Grenoble Alliance for Integrated Structural & Cell Biology

GRAL MASTER 2 RESEARCH SCHOLARSHIP - Program 2018 - 2019

CALL FOR RESEARCH INTERNSHIP TOPICS

Deadline for proposal submission: **DECEMBER 15th, 2017**

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***MASTER II University programs compatible with the scholarship program:***

***Master in biology:*** *Specialty biochemistry and structural Biology / Specialty cell Biology, Physiology and development / Specialty neurobiology and neurosciences / Specialty immunology, microbiology, infectiology/ Master Biology, Ecology, Environment*

***Master in physics:*** *Specialty « Complex matter, living matter » (MCMV)*

***Master in Nanosciences, nanotechnologies:*** ***S****pecialty Nanochemistry-Nano-objects / Specialty Nanobiology-Nanobiotechnology / Specialty Nanophysics – Nanostructures*

## INTERNSHIP PROPOSAL

**Institute and Group:** BIG/LPCV/LPM

**Supervisor:** Dimitris PETROUTSOS **Phone:** 04 38 78 66 63

**Email**: dimitris.petroutsos@cea.fr

**Research project title:** Cross-talk of light- and carbon-signalling in green microalgae

**5 Keywords to describe the project:**

Photosynthetic microalgae, light signalling, photoprotection, mutant library, plant biology

**Description of the project (aims, experimental techniques, recommended background): 10 to 15 lines:**

**State of the art**: Life on earth depends on photosynthetic conversion of $H_2O$, $CO_2$ and light into fixed carbon, and yet the regulation aspects of the function of the photosynthetic apparatus are not well understood. A major challenge for photosynthetic organisms is to efficiently use light energy for growth while preventing photodamage, a potentially lethal consequence of absorbing excess light energy. A dominant photoprotective mechanism in plants and algae is qE (quenching of energy), a process that dissipates absorbed excitation energy as heat, ensuring cell survival even under adverse conditions. In the green alga *Chlamydomonas reinhardtii* (Cr), LHCSR proteins (Light Harvesting Complex Stress Related) are required for qE. LHCSRs are nucleus encoded and their expression is impacted by $CO_2$, nutrient availability, photosynthetic electron transport, blue light perception and calcium-elicited signalling. **Scientific challenge:** Despite their fundamental importance, regulation of LHCSR is not well understood. **Aim of the project**: Taking a genetic screen approach the student will identify mutant strains with aberrant LHCSRs expression. Through their physiological and molecular

characterization, she/he identify novel regulators of gene expression of LHCSRs and will advance our understanding on the complex signalling cascade controlling the vital process of qE. **Background of the candidate student:** Knowledge in molecular biology, microbiology and/or plant biology.

### Justification that the internship's subject fits with the general theme of GRAL (3 lines):

This project will focus on elucidating the molecular mechanisms that regulate chloroplast function and understanding chloroplast acclimation to stress, therefore it fits with the general theme of GRAL. Moreover, it will complement the GRAL project ChlamyPHOT, coordinated by Dimitris Petroutsos.

### Relevant publications of the team (3 max):

Allorent, G., & **Petroutsos, D*.** (2017). Photoreceptor-dependent regulation of photoprotection. *Current Opinion in Plant Biology*, *37*, 102–108. http://doi.org/10.1016/j.pbi.2017.03.016 (*corresponding author)

**Petroutsos, D*.**, Tokutsu, R., Maruyama, S., Flori, S., Greiner, A., Magneschi, L., et al. (2016). A blue-light photoreceptor mediates the feedback regulation of photosynthesis. *Nature*, *537*(7621), 563–566. http://doi.org/10.1038/nature19358 (* corresponding author)

**Petroutsos, D.**, Busch, A., Janssen, I., Trompelt, K., Bergner, S. V., Weinl, S., et al. (2011). The chloroplast calcium sensor CAS is required for photoacclimation in *Chlamydomonas reinhardtii*. *Plant Cell*, *23*(8), 2950–2963. http://doi.org/10.1105/tpc.111.087973