



NUMERICAL **SIMULATION & MODELLING**

Numerical simulation and physical modelling are essential tools to enable and accelerate the development of all leading-edge technologies, from the earliest process developments to the proof of concept on demonstrators. At the material level, atomistic simulations are used to anticipate, understand and optimize the thermal, mechanical, thermodynamic or optical properties of new materials, according to the required specifications. This predictability can be extended to device and process integration levels through the development of physical models built from ab initio simulation and experimental results and implemented in finite elements / finite difference simulation tools. Such Technology Computer-Aided Design tools are then used to set-up the fabrication process flow and to efficiently optimize the design of the device.

For example, to enable the design of semiconductor integrated circuits, compact (or SPICE) models

are needed to accurately reproduce the behaviour of active and passive devices on the whole operating domain. In another domain of energy, Li-ion batteries and fuel cells will be improved by numerical simulation, in particular for new material designs, electrode optimization, durability prediction and mitigation. Throughout this tool chain, research in the field of numerical simulation and modelling requires not only solid skills in physics, applied mathematics and programming, but also strong interactions with material research, process integration, device engineering, physico-chemical and electrical characterizations, operando characterization and system design.

Thanks to its huge fleet of equipment and skills in all these areas, CEA Tech is a unique place to grow innovative and useful developments in the field of multi-physics modelling, numerical simulation and virtual material and prototyping design.

WHY A PHD RELATED TO NUMERICAL SIMULATION & MODELLING AT CEA TECH?

Numerical simulation and modelling is at the heart of many CEA Tech research programs.

At CEA Tech, PhD students will find a complete chain of simulation and modelling tools and expertise, as

well as the world-class technological platforms of CEA-Leti & CEA-Liten Institutes in Grenoble Alpes. These include MEMS, photonics, CMOS, and battery platforms with know-how and heavy equipment required to develop, produce and characterize small runs of devices or lithium-ion batteries.

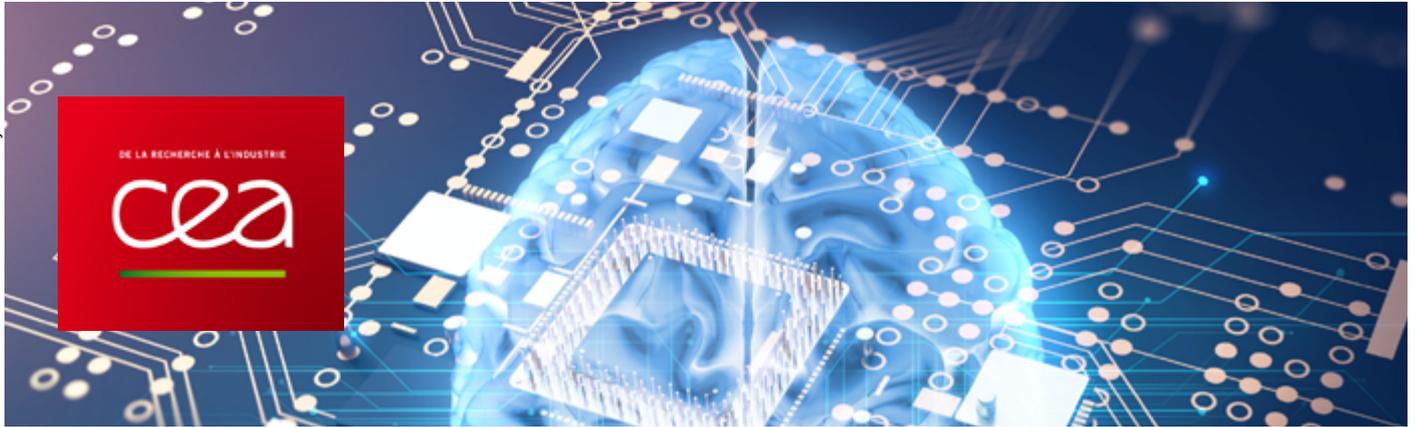
In that environment, PhD students will work with world class teams in process development, material and cell/device engineering, physico-chemical and electrical characterization

and system/circuit design. Through these daily interactions, their research work in simulation and modelling will be constantly fuelled by world class experimental data and their results will be rapidly used for technological development.

 CEA-Leti & CEA-Liten Institutes in Grenoble Alpes

 10-15 ongoing PhD projects





CEATECH SCIENTIFIC AND TECHNOLOGICAL CHALLENGES

CEA Tech tackles the three key and ongoing transitions of the 21st century: numeric, energy and medical ones. For each, CEA Tech research teams innovates within a vibrant network of academic and industrial partnerships, to develop the technologies of the future.

CEA Tech, one of the four CEA research divisions, relies on three large research Institutes, two in Grenoble, Leti and Liten and one in Saclay, List, and a network of technology transfer facilities in Bordeaux,

Nantes, Toulouse, Metz, Cadarache and Lille. Close to 500 young researchers, prepare their PhD in CEA Tech Labs, with a major contribution to the research teams. They share the successes of the CEA, embodied in leading publications, patents, technology transfers to industry, business and start up creation. For years, Reuters ranks CEA as one of the top three most innovative research organizations in the world (1st, 2nd or 3rd).

WHY A PHD AT CEA TECH?

Regardless of the field of research you are looking for, willing to explore prospective ideas or to further advanced technologie, you will likely find among CEA Tech doctoral positions the one that meets your expectations.

Then you can join either Leti (1800 p.) and focus on micro and nanotechnologies, embedded electronics, communications, components for the Internet of Things (IOT), cybersecurity, medical devices and healthcare outpatients (at Clinattec) - or Liten (950 p.) to face the challenges of non-CO2 emitting energies (solar, batteries, hy-

drogen, biomass or smart grids) - or List (750 p.) to innovate in terms of data intelligence, cybersecurity and IOT software, manufacturing (4.0 industries), radiotherapy, health data processing - or a research team located in one of the technology transfer facilities (Bordeaux, Nantes, Toulouse, Metz, Cadarache and Lille).

Whatever the topic you select, whatever the career path you envision, joining CEA Tech for your PhD has a deep meaning. On the one hand, you will be dealing with one major societal challenge, deeply rooted in science

and technology. On the other hand, your PhD will be at the heart of highly innovative ecosystems, each offering unique opportunities in research and career paths.

Indeed, CEA Tech offers a highly efficient mix of digital and hardware skills, world-class facilities such as state-of-the-art 300 mm clean rooms, and integration facilities for hydrogen and battery technologies, and many others. CEA Tech's teams form active partnerships with other research organizations and universities, as well as active cooperation with more than 500 industrial partners in France, Europe, North America and Asia.

We will do our best to accompany your success.



CEA-List Institute in Paris Saclay or CEA-Leti Institute in Grenoble Alpes or CEA-Liten Institute in Grenoble Alpes



500 ongoing PhD projects