Chair of Analysis, Emmy-Noether Junior Research Group
TUM School of Computation, Information and Technology
Technical University of Munich

Doctoral position in Numerical Analysis

3 years, 75%, m/w/d, TV-L, starting early 2026.

Applications are invited for a doctoral position in the DFG-funded Emmy-Noether Junior Research Group of Dr. Muhammad Hassan on the **Numerical Analysis of Electronic Structure Methods for Molecules and Materials**. The group is located within the Chair of Analysis in the Department of Mathematics within the TUM School of Computation, Information and Technology at the Technical University of Munich.

About the PhD Project:

The goal of the project is the development of *a posteriori* error estimates for state-of-the-art numerical methods used to solve the electronic Schrödinger equation. The electronic Schrödinger equation is a high-dimensional eigenvalue problem that models the behavior of electrons in molecular systems using non-relativistic quantum mechanics. Cutting-edge numerical methods to solve this equation (such as *coupled cluster* or *DMRG*) involve the use of a low-rank, non-linear ansatz. Analyzing such methods and developing *a posteriori* error estimates, therefore, requires tools from non-linear numerical analysis and high-dimensional approximation.

Profile:

The ideal candidate

- should possess or be close to obtaining a master's degree in applied mathematics with a focus on numerical analysis or analysis of PDEs.
- have an excellent knowledge of linear functional analysis.
- have experience with LaTeX and at least one scientific programming language, e.g., Julia, Python, or MATLAB.
- have solid spoken and written English communication skills.

Knowledge of German is not required. Prior knowledge of quantum physics is not required, but may be an advantage.

Employment Conditions:

- The start date is negotiable, but ideally in early 2026. The position is expected to last three years.
- The salary is based on the German public sector pay scale TV-L E13 (75%). The actual salary depends on academic experience, family situation, tax classification, etc.
- Generous funding for travel to and participation in international conferences, workshops, and summer/winter schools is available.

The successful candidate will have the opportunity to work within a vibrant, interdisciplinary and international research environment on the Garching Campus of the Technical University of Munich. For more information on the TUM Department of Mathematics, please visit our website:

https://www.math.cit.tum.de/math/home/

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Duties:

This research position is funded by the DFG (German Research Foundation), so the PhD student's primary responsibility will be to undertake research and disseminate their results through participation in scientific conferences and workshops and through publications.

The PhD student will also be expected to participate in the supervision of BSc and MSc research projects, and will be encouraged to collaborate with colleagues working on electronic structure, both at TUM as well as at other universities.

There are no teaching obligations linked to the position, but opportunities are available within the department in case of interest.

How to Apply:
Applications should be submitted **solely via the mathjobs.org website**:

https://www.mathjobs.org/jobs/list/27607.

Please include the following documents.

- A cover letter explaining your background and your interest in the position.
- A CV.
- An academic transcript including a list of graduate courses taken and your grades.
- A copy of your MSc thesis, together with a 1-2 page summary of the main results. If you have not yet finished your thesis, then please include a copy of any significant mathematical work (e.g., a semester project report) of which you are the main author.
- Names and contact information of two referees.

Applications will be reviewed on a rolling basis until the position is filled. In case of technical questions, please contact Muhammad Hassan via email: muhammad.hassan(AT)cit.tum.de.

As an equal opportunity and affirmative action employer, TUM explicitly encourages applications from women as well as from all others who would bring additional diversity dimensions to the university's research and teaching strategies. Preference will be given to candidates with disabilities who have essentially the same qualifications.