



Conducting research for a changing society: This is what drives us at Forschungszentrum Jülich. As a member of the Helmholtz Association, we aim to tackle the grand societal challenges of our time and conduct research into the possibilities of a digitized society, a climate-friendly energy system, and a resource-efficient economy. Work together with around 7,500 employees in one of Europe's biggest research centres and help us to shape change!

The Peter Grünberg Institute - Neuromorphic Software Ecosystems (PGI-15) led by Prof. Dr. Emre Neftci explores neuromorphic computing technologies that learn and work like the brain. Our research team designs computing algorithms and architectures from the perspective of neuroscience and their physical realizations in dedicated circuits and devices. Applications of our research are targeted to improve computing in computer vision, autonomous control, data processing in mobile devices, and scientific data analysis.

We are offering a

PhD Position - Algorithms for Hardware-Algorithm Co-Design

Your Job:

The conventional, manual co-design of algorithms and hardware is slow and inefficient. Our group develops methods and tools to automate the co-design process. The core of this project is the development of meta-optimization techniques that can automatically search for the best algorithm-hardware pair for a given problem.

While we have a history of success in optimizing digital neuromorphic hardware, this project will push into next-generation analog circuits and memristive devices, in collaboration with PGI-14. The goal is to train a system that leverages the intrinsic non-linear dynamics of these devices to perform complex learning tasks with extreme energy efficiency.

Your Job:

- Develop and apply meta-optimization that can automatically search for the best algorithm-hardware pair
- Tackle the challenge of computationally expensive meta-optimization procedures by developing and using dedicated tools and processors
- Contribute to our sparse auto-differentiation libraries to accelerate the training of state-space models
- Collaborate closely with our internal partners at PGI-14 (Neuromorphic Hardware

We look forward to receiving your application until 30.09.2025 via our

Online-Recruitment-System!

Questions about the vacancy?

Get in touch with us by using **our contact form**.

Please note that for technical reasons we cannot accept applications via email.

www.fz-juelich.de

Nodes) and international academic and industry partners

- Publish research articles and regular participation in top international conferences to present your work
- Participate in yearly retreats organized by the doctoral network participants
- Support the dissemination of software tools and concepts
- Supervise student projects and BSc/MSc theses

Your Profile:

- Master's degree in physics, electrical/electronic engineering, computer science, mathematics, or a related field
- Strong background in machine learning, particularly deep learning and optimization methods
- Excellent coding skills, particularly in Python and machine learning frameworks (PyTorch or Jax)
- The ability for creative and analytical thinking across discipline boundaries and abstraction levels
- Knowledge in integrated circuit design, testing and simulation using Cadence is a plus
- Knowledge of evolutionary optimization methods is a plus
- Very good communication skills in English, both spoken and written. PGI-15 offers an English-speaking environment; therefore, German language skills are not required

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 support you in your work with:

- **TEAM & ENVIRONMENT:** You will work in a motivated team with an international and interdisciplinary focus – at one of the largest research institutions in Europe
- **RESEARCH & INFRASTRUCTURE:** You will have access to excellent scientific and technical facilities with state-of-the-art experimental equipment for your work in an international research environment and versatile opportunities to grow as a curious researcher. You will cooperate with researchers at the following institutes: Neuromorphic Hardware Nodes (PGI-14), Electronics Materials (PGI-7), the Institute of Neuroscience and Medicine - Computational and Systems Neuroscience (INM-6), The Jülich Supercomputer Center (JSC) and the Faculty of Electrical Engineering and Information Technology at RWTH Aachen.
- **ENROLLMENT:** The student will be enrolled in the PhD program of the department of Electrical Engineering and Information Technology, RWTH Aachen
- **LEAVE:** You will receive 30 days of leave plus additional days off (e.g. between Christmas and New Year's Day)
- **KNOWLEDGE & DEVELOPMENT:** Your professional growth is important to us – we support you specifically and individually, for example through training opportunities and the structured JuDocS program for doctoral candidates: <https://go.fzj.de/JuDocs>
- **SUPPORT FOR INTERNATIONAL EMPLOYEES:** Our International Advisory Service makes it easier for international employees to get started
- **FAIR REMUNERATION:** 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 („Christmasbonus“). All information about the TVöD-Bund collective agreement can be found on the BMI website: <https://go.fzj.de/bmi.tvloed> (pay scale table on page 66 of the PDF download)
- **PERSPECTIVE:** The position is initially for a fixed term of 3 years but with the prospect of longer-term employment. Let's use this time to find out how well we fit together

Further information on doctoral degrees at Forschungszentrum Jülich including our other locations is available at: www.fz-juelich.de/gp/Careers_Docs

In addition to exciting tasks and a collegial working environment, we offer you much more: <https://go.fzj.de/benefits>

Place of employment: Aachen

We welcome applications from people with diverse backgrounds, e.g. in terms of age, gender, disability, sexual orientation / identity, and social, ethnic and religious origin. A diverse and inclusive working environment with equal opportunities in which everyone can realize their potential is important to us.

Further information on diversity and equal opportunities: <https://go.fzj.de/equality>