

PhD Student Position

Applications are invited for a PhD position within the Chair of Analysis in the Department of Mathematics at the Technical University of Munich. The position will be part of the DFG-funded Emmy-Noether junior research group of Dr. Muhammad Hassan on the “Numerical Analysis of Electronic Structure Methods for Molecules and Materials”.

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 behaviour 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. Analysing such methods and developing a posteriori error estimates, therefore, requires tools from non-linear numerical analysis and high-dimensional approximation.

Profile:

- Should possess or be close to obtaining a Master’s degree in applied mathematics with a focus on numerical analysis or analysis of PDEs.
- An excellent knowledge of linear functional analysis.
- Experience with at least one scientific programming language (e.g., Julia, Python, or MATLAB) and LaTeX.
- Solid spoken and written English communication skills. Knowledge of German is not required (but is nice to have if you wish to take advantage of everything Munich has to offer).
- Prior knowledge of quantum physics is not required but may be an advantage.

Employment Conditions:

- Start date: As soon as possible (tentatively, beginning of 2026). The PhD is expected to last three years.
- Salary: Based on the German public sector pay scale TV-L E13 (75%).
- Generous funding for travel and participation in international conferences, workshops, and summer/winter schools is available.

Duties:

This is a DFG-funded research position, so the PhD student's primary responsibility will be to undertake research and disseminate their results through participation in scientific conferences and workshops.

The PhD student will also be expected to participate in the supervision of BS and MS research projects, and will be encouraged to collaborate with colleagues working on electronic structure (both at TU Munich as well as other universities).

There is no obligation to teach at the department, but opportunities will be available in case of interest.

How to Apply:

In a single PDF, please send the following documents to Muhammad Hassan at [muhammad.hassan\(AT\)cit.tum.de](mailto:muhammad.hassan(AT)cit.tum.de).

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

Applications will be reviewed on a rolling basis until the position is filled. In case of technical questions, please write to Muhammad Hassan ([muhammad.hassan\(AT\)cit.tum.de](mailto:muhammad.hassan(AT)cit.tum.de)). Female researchers are particularly encouraged to apply for the position. Among equally qualified applicants, (physically) challenged candidates will be given preference.