

Internship proposal 2009-2010

Laboratory : Institut d'Optique & Saint Gobain Recherche (SGR) Address : Campus Ecole Polytechnique Laboratory director : Pierre Chavel	
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Light emission and scattering by a cloaked quantum dot
Emission et diffusion de la lumière par une boîte quantique recouverte d'une cape d'invisibilité

Saint-Gobain is one of the world leaders in building materials with a turnover of more than 43 billions € and around 200000 employees worldwide (end 2008).

Scientific project :

The objective of this internship is to study 2 very promising scientific fields in optics:

- nano-antennas, which is a new word to describe nano-components that are able to strong local field enhancements;
- optical cloaking, which is the ability of suppress light scattering of small particles. This is usually done by adding thin layers with well chosen materials and thicknesses.

We propose to theoretically study the feasibility of artificial nanostructures showing strong absorption resonances in particular wavelengths (IR or UV for example) and very low scattering cross section at other wavelengths (visible, for example).

This property can be of strong interest for future Saint-Gobain products, since particles with specific properties (mechanical, optical, thermal,...) could be added to a glass surface and made invisible (cloaked).

Our research will start from previous works of Professor Engheta at the University of Pennsylvania on the possibility of cloaking nano-objects by covering them with metallic layers.

Techniques in use : the internship will be essentially on modelling. Experiments will follow after first theoretical validation of the concept (during the PhD thesis that will follow the internship)

Applicant skills :

Granted internship : yes (~1100 €/month)
C'nano IdF laboratory (France only) : yes / no
Possibility for a thesis : yes (type of grant : CIFRE)