

PhD position in the area of “High Definition Electron Microscopy: Greater clarity via multidimensionality” (HDEM)

The EMAT research group at the Faculty of Science (University of Antwerp) is seeking to fill **two PhD positions** in the area of “High Definition Electron Microscopy: Greater clarity via multidimensionality” under the supervision of Prof. Timothy Pennycook.

These vacancies are situated in the **H2020 ERC Starting grant** High Definition Electron Microscopy: Greater clarity via multidimensionality (HDEM). The overarching goal of the HDEM project is to maximize the amount of information retrieved per unit dose via multidimensional data acquisition and analysis techniques such as 4D STEM and optical sectioning.

Phase contrast imaging in HRTEM is currently the mode of choice for imaging the most beam sensitive specimens due to its high dose efficiency. Advances in camera efficiency and averaging methods such as single particle analysis have led to a so called resolution revolution in structural biology and the awarding of the 2017 Nobel prize in chemistry for cryo-EM. However we have recently shown via image simulations that electron ptychography can significantly outperform the dose efficiency of HRTEM, offering the prospect of extending the capabilities of cryo-EM yet further. To realize the potential of ptychography for low dose imaging experimentally we will utilize the latest in high speed cameras to record the required 4D STEM datasets. We will combine our enhanced imaging capabilities with single particle analysis for imaging biomolecules at ultra low doses. Similar techniques will be used for fragile materials science samples, for instance metal organic framework, Li ion battery, 2D, catalyst and perovskite solar cell materials. In addition to ultralow dose we aim to investigate high precision applications including imaging local electromagnetic fields such as those due to charge transfer, and testing the limits of imaging directly in 3D with optical sectioning in combination with spectroscopic imaging.

Job description

- Depending on your interest, a successful candidate will work on a combination of a selection of the following topics: (i) optimization of the 4D STEM acquisition with the new ultra fast camera (ii) cryo ptychography (iii) application and optimization of single particle analysis based on ptychographic data for ultra low dose imaging (iv) biomolecular imaging (v) imaging of samples for materials science (vi) ptychography and other 4D STEM development (vii) electromagnetic field mapping (viii) optical sectioning.
- You prepare a doctoral thesis in the field of sciences.
- You publish scientific articles related to the research project of the assignment.
- You present your work at national and international workshops and conferences.

Profile and requirements

- The PhD candidates hold a master degree with background in e.g. physics, mathematics, materials science, transmission electron microscopy.
- You are enthusiastic and greatly interested in the quantitative analysis of electron microscopy data.
- You can submit outstanding academic results.
- You are highly motivated, quality-oriented, conscientious, creative and cooperative.

We offer

- a doctoral scholarship for a period of 1 year, renewable for an additional 3 years after positive evaluation for the PhD candidates;
- an exciting project in which we will aim to go significantly beyond the state-of-the-art;
- a competitive salary;
- the preferred starting date is between 1 May 2019 and 1 July 2019, but will be adapted to the selected candidate's availability;
- a world-class, dynamic and stimulating work environment with state-of-the-art instrumentation and computing facilities (see also <http://www.emat.uantwerpen.be/>).

Additional information about the vacancy can be obtained from: Timothy Pennycook, tel. +32 3 265 36 65, timothy.pennycook@uantwerpen.be

Please submit your motivation letter, CV, summary of your Master and/or PhD thesis, a list and grades of the courses that you took during your studies, and names of 2 professional referees as one single PDF file uploaded on the following [Application Submission \(http://nano.uantwerpen.be/jobs/submission\)](http://nano.uantwerpen.be/jobs/submission) page by selecting "PhD HDEM".