Computational Microscopy

Supplementary information

Embedded in the interfaculty Field of Expertise (FoE) “Advanced Materials Science” (AMS), the Graz University of Technology has opened a **Tenure-Track Assistant Professorship** with a potential focus on “Computational Microscopy”, to enable and support innovative computer-based concepts and novel approaches across a broad range of imaging and spectroscopy techniques in **electron microscopy**. Whereas the details of the professorship vacancy are given on pages 2 and 3, here some further information about the sought expertise is provided.

Description:

The post is not intended to be purely theoretical but will include a certain amount of own experimental work behind electron microscopes. Depending on the candidate profile, the weights on the topics can vary. These topics shall include, but are not restricted to:

- *Artificial intelligence, machine learning ML, deep learning DL*

  Various tasks, such as detection, segmentation, classification and alike in microscopy image analysis can be empowered by machine-aided algorithms and networks, efficiently handling the complexity and diversity of multi-dimensional microscopic images. By using deep convolutional neural networks, for instance, ML and DL shall be harnessed to perform 2D and 3D computational imaging to enable new approaches in microscopy.

- *Big data*

  Large microscopy data sets, originating from multimodal acquisitions and in-situ observations, may be analyzed computationally to reveal patterns, trends and correlations. This is also relevant in the context of correlated microscopy.

- *Simulations*

  The post shall support experimental data with quantitative theoretical simulations calculated for various image modes (bright-field, dark-field, differential phase contrast images, electron diffraction patterns) to spectral data (energy-loss fine-structure, valence EELS calculations, X-ray spectra), molecular dynamics simulations and such.

- *Data reconstruction*

  New data acquisition concepts such as non-uniform sparse sampling combined with compressed sensing reconstructions in order to substantially decrease the dose or ptychographic phase retrieval shall be explored and implemented, to name a few. 3D tomographic reconstruction schemes shall be adjusted and customized, depending on the signal and information sought.

- *Automation, data management*

  Novel acquisition techniques such as differential phase contrast, ptychography, holography etc. require a great share of automation in the acquisition, the analysis and the data management work-flow.

Successful applications will be allocated to the FELMI Institute of Electron Microscopy and Nanoanalysis (https://www.felmi-zfe.at/).

For further information please contact *Gerald Kothleitner* (gerald.kothleitner@felmi-zfe.at)

Fields of Expertise – Advanced Materials Science

Research in the Field of Expertise Advanced Materials Science – one of the five research areas at Graz University of Technology – aims to understand the smallest components in their structure and function, to develop new materials and to assemble them in special processes. It's all about designing new and improving existing materials and tailoring them to be more flexible, more responsive, cheaper or more robust. The researchers in this Field of Expertise work primarily with structural and functional materials for the areas of energy technology, electronics, lightweight construction and medical technology in basic and application-oriented research.

Graz University of Technology invites applications for an open topic

Tenure-Track Assistant Professorship for chemical or physical properties of Materials (f/m/d)

For this position, we are seeking a highly qualified and scientifically excellent person who has committed his research on modelling, synthesis, processing, characterization or applications of functional materials with a special focus on the investigation of chemical and physical properties of materials. The position is promoted by the interfaculty Field of Expertise (FoE) "Advanced Materials Science" (AMS) and thus a multidisciplinary research strategy is highly favored.
The scientific focus of the candidate should strengthen and complement one of the strategic themes of the Field of Expertise focusing on energy materials, sensor materials, thin films, soft matter, semiconductors, computational microscopy, porous materials, or functional (biobased/biodegradable) polymeric materials.

In addition, we expect willingness to interdisciplinary cooperation inside and outside of TU Graz (e.g. NAWI Graz), cooperation across faculty borders within the TU Graz Field of Expertise „Advanced Materials Science".

More information on the FoE Advanced Materials Science can be found at https://www.tugraz.at/en/research/fields-of-expertise/advanced-materials-science/overview-advanced-materials-science/

Based on the research and teaching focus, the candidate will be assigned to a matching institute and faculty that participate in this Field of Expertise specifically in Physics or Chemistry.

Requirements:

- A relevant university education with a completed doctoral/PhD degree

Expected Qualifications:

- Outstanding achievements and potential in research, excellent publication activity and international reputation
- International experience in the form of a PhD or PostDoc
- Experience in the design and implementation of international research projects as well as willingness and ability to establish and lead a research group
- Enthusiasm for excellent teaching, teaching experience as well as the ability and willingness to teach in all curricular stages (Bachelor, Master, Doctorate), supervise theses and promote young scientists

To ensure effective international representation of the research group and its work, excellent spoken and written competence in English is required. Specifically, willingness to teach courses in English is expected. Fluency in German or the willingness to acquire it is also required. The successful candidate is also expected to transfer her/his residence to the area of Graz.

Graz University of Technology aims to increase the proportion of women, in particular in management and academic staff, and therefore qualified female applicants are explicitly encouraged to apply. Until a balanced ratio of men and women has been achieved at the university, preference will be given to women if applicants are equally qualified.

Graz University of Technology actively promotes diversity and equal opportunities. Applicants are not to be discriminated against in personnel selection procedures on the grounds of gender, ethnicity, religion or ideology, age, sexual orientation (Anti-discrimination). People with disabilities who have the relevant qualifications are expressly invited to apply.

Our Offer:

The advertised position is a tenure-track career position for an initial period of 6 years. (pursuant to § 99 para. 5 of the Universities Act) After the conclusion of a qualification agreement, the job holder is appointed as an **Assistant Professor**. After a positive evaluation of the qualification agreement, the position will be turned into a permanent position as **Associate Professor**. Graz University of Technology provides excellent working conditions in a lively scientific community combined with the outstanding living quality of the Graz area.

The position will be paid according to category B1 of the collective agreement for employees of Austrian universities, stipulating an initial gross salary of EUR 4,309.30 (14 x per year).

Your Application:

Interested applicants are requested to send a detailed application in electronic form, and should quote the position identification number:

- using the completely filled out application form https://www.tugraz.at/go/professorships-vacancies/ ,
- including a resume (with copies of diplomas),
- a list of publications with copies of their 5 most important publications,
- a research statement describing past and planned research activities (3 pages max.),
- a teaching statement describing past and planned teaching activities (3 pages max.) and evaluations of past teaching activities (if available),

at the latest by September 30th, 2020 (date of email)

to the Vice Rector of Research via the Research & Technology House of the Graz University of Technology, **Horst Bischof**, E-Mail: applications.foe@tugraz.at

The interviews for the position are expected to take place in the week from November 23rd, 2020. Candidates are asked to be available in this period. For further questions, please contact the head of the Field of Expertise, **Anna Maria Coclite**, E-Mail: anna.coclite@tugraz.at

Vice Rector of Research: Horst Bischof
Position identification number: 30/R/PA/93070/20