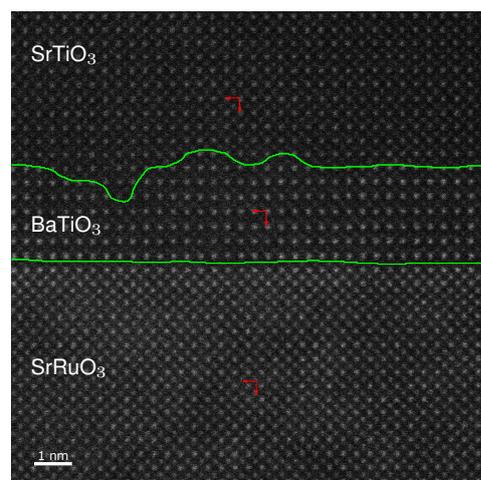


Doctoral Position in Mathematical Image Processing

in DFG Collaborative Research Centre 1394 “Structural and Chemical Atomic Complexity”

CRC 1394 aims to establish a link between two currently separate aspects of material research, which have previously been used to manufacture tailor-made materials. Firstly, the thermodynamic description of crystalline phases and, secondly, the examination and manipulation of crystal defects, which can determine the strength, malleability and corrosion of materials. By combining different methods, the CRC intends to explore the structural and chemical complexity of materials. This could lay the foundation for the development of new material design concepts.

The advertised position is associated with the project *A04 Crystal Analysis of High Resolution Image Data* and advised by Prof. Benjamin Berkels at RWTH Aachen. An important necessity towards the goals of the CRC are mathematical tools to detect, categorize and quantify defects in atomic resolution data, both experimental data and data obtained by computational simulation. Here, defects are deviations from a perfect crystal lattice. Thus, to characterize defects, the crystal lattice needs to be characterized at least in the area directly surrounding the defect. As a result, the goal of project A04 is the development of tools for the analysis of crystalline structures, which enable a quantitative defect characterization from high-resolution data at atomic scale. The tools will be based on variational approaches for the segmentation of atomic resolution images of crystals into individual crystal types and the quantification of the deviations of an individual crystal from the perfect lattice.



Crystal segmentation followed by unit cell extraction on each segment.

The main aims of this project are:

- Unsupervised segmentation of atomic resolution images of crystals into individual grains or crystal types without prior knowledge of the unit cell
- Robust characterization of the crystal unit cells as part of the segmentation
- Quantification of the deviation of an individual crystal from the perfect lattice

Your profile: We are seeking highly motivated candidates with strong mathematical skills. Requirement for this position is a master's or equivalent degree in mathematics or a related field with a superior academic record. Knowledge in signal/image processing, optimization and/or data analysis is desired. Good programming skills are of advantage. Excellent written and spoken English language skills are required.

Our offer: The candidate will be a regular employee and must meet required personal qualifications. This is a full-time position with a civil service pay scale TV-L E 13.

The expected appointment period is **three years**. Full involvement in the CRC activities, including colloquia, annual schools and short courses is expected. Applications are being reviewed now.

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Starting date: at the next possible date