The Peter Grünberg Institute for Quantum Control (PGI-8) at the Forschungszentrum Jülich specializes in novel optimization strategies for emerging quantum technologies. These emerging technologies aim to provide transformative changes to our society, including how we think about information, and unlocking vast calculations for the natural sciences, logistical problem solving, and high-performance computation. Our group has pioneered the application of quantum optimal control methods to quantum computation and many-body quantum systems. This includes the development of physical models and model reduction techniques as well as algorithmic advances of in-situ optimization and machine learning to tackle the complex processes inherent to scalable quantum devices.

We are looking to recruit a

PhD Position - Optimal Control Theory for Open Quantum Systems

Your Job:

• Develop techniques to simulate and control open system dynamics for complex quantum information tasks, including both negative and positive roles for environmental noise
• Build effective models for open quantum systems involving especially cold atoms and ions, e.g. using tensor network methods
• Research open quantum control methods such as reservoir engineering and feedback control, including co-design of system parameters and development of quantum protocols
• Cooperate with and provide theory support for experimental partners developing quantum processors using these technological platforms
• Design and implement optimization techniques for fixed point engineering and active feedback

Your Profile:

• Master’s degree in physics (or in a related subject)
• Background and strong interest in developing theoretical models and methods as well as in implementing numerical optimization techniques
• Detailed knowledge of quantum physics and experience with quantum technology
• Strong mathematical education, in particular in relation to linear algebra
• Programming experience (e.g., Python or Julia)
• Ability to effectively communicate in written and spoken English
• Ability to work autonomously and in close interaction within a team
• Most importantly: enthusiasm to explore uncharted territory, develop, and follow your own ideas

Our Offer:
We work on the very latest issues that impact our society and are offering you the chance to actively help in shaping the change! We offer ideal conditions for you to complete your doctoral degree:
• Opportunity to conduct research at the interface of theory and experiment in a world-leading group in quantum control.
• Work in a highly motivated research group as part of an international and interdisciplinary working environment with access to outstanding computing facilities and connections to the best research institutions around the world.
• Continuous scientific mentoring by your scientific advisor as well as feedback and wide-ranging expertise from the whole group in multiple facets of quantum technology and optimization.
• Opportunity of participating in (international) conferences and project meetings
• The skills that you will acquire during your Ph.D. are in high demand both in academia and in high-tech companies: at present, there is significant government and private investment in the field of quantum technologies.
• Further development of your personal strengths, e.g. through an extensive range of training courses; a structured program of continuing education and networking opportunities specifically for doctoral researchers via JuDocS, the Jülich Center for Doctoral Researchers and Supervisors: https://www.fz-juelich.de/judocs
• Flexible working hours and 30 days of annual leave

The position is initially for a fixed term of 3 years, with possible long-term prospects. Pay in line with 75% of pay group 13 of the Collective Agreement for the Public Service (TVöD-Bund) and additionally 60 % of a monthly salary as special payment („Christmas bonus”).
Further information on doctoral degrees at Forschungszentrum Jülich including our other locations is available at: https://www.fz-juelich.de/gp/Careers_Docs

Forschungszentrum Jülich promotes equal opportunities and diversity in its employment relations.
We also welcome applications from disabled persons.