



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!

At the Institute for Advanced Simulation – Civil Safety Research (IAS-7) at Forschungszentrum Jülich, we are researching the complex dynamics of crowds. Our goal is to make situations with high density of people - such as train stations, public venues, or events - safer and more comfortable. For the ERC-funded Synergy Grant project CrowdING, we are assembling a new interdisciplinary research team. Together, we aim to understand when and why people change their behavior in large groups—for example, when a crowd that is initially waiting calmly becomes impatient. A team from the fields of physics, computer science, and social psychology is developing new approaches to describe crowd dynamics. The research is supported by large-scale laboratory experiments with numerous participants, state-of-the-art analysis methods and a powerful simulation environment. You can find out more about us and our research here: <https://www.fz-juelich.de/en/ias/ias-7>

We are offering, with the position starting date on April 1, 2026, a

PhD Position – Agent-based models for crowd dynamics

Your Job:

In the CrowdING project, you will develop agent-based movement models that realistically simulate different behaviors such as lining up, overtaking, or pushing. Based on this, you will analyze how these behavioral differences affect collective phenomena in large crowds. The models will be integrated into the JuPedSim simulation environment and further developed there. To support model development and validation, you will also participate in the planning and execution of laboratory experiments and the analysis of the collected data. The project is being carried out in close collaboration with the University of Wuppertal and the University of Groningen (NL). Your tasks will include:

- Developing agent-based movement models with different movement strategies
- Analyzing how these different movement strategies influence collective phenomena in crowds
- Integrating and further developing the models in the JuPedSim simulation framework
- Evaluating experimental data to validate and improve the models

The job will be advertised until the position has been successfully filled. You should therefore submit your application as soon as possible. We look forward to receiving your application 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

- Exchanging ideas and working closely with partners from physics, computer science, and social psychology
- Collaboration in the planning, implementation, and evaluation of crowd experiments
- Publication of research results in international journals
- Presentations at international conferences and participation in project workshops in Wuppertal and Groningen (NL)

Your Profile:

- Completed university degree (master's or equivalent) in physics, computer science, mathematics, data science, computational science, and cognitive science
- Very good programming skills (e.g., in Python, C++, or comparable languages)
- Ideally, initial experience in the field of crowd dynamics, modelling, or data analysis—however, a strong scientific interest is more important to us than prior knowledge
- Enthusiasm for combining and expanding methodological approaches and developing new metrics or models
- Enthusiasm for working in a team and in the interdisciplinary research environment of IAS-7
- Very good communication skills, also in an intercultural context
- Very good written and spoken English
- Structured scientific approach and enjoyment of independently developing models and research methods

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:

- **MEANINGFUL TASKS:** The position offers a varied and diverse role in an international environment and freedom to pursue your own research ideas within the project context
- **KNOWLEDGE & FURTHER TRAINING:** Your further development is important to us – we offer a structured research environment with excellent opportunities for scientific advancement
- **SUPERVISION & SUPPORT:** We will accompany your doctoral studies with continuous, expert guidance from your academic supervisor
- **WORK-LIFE BALANCE:** Optimal conditions for balancing work and private life, as well as a family-friendly company policy. The option of flexible working (in terms of location) is generally available after consultation and in accordance with upcoming tasks and (on-site) appointments
- **VACATION:** You will receive 30 days of vacation
- **FAIR REMUNERATION:** Depending on your qualifications and assigned responsibilities, you will be classified according to pay group 13 (75%) of the TVöD-Bund. Additionally, you will receive a special payment ("Christmas bonus") amounting to 60% of one month's salary. All information about the TVöD-Bund collective agreement can be found on the BMI website (pay scale table on page 66 of the PDF download): <https://go.fzj.de/bmi.tvod>
- **FIXED TERM:** The employment of doctoral students in Jülich is governed by a doctoral contract, which usually has a term of three years. There is an option to extend the term to four years.

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

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.

The following links provide further information on diversity and equal opportunities:

<https://go.fzj.de/equality> and on the targeted promotion of women:

<https://go.fzj.de/womens-job-journey>