Effect of a complex environment on radiation damage:
DNA sequences into liquid microdroplets containing radiosensitizers and polypeptides

Nowadays, hadrontherapy is a powerful emergent technique used in cancer therapy, especially for deep-seated tumors. The advantages of ion beams in cancer treatment with respect to conventional radiotherapy with photons and electrons are well known, due to their characteristic Bragg peak, small lateral spreading and increased relative radiobiological effectiveness. However, a number of important scientific issues have not been resolved, especially those related to DNA damage assessment at the molecular level.

During this PhD, the main objective is to develop an original method to study indirect effects of irradiation, combining the advantages of the *in vivo* and of the *in vaccuo* approaches currently used. This experimental project is based on the development of a new technique to put biomolecules in the gas phase, using a home-made soft laser desorption from liquid microdroplets directly into vacuum, and on the coupling of this new source with an irradiation platform and a mass spectrometry analysis. This provides a unique opportunity to study the action of radical species on pertinent biomolecular systems in the liquid phase and to apprehend the understanding of processes at the molecular level by the use of gas phase analysis techniques. In parallel, metal nanoparticles will be also included in the target in order to elucidate their enhancing effect on the radiobiological efficiency of ion irradiation, with the aim to determine the role of radiosensitizers in radical production qualitatively and quantitatively. This knowledge is essential for optimizing methods for cancer treatment based on nanoparticle enhanced hadrontherapy.

We are looking for a candidate having or finishing a Master in the field of physics or physical chemistry, with good experimental skills.
For candidate currently in master 2, a training period in the group is available between March and July 2018.

Please send a complete CV, letter of recommendation as well as a list of the courses followed in 2016-2017 with grades and possibly ranking to Prof. Bruno Manil (bruno.manil@univ-paris13.fr).

The deadline for application is end of April 2018 but the selection will be filled asap.

Available funding:
French Ministry for Higher education and Research and University Paris 13 – Salary of 1,785 € (gross/month)

Starting date:
September 2018 (for 3 years)