# Internship Program for International Students

## Internship Subject Form

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<thead>
<tr>
<th>Name of the Host Laboratory</th>
<th>Laboratoire des Solides Irradiés</th>
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| Website of the Host Laboratory       | [https://portail.polytechnique.edu/lsi/en](https://portail.polytechnique.edu/lsi/en)  
| Research Group                       | Materials Science Theory         |
| Internship Supervisor                | Nathalie VAST                    |
| Internship Subject                   | Modelling electronic density fluctuations with time-dependent density functional theory |

**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 proposed internship subject requires an understanding of quantum mechanics and solid state physics. It will involve theoretical and/or computational work: some ability and willingness to programming is essential. Some knowledge in computers with linux operating system and/or basis in the Fortran programming language and/or previous experience in density functional theory are a plus.

**Internship description (max. 15 lines)**
The signature of plasmons in EEL spectra of noble metals and their surfaces shows the richness of the physics underlying the various contributions to the density fluctuation in theses materials [1], and their modelling has become tractable nowadays within time density functional perturbation theory (TDDFPT). The present internship work will be devoted to the modelling of electronic density fluctuations within TDDFPT in some bulk material and eventually, it time allows it, its surfaces, with the code turboEELS in the Quantum ESPRESSO suite of softwares [2].

[1] Electron energy loss spectroscopy of bulk gold with ultrasoft pseudopotentials and the Liouville-Lanczos method


The boxes marked with cross implies eligible