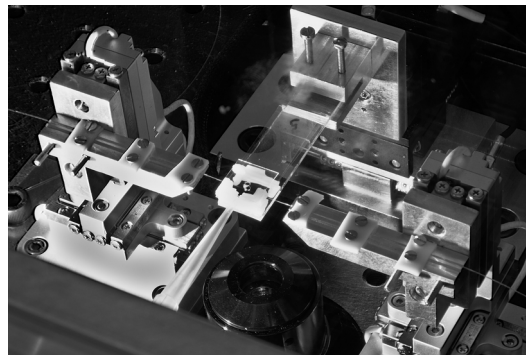


Fluorescent Nanorods Optical Trapping in Air

General Scope : Since their introduction in 1986, optical tweezers become a standard tool for non-invasive manipulation in microbiology, chemistry, and solid state physics. The importance of this device was underlined by the attribution of the Nobel Prize 2018 to Arthur Ashkin, the “Inventor” of the optical tweezers. The great majority of optical tweezers are actually optimized for trapping particles in suspension, allowing for example working with biological cells such as bacteria. Optical trapping of small particles in air is a more challenging task as one has to compensate the stronger Brownian motion and consider the very strong adhesion forces of particles on a surface. Very recently we have succeeded to trap efficiently sub-micron sized dielectric particles in air. The main scope of this internship is to extend the range of trapped particles to fluorescent nanorods and to implement and run a spectroscopic characterization tool for the characterization of these particles. This will be the first spectroscopic study of free, only optically trapped, nanorods in air.



Optical Tweezers setup developed at Institut Néel.

Research topic and facilities available :

In a first step the student will optimize the optical tweezers set-up for trapping the fluorescent nanorods. After the investigation of the trapping efficiency, the student will implement the spectroscopic tool already used for Institut Néel's suspension tweezers. Finally the fluorescence emission of the particles will be studied with special interest of the spatial intensity and polarization dependency. All the required equipment is available at Institut Néel and the fluorescent nanorods will be provided by our colleagues from Ecole Polytechnique.

Possible extension as a PhD : YES

Required skills: Knowledge in optics/ photonics including integrated optics, fiber optics and optical trapping. The student should also have skills in optics experiments and basic knowledge in LabView-programming would be useful.

Starting date : free, as a function of the students program.

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