

Fully Funded PhD/Postdoc Positions in Rational Machine Learning

Saarbrücken, October 22, 2026

The Rational Intelligence Lab (<https://ri-lab.org/>) at the CISPA Helmholtz Center for Information Security in Saarbrücken, Germany (<https://cispa.de/en>), is seeking several doctoral students and postdoctoral researchers to work on the following topics:

- **Open Topic (3 PhD or postdoctoral positions):** Successful candidates will pursue research in rational machine learning at the intersection of machine learning and economic theory, aiming to improve the rationality, efficiency and reliability of intelligent systems. Research topics are flexible and will be developed jointly around each candidate's interests and expertise. Possible directions include out-of-distribution generalisation, causality, incentive-aware machine learning, distributed and collaborative learning, imprecise probabilistic machine learning, human-AI collaboration, learning from preference and choice data, and learning in games. Applicants are encouraged to propose other directions aligned with the group's broader research goals.

Start date: As soon as possible.

- **Metacognitive AI (1 PhD position, 1 postdoctoral position):** Successful candidates will join a collaborative project advancing the metacognitive capabilities of frontier AI systems to improve their trustworthiness, safety and efficiency.
 - The postdoctoral researcher will help establish the mathematical foundations for metacognitive AI based on imprecise probabilities, and will subsequently extend this foundation to coherent learning, updating, inference, and decision-making principles, and investigate their application to modern AI architectures. The candidate will also contribute to the theoretical guarantees for decision-making, multi-agent interaction, deployment, and faithfulness verification. Given the theoretical depth, the position requires a researcher with a completed PhD and strong expertise in mathematical machine learning, probability/statistics, uncertainty quantification, or related areas.

Starting date: May 1st, 2027 or later.

- The doctoral researcher will primarily work on metacognitive harness for AI agents, developing and evaluating methods that equip existing AI systems with metacognitive capabilities at different levels of model access. This includes black-box, semi-transparent, and model-based harnesses for uncertainty assessment, calibration, abstention, and safe decision-making, as well as their empirical evaluation on foundation models and agentic systems. The position requires a strong Master's degree in computer science, machine learning, mathematics, statistics, or a related field, together with solid programming skills and a strong foundation in machine learning and probabilistic modelling.

Starting date: No later than May 1st, 2027.

- **Epistemic Machine Learning with Kernels (1 PhD position):** The successful candidate will work at the intersection of Hilbert space embeddings of distributions and imprecise probabilities. The project aims to advance *epistemic* machine learning by extending kernel mean embeddings to faithfully represent epistemic uncertainty across a broad range of imprecise probabilistic models. Research topics include Hilbert space representations of credal sets, empirical estimation and statistical inference, and uncertainty quantification using kernel credal representations. Given the project's theoretical focus, applicants should have a strong background or interest in mathematical machine learning, probability and statistics, kernel methods, uncertainty quantification, or related areas. The position includes the opportunity for a six-month research visit to our partner lab at Nanyang Technological University (NTU) in Singapore.

Start date: No later than September 1st, 2027.

For more information on our past and current research, please visit our publications page at <https://ri-lab.org/pubs/>.

What We Offer

Doctoral and postdoctoral researchers are full-time employees and are paid and receive benefits according to the E13 scale of the collective salary agreement for civil servants of the federal state (TVöD-Bund). The gross monthly salary, based on 39 hours per week and dependent on relevant experience usually ranges from 4000€ to 6000€. Additional benefits include roughly 6 weeks of paid annual leave; a collectively agreed annual special payment; paid sick leave; as well as maternity and parental leave; the possibility to set up a workplace at home in Germany; a pension scheme; the possibility to follow courses to learn German. The research groups have sufficient annual budget for the members to purchase necessary research equipment and to attend international conferences.

The candidates will have the opportunity to collaborate with other research groups at CISPA (<https://cispa.de/en/research>) and with partners within the Helmholtz AI Cooperation Unit (<https://www.helmholtz.ai/>). We strongly encourage collaborations with neighboring research institutes at the Saarland Informatics Campus (<https://saarland-informatics-campus.de/en/>) such as Saarland University (UdS), Max Planck Institute for Informatics (MPI-INF), Max Planck Institute for Software Systems (MPI-SWS), Helmholtz Center for Pharmaceutical Research (HIPS), Deutsches Forschungszentrum für Künstliche Intelligenz GmbH (DFKI), as well as the Max Planck Institute for Intelligent Systems (MPI-IS) in Tübingen. International collaborations will be highly appreciated.

Our group is part of the ELLIS Unit Saarbrücken (<https://ellis.eu/units/saarbrucken>).

About CISPA

The CISPA Helmholtz Center for Information Security provides a unique work environment that offers the advantages of a university department and a research laboratory alike. As the latest member of the Helmholtz Association, the largest research organization in Germany, CISPA has embarked on a mission: to rethink the digitalized world of the future from the ground up and make it safer through innovative cutting-edge research. In the medium term, the center will grow to more than 800 employees with not less than 60 Faculty and research group leaders. Faculty receive extremely competitive institutional funding, enjoy academic freedom, and build and lead their team of young researchers, and are granted the opportunity to teach graduate and undergraduate courses.

At CISPA, there is a growing number of faculty members with strong interests in areas such as machine learning theory, deep learning, optimization, causality, trustworthiness, privacy, AI safety and security, and robustness among others.

CISPA is located in Saarbrücken, in the tri-border area of Germany, France, and Luxembourg. We maintain an international and diverse work environment and seek applications from outstanding researchers

worldwide. **The working language is English.** A command of German is not required for a successful career at CISPA.

How To Apply

Applications and inquiries should be sent to ri-recruitment@cispa.de. A complete application must include: (1) a cover letter, (2) a CV, (3) academic transcripts, and (4) a personal or research statement. All positions will remain open until filled.

PhD applicants are also welcome to apply through the ELLIS PhD Program and select **Krikamol Muandet** as their preferred main supervisor.