



**a PhD grant from the CNRS at the
Institut des NanoSciences de Paris
(*Université Pierre et Marie Curie – Paris VI*)**

Research project Title :
***Sub-picosecond dynamics of the laser-cluster interaction
probed by X-ray spectroscopy***

Summary : Large clusters (nano-objects of a few thousands of atoms), similarly to solids, couple very efficiently to intense sub-picosecond laser pulses. Near 100 % of the laser radiation can be absorbed giving rise to the observation of highly charged ions with energies reaching MeV and electrons with energies up to a few keV. One fascinating feature of this interaction is its efficiency for converting photons in the eV range to x-rays with keV energies, which may lead to novel non-polluting and renewable x-ray sources of a sub-millimeter resolution. Whereas the spectroscopy of the emitted ions and electrons extracts information from the system a few microseconds after the femtosecond laser pulse and the cluster disintegration, x-ray spectroscopy allows performing measurements on a very short time scale. Our recent findings have shown evidence of new features allowing for an identification of the mechanisms responsible for x-ray production. We propose to perform further experimental investigations at the LUCA* facility in Saclay in order to precisely determine the dynamics of the nanoplasma on a short time scale and to test the mean field theoretical approach based on Monte Carlo simulation, which we recently worked out.

*LUCA: Laser UltraCourt Accordable

http://www.insp.upmc.fr/site_anglais/axe4_eng/clusters/clusters_themes.php

Applicants should apply via the CNRS website:

<https://www2.cnrs.fr/DRH/doctorants-09/>

and send their applications together with a CV, statement of motivation and names and contact information of one or two referees to Dominique Vernhet; vernhet@insp.jussieu.fr before **April 24, 2009 (sharp deadline)**