Spécialité de Master « Optique, Matière, Paris »

Stage de recherche (4 mois minimum, à partir de début mars)

Proposition de stage (ne pas dépasser 1 page)

Date de la proposition : 21-11-2017

Responsable du stage / *internship supervisor*:

Nom / *name*: Izeddin — Prénom/ *first name* : Ignacio

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Nom du Laboratoire / *laboratory name*: Institut Langevin, ESPCI Paris

Code d'identification : UMR 7587 — Organisme : ESPCI Paris

Site Internet / *web site*: https://www.institut-langevin.espci.fr/

Adresse / *address:* 1 rue Jussieu, 75005 Paris

Lieu du stage / *internship place*: 1 rue Jussieu, 75005 Paris

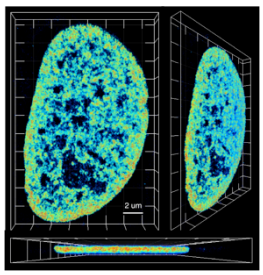
Titre du stage / *title*: ***Dual-objective super-resolution microscopy to study DNA repair mechanisms***

Maintenance of genetic stability is an essential cellular function. By avoiding or limiting the impact of DNA damage, **DNA repair systems play a critical role in cell survival and the prevention of pathologies such as cancer or accelerated ageing**. Among them, base excision repair (BER) is the main DNA repair pathway for removal of modified bases or abasic sites and repair of single strand breaks. BER is the mechanism by which damaged bases in DNA are removed and replaced.

Nuclear architecture has a determining role in DNA metabolism and a link between chromatin compaction and transcription is well established. While it is now clear that the efficiency of repair of double strand breaks is modulated by the chromatin context, the link between chromatin structure and BER is less understood.

In collaboration with a group of cell biologists and DNA repair specialists at the Institut de Radiobiologie Cellulaire et Moléculaire, CEA Fontenay-aux-Roses, we at the Institut Langevin, ESPCI Paris, aim at **using advance single-molecule super-resolution microscopy approaches to study the molecular mechanisms behind the recruitment of the BER complexes on chromatin**.

The advent of super-resolution methods has revolutionized the field of optical microscopy, as recognized with the Nobel Prize in Chemistry 2014. Notably among them, single-molecule localization based super-resolution microscopy (SMLM) makes use of photo-switchable fluorophores so that only a fraction of them fluoresce at a time. Thanks to super-localization approaches, previously hidden details at the macromolecular level are revealed and other physical variables are now accessible.



Super-resolution SMLM 3D image of chromatin

In this internship, the candidate will be in charge of advancing the development of a dual-objective SMLM set-up to achieve 3D isotropic localization in the range of 10-20 nm. Further, he/she will perform dual-color, 3D super-resolution experiments to study the spatial organization of chromatin and BER-related nuclear complexes at different time-points after induced DNA damage. Our long-term aim is to identify the players that recruit DNA glycosylases to initiate BER of damaged bases, and to characterize the molecular mechanisms required for the establishment of BER complexes on chromatin.

Ce stage pourra-t-il se prolonger en thèse ? *Possibility of a PhD* **? : Yes**

Si oui, financement de thèse envisagé/ *financial support for the PhD***: doctoral school grant, ANR/INCA grant demand**

Lumière, Matière, Interactions	**X**	Lasers, Optique, Matière	**X**