



Nuclear Instrumentation & Measurement in the real heart of challenges

The CEA - a Key Player in Research Development and Technological Innovation in Nuclear Instrumentation and Measurement Sciences

The CEA - a prominent player in research, development and innovation is active in three broad areas: Energy, Health and Information Technologies, and Defense and Global Security. Excellence in fundamental research underpins its activities.

The CEA is a driving force for industrial innovation, developing partnerships with French and European industry groups. CEA teams explore and push the limits of scientific knowledge using cutting-edge, high-performance tools:

- Supercomputers
- Research reactors
- Large-scale physics instruments
- High-power lasers
- Nuclear fuel cycle
- Radioactive waste management

Nuclear Power Plants: Present, GEN III, GEN IV



EPR: European Pressurized Reactor



Helium tribometer: analysis of friction and wear in combined materials for gas-cooled fast reactor

Radioactive Waste Management

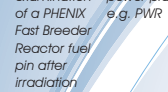


CEDRA: interim storage of long-lived intermediate-level waste



Inspection of waste packages

Nuclear Fuel Cycle

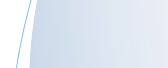


Metallographic examination of a PHENIX Fast Breeder Reactor fuel pin after irradiation

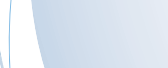


Fuel assembly for nuclear power plants, e.g. PWR

Microelectronics



Eye control of 200mm silicon wafer



Target loading in Endura 5500 machine

Nuclear Energy & Technologies

Healthcare



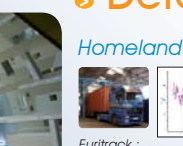
Hands-Feet control in nuclear facility

Radiation Protection



Safeguards

Safety



Nuclear Data Measurements

Defense



Euritrack: European Illicit Trafficking Counter measure Kit

Low-Level Measurements



Surface drilling NEEM Project: North Greenland Eemian Ice Drilling

Environmental monitoring

Water sampling in the Durance River for analysis

Naval Propulsion

RES: test reactor for nuclear propulsion submarine

Non-Proliferation

Secondary Ion Mass Spectrometer (SIMS) for illicit traffic detection

Large Scientific Tools

Astrophysics



Herschel: the largest infrared telescope

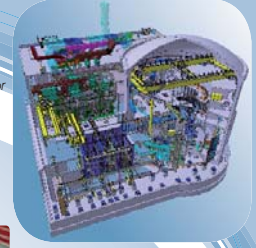


Mid-InfraRed Imager (MIRIM) for the next-generation JWST space telescope

Fission Research Reactors



Eole: Zero power reactor for physics experiments



JHR: advanced material testing reactor under construction at the CEA Cadarache Centre

Particle Accelerator



ATLAS: Large Hadron Collider (LHC) detector



CMS: Muon Chamber detector

ATLAS and CMS are designed for accurate measurements of particle energy and position emitted during very high-energy collisions

Tera-10 Supercomputer Calculation & Simulation



Advanced Data Acquisition



Nuclear facility's control room

Characterization



Jules Cesar subjected to computed tomography analysis

Leading Experimental Programs



Edelweiss experiment Measurement in severe conditions

Data Processing & interpretation



ITER: international project, the world's largest Tokamak



Tore Supra: Tokamak reactor with superconductor magnets

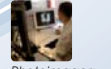
INDRA: charged-particle multidetector devoted to heavy ion collisions experiments at the GANIL laboratory



ITER: international project, the world's largest Tokamak

Biology & Medical Sciences

C.T.R. Computed Tomography Radiotherapy

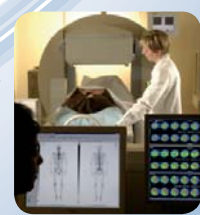


Photomager: radiotherapy result validation

P.E.T. Positron Emission Tomography



3D PET reconstruction



Medical scintigraphy examination

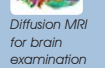


PET

M.R.I. Magnetic Resonance Imagery

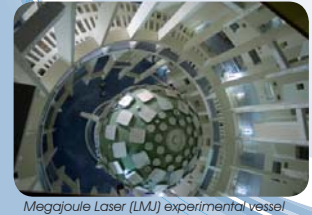


Neurospin



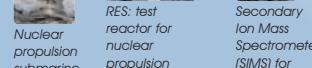
Diffusion MRI for brain examination

Dissuasion



Megajoule Laser (LMJ) experimental vessel

Homeland Security



RES: test reactor for nuclear propulsion

Non-Proliferation



Secondary Ion Mass Spectrometer (SIMS) for illicit traffic detection

Naval Propulsion

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Regarding a wide variety of CEA activity fields “from Nanotechnologies to Astrophysics” CEA is actively and deeply involved in a large range of research and development, notably related to nuclear instrumentation and measurement sciences that have a “fuzzy” boundary with an important number of these scientific and technological disciplines.

With nine research centres throughout France, the CEA is well integrated regionally and enjoys solid partnerships with other research organisations.

To fulfil its mission of disseminating knowledge and scientific culture, the CEA plays a key role in informing the public and backs educational and training initiatives for young people.

The CEA is also recognised as expert in its domains of competence and hence very active partner in the European Research Area and constantly broadening its international involvement.

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L'Institut National des Sciences et Techniques Nucléaires

At the forefront of teaching and training in nuclear science and technology.

The Institut National des Sciences et Techniques Nucléaires (INSTN) is a public higher-education institute. Created in 1956, INSTN is run by the French Atomic Energy Commission (CEA).

This institute of international stature shares CEA knowledge and know-how through its teaching and training. The teams – 115 people in France – are based at **Saclay** [headquarters, near Paris] and **Cadarache, Grenoble, Marcoule Cherbourg**.

Vocational or continuous training is available on subjects such as nuclear reactors, safety, security, Instrumentation and measurements, environment and radiation-protection.

In the field of **basic training**, each year at the INSTN a class of about 100 engineers sets out to obtain their post-graduate diploma specialised in nuclear engineering. After having attended 500 hours of lessons and having passed the exams, these young post-graduates are generally seen signing a job contract within one months! EDF, AREVA, IRSN, and the CEA are the main employers.

At the Cadarache INSTN Centre, **radiation protection certificates** for **technicians** and **senior technicians** tend to attract about 25 students for each course every year. These certificates can be taken either in a classic way or as a “study-work” programme (INSTN classes and work in a company).

About 85% of the graduates sign a permanent job contract with EDF, AREVA, CEA or contractors within 1 month after graduation.



The four Master programmes on offer at the Cadarache INSTN Centre are organised in association with the local universities. The latest Master focuses on **Instrumentation & Measurements for test devices in severe environments** in collaboration with Instrumentation Department (**La Filière Instrumentation**) at the **University of Provence**. This Master is accredited by INSTN and will boast the “Research & Profession” quality label right from 2009/2010 school year.

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