Offer #2025-08689

Development and application of AI-based numerical modeling tools for nanophotonics

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : Graduate degree or equivalent

Fonction : Temporary scientific engineer

Level of experience : Recently graduated

About the research centre or Inria department

The Inria centre at Université Côte d'Azur includes 42 research teams and 9 support services. The centre's staff (about 500 people) is made up of scientists of di?erent nationalities, engineers, technicians and administrative staff. The teams are mainly located on the university campuses of Sophia Antipolis and Nice as well as Montpellier, in close collaboration with research and higher education laboratories and establishments (Université Côte d'Azur, CNRS, INRAE, INSERM ...), but also with the regiona economic players.

With a presence in the fields of computational neuroscience and biology, data science and modeling, software engineering and certification, as well as collaborative robotics, the Inria Centre at Université Côte d'Azur is a major player in terms of scientific excellence through its results and collaborations at both European and international levels.

Context

Atlantis is a joint project-team between Inria, CNRS and Université Côte d'Azur, which gathers applied mathematicians and computational scientists who are collaboratively undertaking research activities aiming at the design, analysis, development and application of innovative numerical methods for studying nanoscale light-matter interaction problems. In the recent years, the team has developed the DIOGENeS [https://diogenes.inria.fr/] software suite, which is organized around several numerical tools for the simulation of physical problems related to the fields of nanophotonics and nanoplasmonics. In particular, this software suite implements several high-fidelity fullwave solvers based on high-order Discontinuous Galerkin (DG) methods tailored to the systems of time- and frequency-domain Maxwell equations possibly coupled to differential equations modeling the behavior of propagation media at optical frequencies. Moreover, DIOGENeS also includes algorithms and workflows for the inverse design of nanostructures and nanophotonic devices for harvesting and shaping nanoscale light-matter interactions. The numerical methods currently implemented in DIOGENeS are accurate and flexible but they are also time consuming. For this reason, the team has recently launched a line of research aiming at the design of novel AI-based methods by considering purely data-driven or model-driven modeling approaches.

Assignment

The first objective in this assignment is to participate in the development of a novel software platform that will implement AI-based methods for the study of nanoscale light-matter interactions and the design of advanced nanoscale structures and devices for various applications in the realm of planar optics. In particular, the recruited engineer wil actively collaborate with researchers, postdoctoral fellows and PhD candidates of the team who are involved in research activities on modeling methods based on artificial neural networks. As a second goal of this assignment, the recruited engineer will also actively participate in the studies conducted by the Atlantis team members for demonstrating the benefits of the developed numerical tools for concrete applications that are addressed in close collaboration with physicits from national and international labs, and with industrial partners of the team.

Main activities

Overall, that activities that will be conducted in this assignment are:

- Development of a modular software infrastructure to host new numerical modeling methods based on various types of artificial neural networks;
- Implementation of various data-driven and model-driven methods, in close collaboration with researchers, postdoctoral fellows and PhD candidates of the team;

- Documentation for developers and users of the novel software platform;
- Use case studies in the context of academic and industrial partenerships, using numerical tools from the DIOGENeS software suite and the AI-based tools of the novel software platform;
- Post-processing and reporting of use case studies including participation to scientific publications with researchers, postdoctoral fellows and PhD candidates of the team.

Skills

Candidates will hold a PhD degree in applied mathematics/scientific computing or computational wave physics or computational photonics.

Required skills:

- Sound knowledge of deep learning with neural networks;
- Knowledge of numerical analysis and development of finite element type methods for computational physics;
- Strong programming skills (Python and PyTorch);
- Fluent spoken and written English.

Other skills that will be appreciated:

- Experience in numerical modeling for computational electromagnetics;
- High performance computing programming models (MPI, OpenMP/OpenACC, CUDA).

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Contribution to mutual insurance (subject to conditions)

Remuneration

From 2692 € gross monthly (according to degree and experience)

General Information

- **Theme/Domain :** Numerical schemes and simulations
  Scientific computing (BAP E)
- **Town/city :** Sophia Antipolis
- **Inria Center :** Centre Inria d'Université Côte d'Azur
- **Starting date :** 2025-10-01
- **Duration of contract :** 12 months
- **Deadline to apply :** 2026-06-30

Contacts

- **Inria Team :** ATLANTIS
- **Recruiter :**
  Lanteri Stéphane / Stephane.Lanteri@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

Warning : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

Instruction to apply

Defence Security :
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.

Recruitment Policy :
As part of its diversity policy, all Inria positions are accessible to people with disabilities.