Institut für Metallkunde und Materialphysik | SFB 1394 Structural and Chemical Atomic Complexity | RWTH AACHEN UNIVERSITY

Research Associate (f/m/d)

Artificial Intelligence in EBSD Analysis of Defect Phases

We are looking for a new team member to join the research group “Data Science & Artificial Intelligence in Materials” at RWTH Aachen University as part of the Collaborative Research Centre (CRC) 1394 who will focus on developing new methods in electron backscatter diffraction (EBSD) analysis based on artificial intelligence.

The CRC 1394 focuses on the understanding the role of defect phases on the properties of materials. Across the research consortium, the materials are characterised using a wide range of methods, in this project we will focus on the analysis using electron backscatter diffraction. Since the change in the pattern due to defect phases is expected to be small, conventional analysis methods are likely not powerful enough to resolve the quantities of interest. Therefore, new methods, based on artificial intelligence, need to be developed to be able to analyse the intricate features of the crystals. As part of the funding for the CRC, a new EBSD detector will be procured that uses the TimePix sensor for direct electron capture. In collaboration with other projects of the CRC, as well as the vendor, we will also develop new methods to exploit the capabilities of this sensor to improve the image acquisition process.

The successful candidate will have the opportunity to pursue a doctoral degree as part of their work in this project.

Your Profile:

- STEM degree (Master).
- Good knowledge in at least one modern programming language such Python, as well as working with git and relevant software documentation systems.
- Basic knowledge in machine learning and artificial intelligence.
- Ideally, good working knowledge in common machine learning libraries (scikit-learn, PyTorch, TensorFlow), as well as using Linux-based environments.
- Ideally, some knowledge in electron backscatter diffraction and relevant analysis methods.
- Fluent in English (B2 or above)
- Willingness to dive into new subject areas, task, and technologies.

Your Responsibilities:

- Development of novel A.I. algorithms for the analysis of EBSD data, both on local Linux-based environments, as well as the HPC cluster of RWTH Aachen University.
- Development of reproducible and automated workflows using containers (e.g. docker) and integration into the research data management infrastructure of the CRC.
- Creation of a large library of simulated EBSD patterns for the training of the A.I. models using mainly the open-source software EMSoft.
- Publication of the library of simulated EBSD patterns in suitable repositories (e.g. Zenodo) and providing relevant details to the community
- Development and training of A.I.-based models to improve the efficiency and speed of the simulation of EBSD patterns
- Development of novel methods to exploit the capabilities of the TimePix sensor for EBSD analysis in collaboration with other projects of the CRC and the vendor.
- Development of AI-based models for the application in Density Functional Theory (DFT) and atomistic simulation in collaboration with relevant projects of the CRC

Our offer

The successful candidate will be employed under a regular employment contract. The position is to be filled at the earliest possible date and offered for a fixed term of 2 years. An extension of 2 years is envisioned (until the end of 2027). The fixed-term employment is possible as it constitutes one of the fixed-term options of the Wissenschaftszeitvertragsgesetz (German Act on Fixed-term Scientific Contracts). This is a full-time position with the possibility of a part-time contract upon request. The successful candidate has the opportunity to pursue a doctoral degree in this position. The salary is based on the German public service salary scale TV-L. The position corresponds to a pay grade of EG 13 TV-L.

About us

RWTH is certified as a family-friendly university. We support our employees in maintaining a good work-life balance with a wide range of health, advising, and prevention services, for example university sports. Employees who are covered by collective bargaining agreements and civil servants have access to an extensive range of further training courses and the opportunity to purchase a job ticket.

RWTH is an equal opportunities employer. We therefore welcome and encourage applications from all suitably qualified candidates, particularly from groups that are underrepresented at the University. All qualified applicants will receive consideration for employment and will not be discriminated against on the basis of national or ethnic origin, sex, sexual orientation, gender identity, religion, disability or age. RWTH is strongly committed to encouraging women in their careers. Female applicants are given preference if they are equally suitable, competent, and professionally qualified, unless a fellow candidate is favored for a specific reason.

As RWTH is committed to equality of opportunity, we ask you not to include a photo in your application.

Information on the collection of personal data in accordance with Articles 13 and 14 of the European Union's General Data Protection Regulation (GDPR) can be found at https://www.rwth-aachen.de/dsgvo-information-bewerbung.

Your contact person:

Prof. Dr. Ulrich Kerzel (kerzel@fb5.rwth-aachen.de)

Applications (cover letter, CV and any supplementary information) should be submitted **as soon as possible.**