

Research Scientist QEC Implementations

Location: Cologne, Germany / on-site, remote partially possible Role: Research scientist

Department: Applied Fault Tolerance team Employment type: Full-time

Who we are

At neQxt, we build full-stack ion-trap quantum computers, striving for excellent performance and scalability. With decades of expertise in ion-trap technology, neQxt was spun out of Mainz University, and it is headquartered in Germany's Frankfurt Metropolitan area. Our team of leading talent from Europe and beyond covers the entire value chain, from the basic hardware to end-user software level. Join our passionate team of ambitious scientists, engineers, technicians and quantum enthusiasts, building top-tier fault-tolerant quantum computers together!

Job description

You will join neQxt's QEC team in Cologne, Germany. In this role, you are conducting research at the interface of Quantum Error Correction with physical operations and hardware-specific constraints. In close collaboration with other team members, your tasks include mapping state-of-the-art QEC codes and their circuit implementations to 1D and 2D configurations of multiple ion chains. This includes a thorough understanding of circuit-level noise and additional hardware-specific noise processes that arise from atomic physics and our predefined hardware architecture.

Responsibilities

- Conduct research on implementing QEC methods within our ion trap architecture
- Contribute to the development of models, tools, and numerical methods for the analysis of large-scale mappings of logical qubits to individual ions
- Work closely with other researchers to integrate results into broader architectural and simulation frameworks
- Produce high-quality research outcomes, including publications, software tools, and technical reports
- Track and incorporate relevant advances in fault-tolerant quantum computing into ongoing work

Requirements

- Education: A PhD in Physics, Mathematics, Computer Science or similar is required.
- Specializations: Expertise in fault-tolerant circuit design and QEC more broadly as well as familiarity with typical limitations of current hardware architectures (not necessarily limited to ion traps)
- Experience: At least two years of experience in a relevant research project in an academic or industrial setting

Nice to have

- Experience in analytical and numerical methods for analyzing fault-tolerant systems at scale
- Previous project experience on the interface of different layers in the QC stack
- Theoretical understanding of physical gate mechanisms in ion traps
- Strong publication record and demonstrated ability to take technical leadership in research teams

Who you are

- You like the idea of working in a fast-paced field, at the forefront of technological development
- Interest in working across and integrating results between different layers of the QC stack
- You can manage complex and demanding technical challenges independently and are not afraid to ask for help
- Curious, persistent and pragmatic, with attention to detail
- You are a proactive problem-solver and are comfortable with posing new research questions
- You are a clear communicator and a collaborative team player

What we offer

Our QEC team is situated in the midst of a thriving research community comprising excellent academic groups in Aachen, Bonn, Jülich, Düsseldorf, Cologne, as well as industrial players like Microsoft and IBM. Cologne is a one-million-people city that is famous for embracing diversity and for its vibrant international scene, which make it particularly attractive for people who don't speak German. The QEC team is currently composed of 50% international and 50% female researchers. We value your individuality and offer a flexible environment.

- Results-oriented environment with flat hierarchies and a passionate team
- Attractive salary with automatic inflation adjustment
- Flexible working hours and full overtime compensation
- Career development in an emerging tech field
- German language courses, if needed
- Company pension scheme
- Choice of a flexible mobility budget or company car
- Default (mandatory) German employment benefits (e.g. health / pension / unemployment insurance, paid sick leave, maternity protection, parental leave, ...)

How to apply

Please submit your CV, a cover letter including your preferred starting date, and any relevant publications, project details or other supporting documents via e-mail to: career@neqxt.org. Applications will be reviewed on a rolling basis until positions are filled. We know that strong candidates often don't tick every box. If the role excites you and you meet the core requirements, we'd appreciate to hear from you rather than not. Please reach out to Sascha Heußen via s.heussen@neqxt.org if you have any questions before applying.