



INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	IPVF – INRIA
Website of the Host Laboratory	https://www.ipvf.fr/ https://www.centralesupelec.fr/fr/centre-de-vision-numerique-cvn
Research Group	UMR 9006 Advanced Optical Characterisation, Digital Vision Center
Internship Supervisor	Stefania Cacovich – Jean-Christophe Pesquet
Internship Subject	Photoluminescence Imaging: Analysis of Big Data by Coupling Physical Models and Neural Networks
Student's level	<input type="checkbox"/> Advanced Undergraduate Students (3 rd or 4 th year) <input checked="" type="checkbox"/> Master's students (1 st or 2 nd year) <input type="checkbox"/> PhD students
Proposed Duration	<input type="checkbox"/> 3 months <input type="checkbox"/> 4 months <input type="checkbox"/> 5 months <input checked="" type="checkbox"/> 6 months
Prerequisites	<ul style="list-style-type: none"> • Strong background in mathematics, image processing, and machine learning • Matlab, Python programming skills
Internship description (max. 15 lines)	<p>In the solar cell community there is a growing interest in the use and in the optimisation of optical imaging techniques, mainly based on photoluminescence (PL) analysis. IPVF optical characterisation lab is at the forefront of the development of advanced characterisation methods for solar cells with a solid expertise on hyperspectral luminescence and Time-Resolved FLuorescence Imaging (TR-FLIM). With these solely optical techniques it is possible to image in a quantitative way a large panel of optoelectronics properties such as the potential voltage, defects density, diffusion lengths, absorption properties. To further expand the capabilities of hyperspectral PL datasets, it is possible to process the signal by using different algorithms to improve the signal-to-noise ratio and to identify possible correlations between different features within the material. This 6-months internship position, carried out in collaboration between the IPVF-UMR and the Centre for Visual Computing of CentraleSupélec & Inria, focuses on the development of advanced variational techniques to process complex 3-dimensional PL datasets. Specifically, the candidate will use parallel proximal optimization algorithms allowing to introduce suitable spatial regularisation on the sought data while taking into account the existing physical priors. In addition, the proposed algorithms will be unrolled under the form of deep neural networks to allow faster computations and automatic tuning of hyperparameters.</p>

The boxes marked with cross implies eligible