

Università degli Studi di Parma
PhD positions in Biophysics

Three PhD positions in Biophysics are available within the PhD program in Physics at the Department of Mathematical Physical and Computer Sciences of the University of Parma.

Available topics are listed below

1. Development of molecular systems for the delivery of photosensitizers and for applications in super-resolution microscopy (*Fellowship funded by Istituto Italiano di Tecnologia*)

The project intends to develop delivery systems for photosensitizers based on recombinant human proteins bearing (in the same genetic construct) selective peptide functionalities, able to target specific receptors overexpressed on the plasma membrane of tumor cells. The carrier protein binds a photosensitizer. The systems will be further functionalized with fluorescent molecules that allow to achieve sub-diffractive resolution in fluorescence microscopes. The study comprises an extensive spectroscopic characterization of the developed compounds, also with high temporal resolution, and advanced optical microscopy. The study is in collaboration with Nanoscopy at Istituto Italiano di Tecnologia where part of the work will be carried out.

2. Molecular probes for photoacoustic microscopy (*Fellowship funded by Istituto Italiano di Tecnologia*)

The project intends to develop molecular systems to be used as contrast agents for photoacoustic microscopy. Sensor systems of chemical-physical parameters will be developed based on non-radiative relaxation of molecular probes. Fluorescent and non-fluorescent proteins will be used to devise sensors, possibly based on FRET, in which acceptors are non-fluorescent. Particular attention will be paid to the use of photochromic proteins with absorption in the spectral region of the red and the near IR. We intend to develop systems for the monitoring of pH, oxygen, CO, and others. The study is in collaboration with Nanoscopy at Istituto Italiano di Tecnologia where part of the work will be carried out.

3. Fluorescent proteins as biosensors for single cell nitric oxide imaging

Over the years, numerous intracellular monitoring systems have been proposed for nitric oxide (NO), one of the most important signal molecules in biology. Most of the sensors developed suffer however from the disadvantage of providing values of NO concentrations mediated on a population of cells. The imaging of the NO concentration at the single cell level allows to obtain information on signal transmission events with high spatio-temporal resolution able to detect differences between the different cells. This information can only be obtained through the use of high-resolution microscopy on fluorescent probes genetically encoded within cells. This project aims to develop fluorescent probes for fluorescence microscopy applications using fluorescent proteins of different colors. The study is carried out in collaboration with Dr. Thomas Gensch at the ICS4 Institute of the Forschungszentrum Jülich in Germany.

Information on the call: <https://www.unipr.it/didattica/post-laurea/dottorati-di-ricerca>

Details for Physics: <https://smfi.unipr.it/it/node/2349>

Deadline for application: September 4, 2018

Interested applicants are encouraged to **contact Cristiano Viappiani**, Email: cristiano.viappiani@unipr.it