience  
and open for everybody**

**Sal F is located at the Dep. of Physics, Professorsgatan 1  
Coffee and refreshments will be served  
before the seminar, from 15:00**



Lund  
Laser Centre

