

PEPR AI Chairs 2024 Call for Applications

<https://anr.fr/fr/detail/call/chaieres-industrielles-edition-2024/>

As part of the French Strategy in Artificial Intelligence (AI), PEPR AI Chairs program offers exceptionally talented AI researchers the opportunity to establish and lead a research program and team for a duration of 4 years in France. This action extends efforts launched in the first period under the Choose France program. This PEPR AI Chairs program is open to both junior and senior researchers, with the primary criterion being an outstanding research track record. Applications are welcome from individuals who earned their PhD either in France or abroad. Candidates who obtained their PhD in France and wish to return must demonstrate substantial international research experience, including mentoring students and managing scientific projects.

This call is open to filling at least 5 positions. Candidates must demonstrate outstanding track records in machine learning (ML), particularly in the thematic areas of the PEPR AI (cf. <https://www.pepr-ia.fr/>):

- frugality
- embedded AI
- trustworthiness
- distributed AI
- mathematical foundations of AI

To attract the best talents, the program will provide customizable integration options tailored to candidates' varying degrees of seniority and experience. Candidates may be hosted in laboratories associated with the PEPR, in laboratories not affiliated with the program but with clear and strong synergies with the PEPR IA projects (<https://www.pepr-ia.fr/projets/>).

The selected candidates may be recruited by any University or Research institute in France. Candidates must propose at least one laboratory to host their research project. They must contact the director of this laboratory and explain in their research proposal how their project aligns with the chosen laboratory, the PEPR AI objectives and how they complement the works already targeted by the ongoing PEPR projects. The final appointment decision will be made by the PEPR AI Committee after candidates are selected and interviewed by a scientific recruitment committee. Candidates are expected to contribute to the overall French AI Strategy, and applications that align with the PEPR projects and other initiatives of the French AI Strategy, like Cluster AI institutes are encouraged.

Proposals with co-funding by a French industrial partner will be considered favourably. In this case, the proposal should be accompanied by a letter of commitment of the industrial partner at the time of submission. Typical co-funding is 50% of the overall expenses. If the co-funding contribution is less than 50%, the part of the work supported by the industrial partner must be clear and focused. If more, the proposal will be carefully studied to ensure that the

proposed work targets research to advance AI foundations and that it provides high engagement to share majority of the results with the whole research community.

The program offers competitive salaries as well as an environment for research in the form of a package that, depending on experience, may go up to 1,2M€ for the period (including gross employer costs for the awarded candidate and other expenses for hiring students and postdocs).

Position Details:

- **Number of Positions:** At least 5 high-level senior or young senior scientists (post-tenure or equivalent, internationally known, influential, and productive) and exceptionally talented early-career researchers in AI.
- **Institutions:** Successful candidates will hold research positions at one of the French universities or research institutes. They may join existing teams or propose new research teams.
- **Research Environment:** Candidates can benefit from robust support, including a 4 to 5-year package covering the recruitment of PhD students, post-doctoral fellows, and engineers (approximately 1.2M € for up to 5 years for senior positions, up to 1M € for early-career researchers for up to 5 years positions).
- **Location:** Various research institutions across France.
- **Teaching:** Optional teaching opportunities are possible depending on the hosting institution.

Eligibility Criteria:

- **Current Position:** Applicants must currently hold a position outside of France.
- **Background:** Open to candidates from both academic and industrial sectors.
- **Nationality:** No nationality requirement, but this position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.
- **Commitment:** Candidates are expected to be based in France during the duration of the chair.

Selection Criteria:

- Commitment to develop sustainable activities within the French research landscape.
- Proposal aligning with laboratories and contributing to the French AI Strategy.
- Ability to interact with economic stakeholders to stimulate innovation and potentially support the creation of technology start-ups.
- **For Senior Positions:**
 - International visibility and scientific leadership in machine learning and related fields.

- Ability to open new research avenues or create new disciplines.
- Creativity, originality, and open-mindedness.
- Experience in leading a team of high-level researchers.
- **For Early-Career Positions:**
 - Outstanding research track record in machine learning and related fields.
 - Experience in mentoring students and managing scientific projects.

Support for Candidates:

- **Relocation Assistance:** Comprehensive support for candidates and their families, including spousal or partner employment assistance.
- **Diversity Commitment:** Encouragement for applications from women and other underrepresented groups. Commitment to equal opportunity employment.

Application Process:

1. Documents Required:

- a. Cover Letter.
- b. Curriculum Vitae (CV).
- c. Letters of support from the potential hosting institutions.
- d. Description of Research Experience and Plans (5 pages max), addressing the listed selection criteria.
- e. Keywords (3-5) describing research interests.
- f. List of References (minimum 3 contacts, no letters needed).
- g. A report describing the proposed research program, including its alignment with one or more laboratories (up to 5 pages excluding bibliography).
- h. In the case of a proposal with co-funding by an industrial partner, a letter of commitment of the industrial partner (encouraged)

2. Submission:

- a. **For Senior Positions:** Email documents to senior-chair-application@pepr-ia.fr.
- b. **For Early-Career Positions:** Email documents to junior-chair-application@pepr-ia.fr.

Project selection follows a rolling evaluation process, with multiple review sessions held throughout the year.

3. Evaluation:

- a. Applications will be evaluated by a selection committee composed of leading scientists in the domain, based on excellence.
- b. Short-listed candidates will be invited to an interview by videoconference.

About PEPR AI

Artificial intelligence (AI) is now central to our industrial competitiveness and to the performance of services essential to our society—not to mention the technology's major implications for state sovereignty. And the global AI ecosystem is nothing if not complex. New tech giants have emerged around AI, and AI startups have risen to unprecedented heights. The constellation of stakeholders gravitating around these AI players is vast, spanning higher education and research and encompassing businesses of all types cutting all industries.

The French government recently introduced its France 2030 investment plan, which will fund a new phase in the National Artificial Intelligence Strategy through an instrument called the Priority Research Programme and Equipments on AI (PEPR IA). A total of €73 million in government funding will be disbursed over six years and the program will be overseen by the CEA, CNRS, and Inria, three major research organizations. The goal is to guarantee France a long-term seat at the global AI table. This new program, which funds research from fundamental science to proofs of concept, aims to remove the scientific barriers to progress on the technological pillars of the national AI strategy, with nine ambitious projects already underway. It aims to meet the essential and fundamental challenges of machine learning in 3 complementary areas:

- **Trustworthy AI and Distributed AI** via a multifaceted point of view on trustworthiness, integrating the development of the foundations of robustness through statistical approaches; the integration of formal methods for the specification, the learning and the validation of AI models; the development of decentralized learning mechanisms guaranteeing safety; the integration of causal models with machine learning to benefit from grounded explanation capabilities.
- **Frugal AI and Embedded AI** via deepening the theoretical and algorithmic foundations of Machine Learning, to ensure frugality by design in both data and compute; advanced optimization of models and tight control of training to meet hardware constraints; design of modular, flexible and adaptive hardware architectures dedicated to AI; exploration of computational models close to physics.
- **New Mathematical Foundations of AI**, particularly in the field of mathematical analysis, via the integration of recent tools and advances in partial differential equations, optimal control and optimal transport to develop new architectures, stable optimization schemes, and efficient solvers, and the understanding of generative and diffusion models from an analytical point of view.

The PEPR IA has already initiated nine ambitious projects, addressing key scientific challenges within these three areas. The ongoing projects include:

- **ADAPTING.** This project proposes a new architectural paradigm adaptable to any AI application and its constraints in terms of precision, energy, latency and reliability. The adaptive architecture will be designed to ensure the flexibility, efficiency, durability and reliability of embedded AI. This approach goes beyond current hardware architectures and is aimed at the next generation of AI applications.

Consortium Members: CEA, Centrale Lyon, Sorbonne University, University of Rennes, Nantes University, Université Bretagne Sud, CNRS, INSA Lyon, CPE Lyon

Project website: <http://perso.ec-lyon.fr/alberto.bosio/AdaptING/>

- **CAUSALI-T-AI.** This project aims at promoting the idea that causal modelling can significantly contribute as a methodology to guarantee the soundness of the AI cycle: from data to models, from models to decisions, from decisions to data. And make AI algorithms more robust and more explainable. The main scientific challenges are causal representation learning, as well as causal inference. The targeted applications are multiple and range from personalized medicine to the economy, including energy and the environment.

Consortium Members: Université Grenoble Alpes, Université de Lorraine, Université Paris-Saclay, CNRS, Inria

Project website: <https://sites.google.com/view/causali-t-ai/>

- **EMERGENCES.** This project aims to advance the state-of-the-art in emerging physics-based models by collaboratively exploring various computational models using the properties of different physical devices. The project will focus on bio-inspired event-driven models, physics-inspired models and innovative physics-based machine learning solutions. Emergences also intends to extend collaborative research activities beyond the consortium's perimeter, in conjunction with other PEPR projects and beyond other laboratories.

Consortium Members: CEA, CNRS, Université Côte d'Azur, Université Aix-Marseille, Université de Bordeaux, Université de Lille, Bordeaux INP, Centrale Lyon

Project website: <https://emergences.lirmm.fr/en/home/>

- **FOUNDRY.** The core vision of this project is that robustness in AI – a desideratum which has eluded the field since its inception – cannot be achieved by blindly throwing more data and computing power to larger and larger models with exponentially growing energy requirements. Instead, we intend to rethink and develop the core theoretical and methodological foundations of robustness and reliability that are needed to build and in still trust in ML-powered technologies and systems from the ground up.

Consortium Members: CNRS, Université Paris-Dauphine, Inria, IMT, ENS Lyon, Université de Lille, ENSAE Paris, Ecole Polytechnique Palaiseau

Project website: In progress

- **HOLIGRAIL.** This project looks at a holistic, global comprehension of the energy consumption of AI algorithms, to provide breakthroughs in efficiency when running

inference and training algorithms on specialized hardware. The results are intended to be integrated into development solutions for embedded systems.

Consortium Members: University of Rennes, CEA, Inria, INSA Lyon, Grenoble INP, CNRS

Project website: <https://project.inria.fr/holigrail/>

- **PDE-AI.** The main aim of this project is to support the creation of a group of applied mathematicians specializing in machine learning issues, and to stimulate the cross-over between mathematical analysis, optimal control and optimal transport, leading to new architectures for machine learning models. Three main themes are being investigated: a first theme focuses on the analysis of learning methods, a second on new deep architectures (where specific architectures for numerical simulation will be studied in particular), and a final research angle focusing on generative methods and diffusion from an analytical point of view.

Consortium Members: Université PSL, Université Paris-Dauphine, CNRS, Inria, Université Paris-Cité, Sorbonne Université, Université Paris-Saclay, Toulouse INP, Université de Bordeaux, ENSAE, Université Strasbourg, Université Paris 1 Panthéon-Sorbonne, ENAC, Université Toulouse Capitole, Université Toulouse 3 Paul Sabatier, Université Lyon 1, INSA Lyon, Université Côte d'Azur

Project website: <https://project.inria.fr/redeem/fr/>

- **REDEEM.** This project aims to explore new distributed learning approaches that are resilient, robust to noise and adversarial attacks, and respectful of privacy. These distributed approaches should make it possible to go beyond current federated learning. From a theoretical point of view, REDEEM aims to provide a solid foundation for the proposed approaches, particularly in the case of malicious protagonists participating in the learning phase, and with the overriding objective of ensuring data confidentiality as far as possible. In addition to new approaches to distributing learning, REDEEM also aims for efficient implementations, by offering the community open-source code and tools.

Consortium Members: CEA, INRIA, CNRS LAMSADE, Ecole Polytechnique

Project website: <https://project.inria.fr/redeem/>

- **SAIF.** This project aims to specify the behavior of ML-based systems, to develop methodologies to validate their large-scale performance, and to guide their design using formal approaches, in order to guarantee their safety, reliability and explicability.

Consortium Members: CEA, CNRS, Inria, Université Bordeaux, Université Paris-Saclay, Institut Polytechnique de Paris, Centrale Supélec, ENS Paris-Saclay, Bordeaux INP

Project website: <https://project.inria.fr/saif/>

- **SHARP.** The major challenge of this project is to design, analyze and deploy intrinsically frugal models (neural or not) able to achieve the versatility and

performance of the best models while requiring only a vanishing fraction of the resources currently needed.

Consortium Members: Inria, Université Paris Dauphine-PSL, École des Ponts ParisTech, CNRS, CEA, Sorbonne Université, ENS Lyon, ESPCI Paris

Project website: <https://project.inria.fr/sharp/>

The scientific challenges inherent to AI cannot be addressed without also considering the societal challenges raised by the technology. The impacts of AI on the planet, on society, and on our technological sovereignty are vital concerns.

See: <https://www.pepr-ia.fr/en/accueil-english/>

And: <https://www.pepr-ia.fr/en/projects-english/>



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