



# COMMUNICATION NETWORKS, IOT, RADIOFREQUENCIES AND ANTENNAS

Wireless communications along with the Internet of Things (IoT) have been the most transformative technologies in the past 50 years bringing new opportunities to people, environment and industry, creating new opportunities for business and sustainability. Coming 5G networks are empowering networks to provide a single platform enabling a variety of services, such as enhanced mobile broadband communications, virtual reality, automated driving, and the Internet of Things. Today in research, it is already possible to envision the need to move beyond 5G and design a new architecture incorporating innovative technologies to satisfy new needs at both the individual and societal levels.

We expect that in the next decade, wireless data growth, driven by ubiquitous connection availability, new mobile applications and pervasive artificial

intelligence support to communication networks and services, will required even more new innovative solutions on the domain of the connectivity and distributed cloud. By 2030, future 6G networks will support disruptive new applications and services such as holographic communications, 5-sense media and pervasive support of ambient available intelligence enabled by cutting-edge technological innovations, concerning new network architectures for volumetric communications including in addition to ground communications backhaul as well as access via unmanned aerial vehicles and satellites. Moreover, groundbreaking technological innovations are expected in the domain of millimeter-wave and sub-THz radio communications, new hardware design, baseband and RF architecture, resources virtualization, new antennas design and much more.

## WHY A PHD RELATED TO CYBER PHYSICAL SYSTEMS – SENSORS AND ACTUATORS AT CEA TECH?



The innovation process supported by research, prototyping and international exchange never stops at CEA Tech, which is one of the few institutes able to carry competitively this type of R&D requiring internal multidisciplinary teams and know-hows, and through tight collaboration with national and international leading partners.

Research on future communications systems, IoT and its technological enablers not only feeds academic research and create new innovation trends but also it strongly impacts key industrial sectors like communications, new media, automotive, robotics, advanced manufacturing, health....

CEA Tech excellence research program

combines hardware, algorithm and software to tackle the development and correctly predict the behavior of future communication and IoT complex systems, ensuring both safety and security.

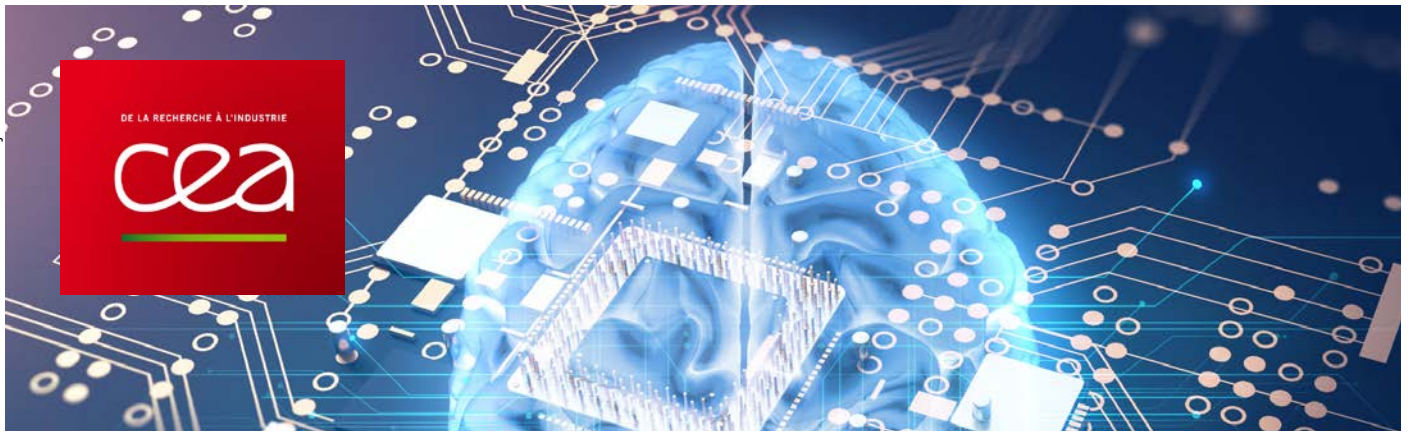
PhD student will be able to interact and work with CEA Tech world-class experts and with its international collaborator teams, on future wireless networks, distributed intelligence systems, sensors and actuators design, and RF technologies and components.



CEA-Leti Institute in Grenoble Alpes



50 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