

# European Training Network LightDyNAMics PhD proposal at CNRS, France

## The Network

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LightDyNAMics combines advanced spectroscopy and computational methods to investigate photoactivated dynamics in DNA and deliver new insights into light/soft-matter interaction. The consortium is composed of 10 leading academic groups and 6 innovative companies, which will provide multidisciplinary training to 15 Early Stage Researchers by teaching them key techniques, technologies and theories as well as transferable and business skills training.

## PhD Research

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### **UV-induced processes in guanine quadruplexes studied by time-resolved optical spectroscopy: from photon absorption to radical reactivity**

Guanine Quadruplexes (G4) are four-stranded structures formed by guanine rich DNA sequences. They have been correlated with the oxidative damage which perturbs biological functions. In addition, G4 structures are studied in respect to their applications in molecular electronics and nanotechnologies.

The objective of the thesis is to study the generation and the reactivity of guanine radicals (including electron holes, important in charge transport) induced by absorption low energy UV radiation by G4. The investigation will involve the use of several experimental and computational techniques:

- The electrons ejected by photo-ionization and the resulting base radicals will be studied by time-resolved absorption spectroscopy and time-resolved circular dichroism, from nanoseconds to milliseconds.
- The dynamics of the excited states, expected to play a role in the photo-ionization process, will be studied by fluorescence spectroscopy, from femtoseconds to nanoseconds.
- The observed optical spectra will be interpreted by means of quantum chemistry methods.
- The reaction products resulting from UV-induced radicals will be identified using analytical methods.

## Location

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**Main Host:** Lasers, Interactions, Dynamics Laboratory (LIDYL-UMR CNRS 9222)  
CEA Saclay Research Centre, F-91191 Gif-sur-Yvette

**Contact:** Dimitra Markovitsi; E-mail: [dimitra.markovitsi@cea.fr](mailto:dimitra.markovitsi@cea.fr)

**Additional training** (8 months total) will be provided ETN partners in Italy and Germany

## University

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The PhD diploma will be delivered by the **Université Paris Saclay**.

The candidate will be registered at the Doctoral School: Chemical Sciences: Molecules, Materials, Instrumentation and Biosystems (2MIB),

Duration: 3 years. Starting date: October 1st, 2018

## Requirements

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- M.Sc. in Physical Chemistry, Laser Spectroscopy or Biophysics.
- Top ranking in the University.
- Proof of English proficiency as communication and teaching language throughout LightDyNAMics is English.
- The candidate must not have resided in France for more than 12 months during the past 3 years.
- Application: send CV, motivation letter and 2 recommendation letters by April 30<sup>th</sup>, 2018.

## Monthly Salary

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~2400 € (net before taxes)