

Call for candidates: Post-doctoral fellowship in analytical electron microscopy

TEM studies of beam sensitive (astro)materials using direct electron detectors

The period is particularly exciting for the study of **beam sensitive materials** thanks to the developments of **direct electron detectors (DED) for transmission electron microscopy (TEM)**. Beam sensitive materials include for instance polymers, cement, and biological materials but also geological samples containing organics or hydrated minerals. Thanks to their high signal to noise ratio and their increasingly faster acquisition rate, DED allow all sort of new analytical methods in the TEM. Among those is 4D-STEM, a technique where the beam is scanned across the samples and a diffraction signal is acquired for each pixel.

These methods require new inline and offline approaches to collect signals and process data. **The Earth and Planetary Materials group at the University of Lille has recently installed two state-of-the-art DED on a Titan Themis Transmission Electron Microscope.** One is dedicated to 4D-STEM and the other one to EELS studies.

These detectors were funded by a project aiming at **analysing the samples from an asteroid**, brought back by the Hayabusa2 Japanese space mission. These samples provide unique insight into the processes at the origin of the Solar System formation. Of the utmost interest for the understanding of the origin of water and organic matter on Earth is the study of hydrated silicates and carbonaceous matter, which are particularly beam sensitive.

We are looking for an outstanding candidate for a postdoctoral position, with skills in electron microscopy and data analysis. **The aim is to develop analytical methods for the 4D-STEM analysis of beam sensitive materials (meteorites and asteroid samples but also polymers or any other beam sensitive material...).** The exact project will be defined according to the candidate competences and interests.

The initial funding is for 12 months, but prolongation could be possible on another funding source. For administrative reasons, the project must start in January-february 2023. Application deadline is therefore end November 2022.

Requirements

- You hold an PhD in physics or materials science or geoscience
- You have experience in scanning transmission electron microscopy, ideally in 4D-STEM.

- You are proficient in scientific Python programming.
- You are curious, creative, rigorous, enthusiastic, and love the process of learning and discovering.
 - A high level of written and spoken English is essential. French is not required.

Application:

For additional information please contact:

- Francisco De La Pena: francisco.de-la-pena-manchon@univ-lille.fr

- Corentin Le Guillou: corentin.le-guillou@univ-lille.fr

→ *Please send a CV with publications, a motivation letter and eventual letter(s) of support.*

Keywords: electron microscopy, beam sensitive materials, diffraction, big data, machine learning, meteorites.

Working environment:

- The lab : <https://umet.univ-lille.fr/>

- The microscopy center : <https://pmel.univ-lille.fr/en/>

- The colleagues involved: Francisco De La Pena, Corentin Le Guillou, Hugues Leroux ; Damien Jacob and Maya Marinova