The Peter Grünberg Institute for Quantum Control (PGI-8) at the Forschungszentrum Jülich specialises in novel optimisation 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 institute 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 optimisation and machine learning to tackle the complex processes inherent to scalable quantum devices.

We are offering a

**PhD Position – Design and Control Theory of NV-Based Quantum Simulators**

**Your Job:**
- Develop techniques to simulate and control the dynamics of diamond-based spin systems (e.g., NV centers)
- Find parameter regimes and control schemes to map few or many-body Hamiltonians on experimentally realisable spin systems
- Cooperate and actively work with our experimental partners toward quantum simulation and quantum computing implementations using this technological platform
- Design and implement optimisation techniques tailored to experimental constraints
- Be part of dedicated national and European research projects

**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 optimisation techniques
• Interest in working closely with experimentalists
• Detailed knowledge of quantum physics and interest in quantum technology
• Strong mathematical education, in particular, in relation to linear algebra
• Strong programming experience
• 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 technology
• 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 optimisation
• Opportunity of participating in (international) conferences and project meetings
• Participation in overarching seminars including certificate
• The skills that you will acquire during your doctoral research 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 transferable skills via 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/en/judocs
• 30 days of annual leave and provision for days off between public holidays and weekends (e.g. between Christmas and New Year)
• Targeted services for international employees, e.g. through our International Advisory Service

In addition to exciting tasks and the collaborative working atmosphere at Jülich, we have a lot more to offer: https://www.fz-juelich.de/en/careers/julich-as-an-employer/benefits

The position is for a fixed term of 3 years. The salary is in line with pay group 13 (75 %) of the Collective Agreement for the Public Service (TVöD-Bund). In addition, an annual special payment is granted (“Christmas payment”), which amounts to 60 % of the monthly salary. Further information on doctoral degrees at Forschungszentrum Jülich (including its various branch offices) is available at https://www.fz-juelich.de/en/careers/phd

The deadline for applications is April 7, 2024

We particularly welcome applications from people from a diverse range of backgrounds (e.g. regardless of age, gender, disabilities, sexual orientation/identity, as well as social, ethnic, and religious background). We strive to offer a diverse and inclusive working environment in which people enjoy equal opportunities and are able to fulfill their potential.