ÉCOLE POLYTECHNIQUE
UNIVERSITÉ PARIS-SACLAY

INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	Condensed Matter Physics
Website of the Host Laboratory	https://pmc.polytechnique.fr/
Research Group	Electron-Photons-Surfaces and Irregularity
Internship Supervisor	Alistair Rowe (alistair.rowe@polytechnique.edu) & Marcel Filoche (marcel.filoche@polytechnique.edu)
Internship Subject	Space charge limited conduction in the presence of charge carrier localization
Student's level	☒ Advanced Undergraduate Students (3rd or 4th year) ☒ Master's students (1st or 2nd year) ☒ PhD students
Proposed Duration	☒ 3 months ☒ 4 months ☒ 5 months ☒ 6 months
Prerequisites	The candidate should have a good grip of semiconductor physics, and prior experience in finite difference or finite element methods would be a significant advantage. The internship would suit someone interested in experiencing multiple aspects of a research project, from making electro-mechanical measurements on nanoscale semiconductor devices to modelling and physically interpreting the experimental observations.
Internship description (max. 15 lines)	**The objective of the internship is to better understand the electrical properties of semiconductors in the so-called space charge limit where charge carrier localization either at crystal defects or due to alloy disorder is important. The space charge limit is encountered in textured or disordered materials, and becomes especially important in nanoscale materials. The internship has both experimental, theoretical and numerical modelling elements. The intern will attempt to solve a series of coupled differential equations (found in Appendix B of the manuscript available here: https://arxiv.org/abs/1801.09494v5) describing space charge limited conduction, and will undertake experimental measurements on silicon or nitride semiconductor nano-objects using impedance spectroscopy techniques. A comparison of the numerically predicted behaviour and the experimental observations will be made.**