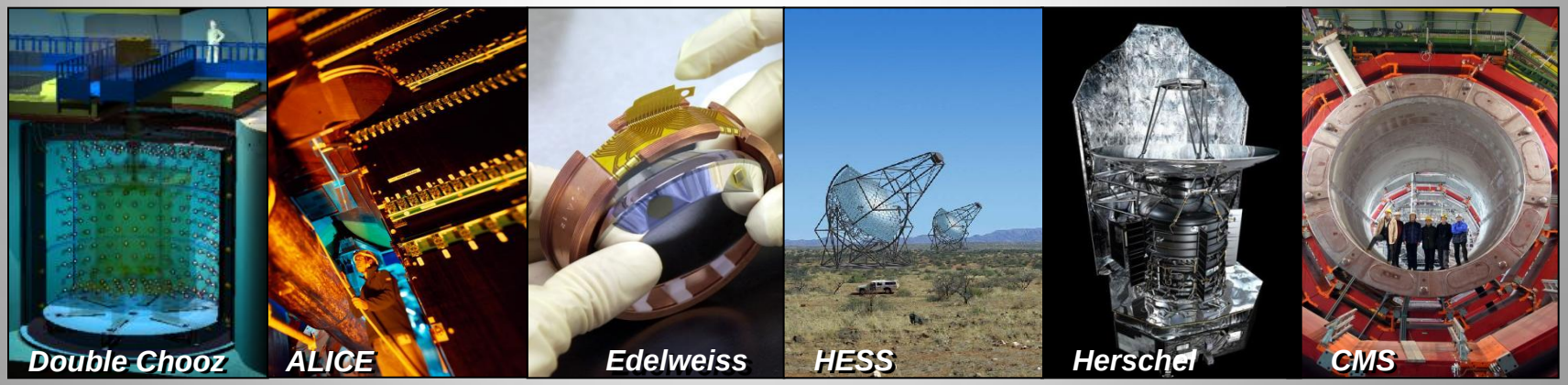
Institute of Research into the Fundamental laws of the Universe

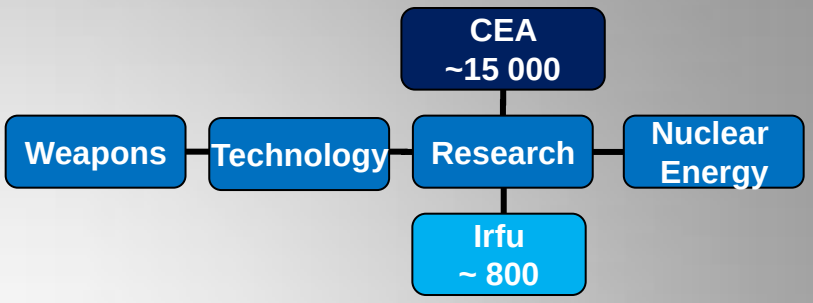
Nicolas ALAMANOS

Deputy director of the Institute

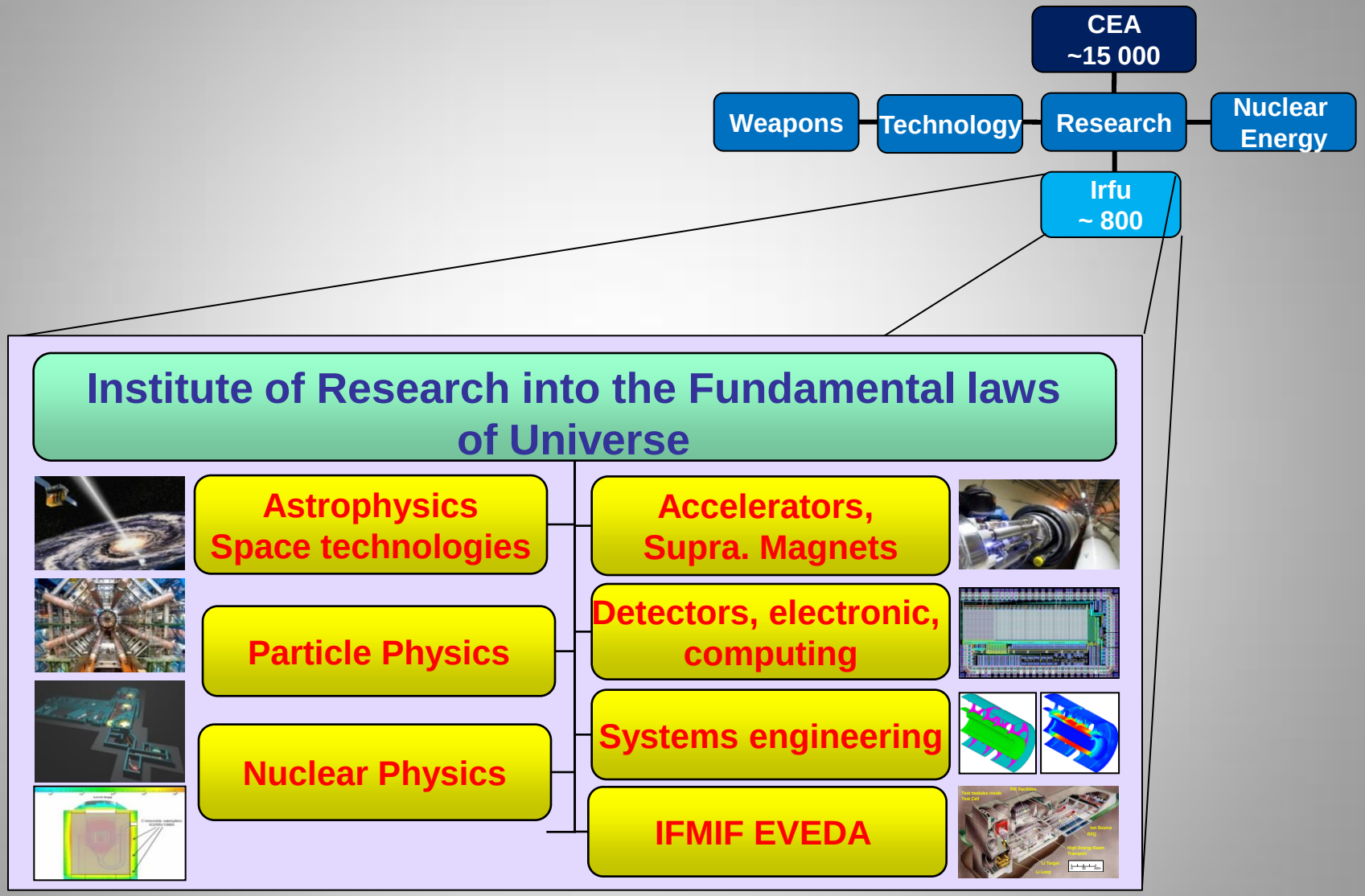


Detecting radiations from the Universe.

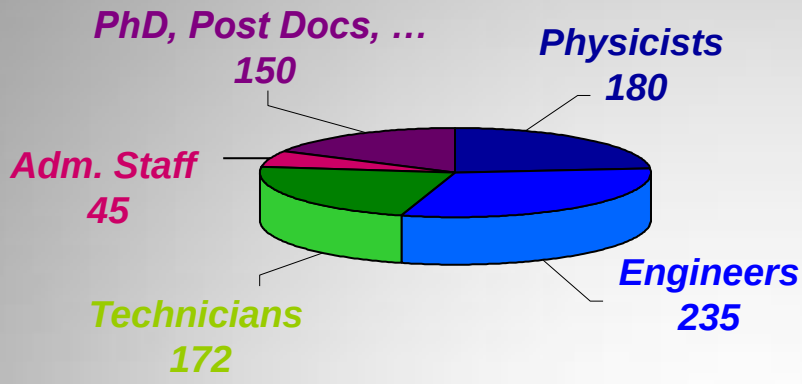
The larger institute of CEA



The larger institute of CEA : Research and technology

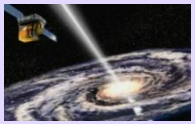


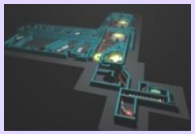
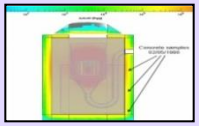
The larger institute of CEA



Research and technology

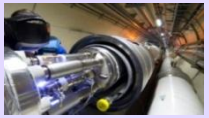
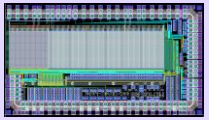
Institute of Research into the Fundamental laws of Universe

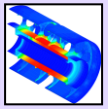
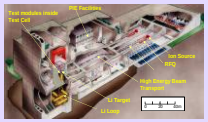


- Astrophysics Space technologies
- Particle Physics
- Nuclear Physics

- Accelerators, Supra. Magnets
- Detectors, electronic, computing
- Systems engineering
- IFMIF EVEDA

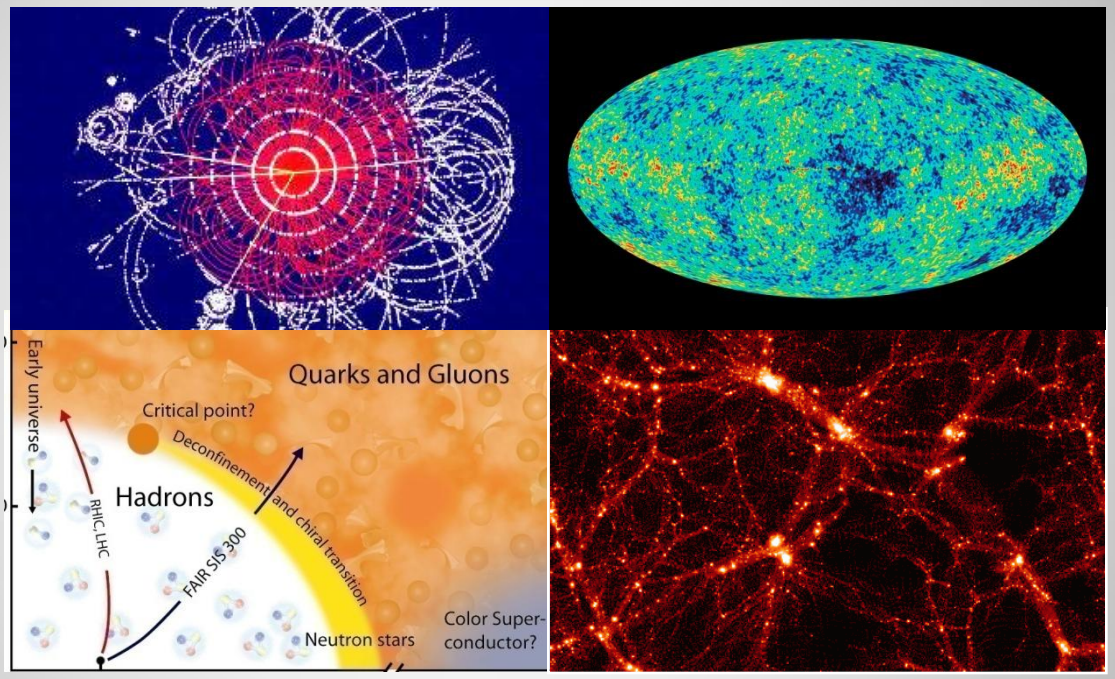



CEA - Irfu:4 fundamental questions

What are the ultimate constituents of matter ?

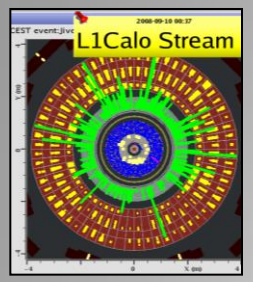
What is the energy content of the Universe ?

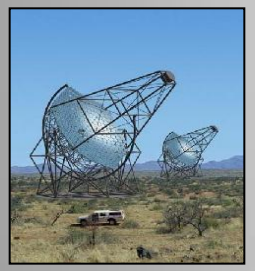


What are the properties of matter under extreme conditions ?

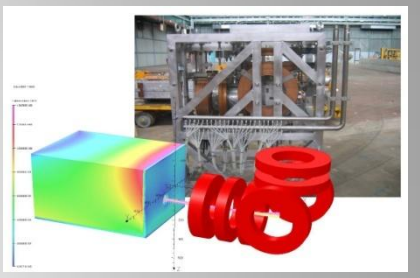
What is the origin and structure of Universe ?

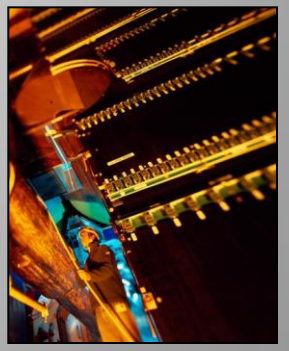
I. Discovering the fundamental laws of Universe



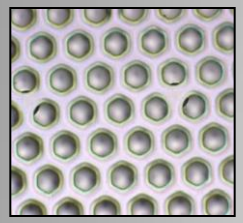


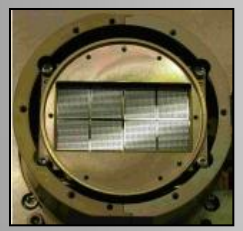
1. **Elementary constituents ?**
   - Standard Model, Higgs boson (D0,ATLAS,CMS)
   - Neutrinos oscillations (T2K, Double-Chooz)
   - Structure of Hadrons (COMPASS, JLAB)
2. **Energy content ?**
   - Dark Universe (Edelweiss, BAO, Euclid …)
   - Antimatter (Babar, Gbar)
3. **Structures in the Universe** ?
   - Cosmology (Horizon, Planck)
   - Formation of galaxies and stars (Hershel, JWST …)
   - Cosmic radiations (Fermi, SVOM, HESS, Antares)
4. **Matter under extreme conditions**?
   - Plasma of quarks and gluons (ALICE)
   - Exotic nuclei (GANIL/SPIRAL2, FAIR)



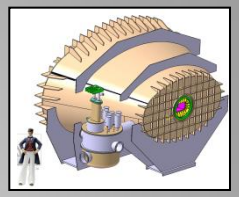


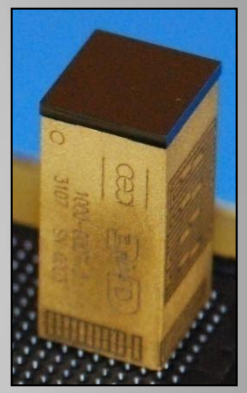
II. Inventing and constructing new devices

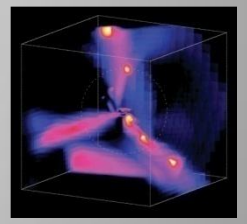




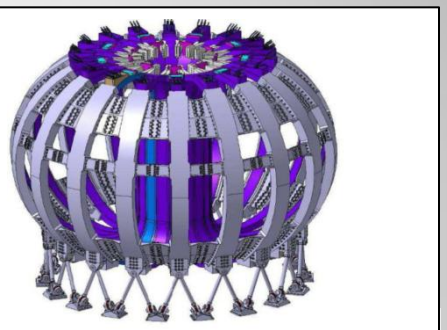
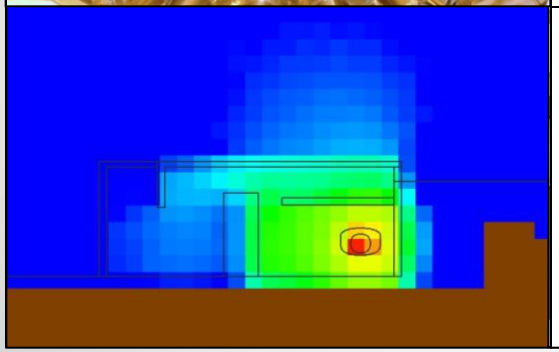
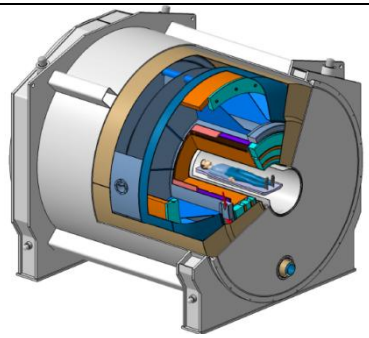
1. **Production and manipulation of radiations**
   - Accelerators (Spiral2, XFeL, FAIR, CERN, IFMIF, ESS)
   - Magnets and Superconductivity (R3B, ISEULT)
2. **Detecting radiation**
   - Microstructured detectors (RD51)
   - Imaging device (ELT-METIS, APEX, CALIST)
   - ASIC
3. **Space technology**
   - Camera (PACS, MIRI, Éclair)
   - Data center (Fermi, SVOM)
4. **Simulation and data treatment**
   - Massively parallel calculations
   - Grid
   - Data processing



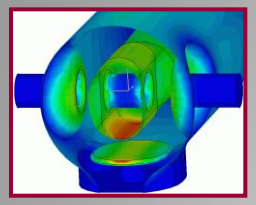




III. Applying research and technologies

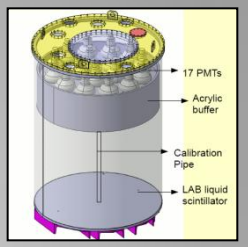
	knowledge	Know-How
Energy		
TGIR		

III. Applying research and technologies



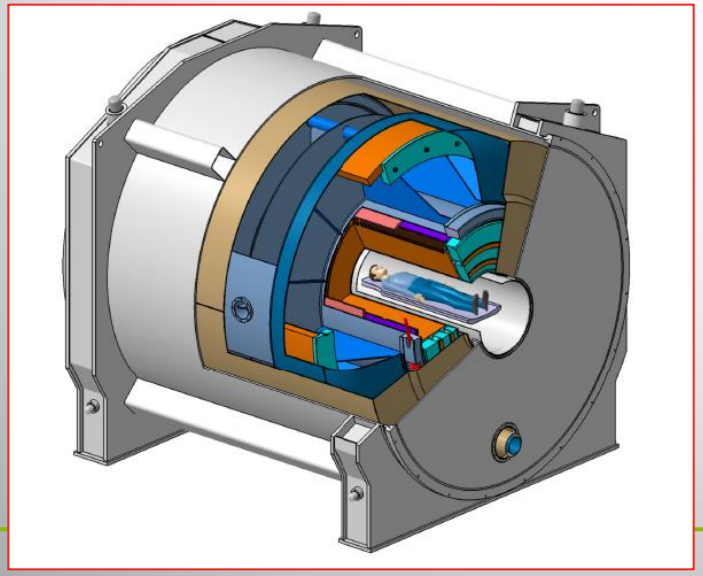
1. Nuclear energy

- Nuclear data and techniques (Nucifer)
- Fusion & Broader approach (IFMIF-EVEDA, JT60Sa, W7x)



2. Application for society

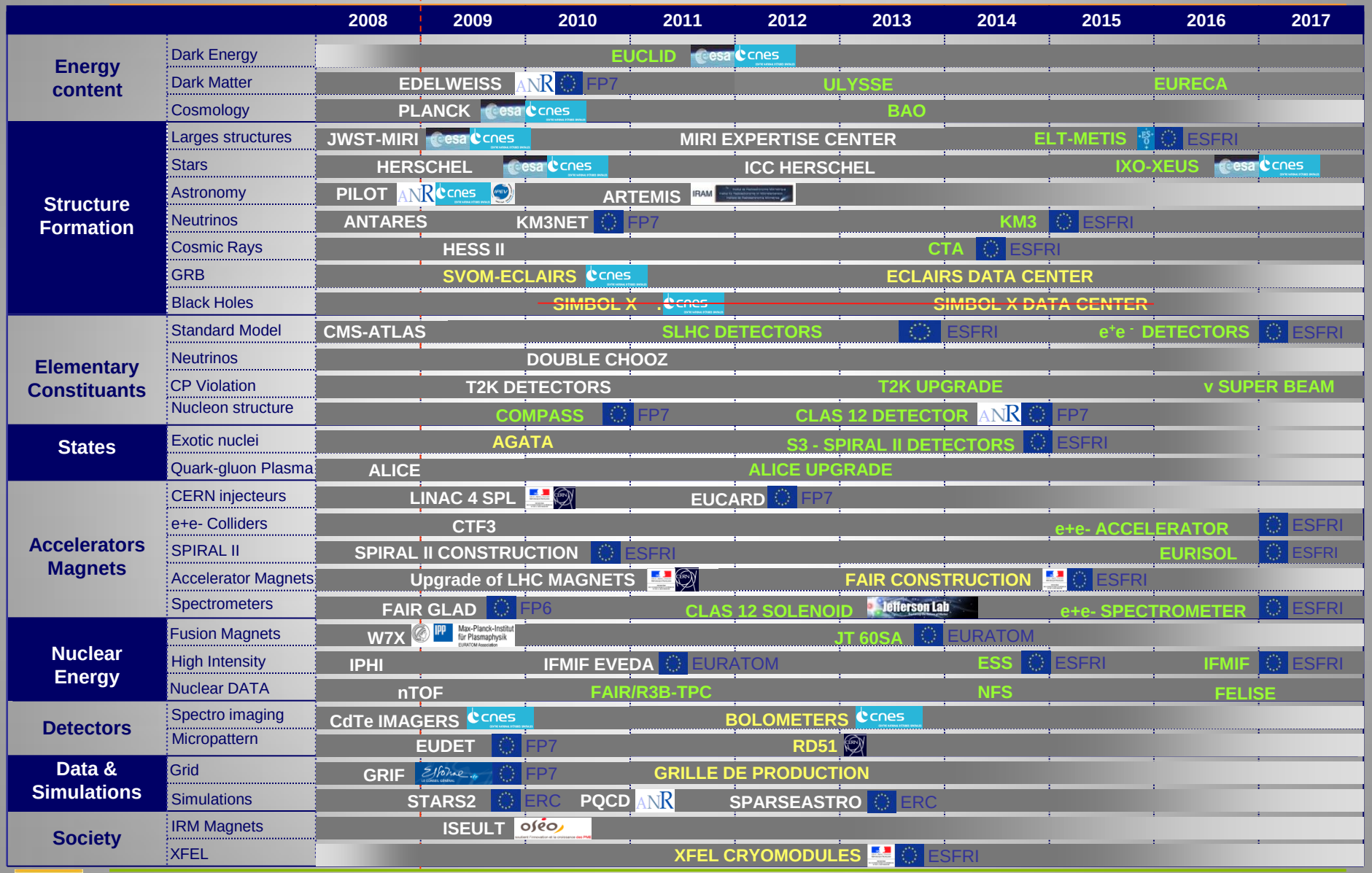
- Material science (XFeL, ESS)
- Application to life science (ISEULT)



Strong international collaborations

Research projects inside large international programs
implying a collaboration with other French and foreign institutions

Feuille de route TGI



EU Agencies

FR Agencies

Other Institutes

Scientific Production of the Institut

REVUES A FORT IMPACT	Nature	Science	Physical Review Letters
2005	1	9	64
2006	6	2	53
2007	2	3	61
2008	2	2	65
2009	3	6	58
Total 2005-2009	14	22	301

Dear Colleagues Welcome to the DITANET

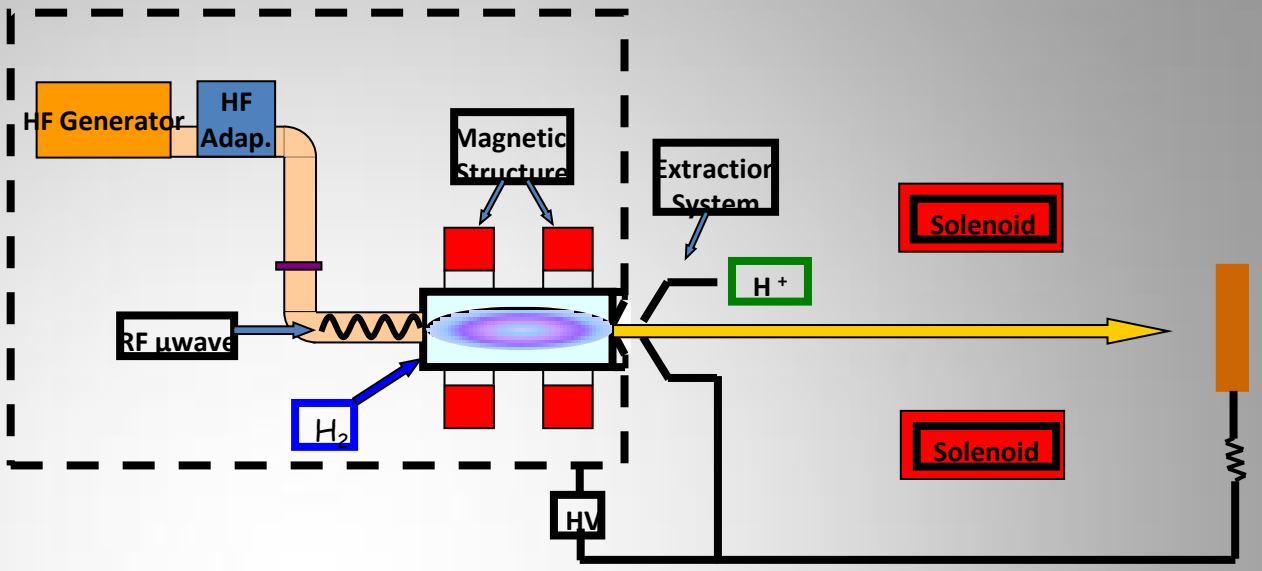
Topical Workshop on

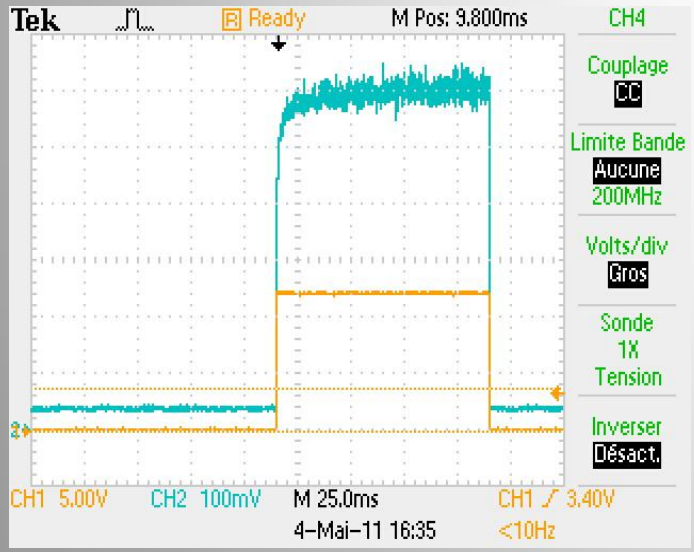
High Intensity Proton Beam Diagnostics

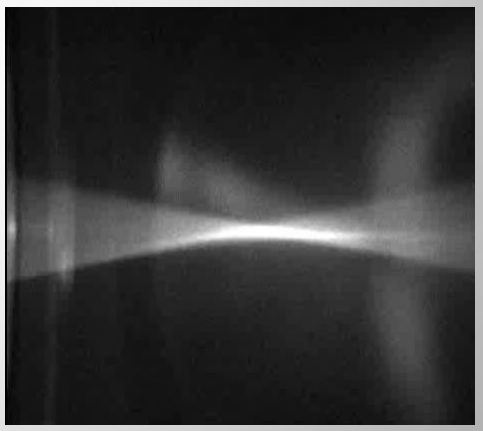
Le 1er Faisceau : 4 mai 2011

Faisceau de Protons:

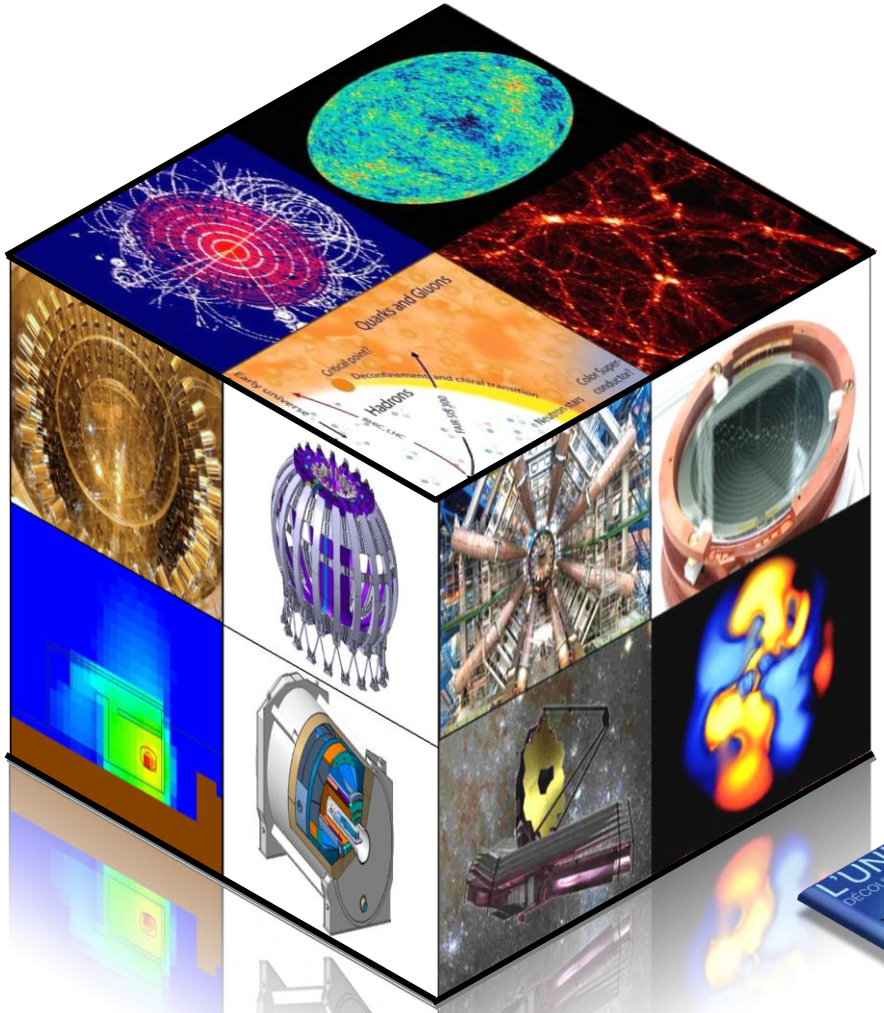
V source: 65 kV
V EI: 28 kV
P rf: 500 W (100 ms/2Hz)
Inj gaz: 2 sccm
Sol1: 70 A
I CF: 15 mA







Quelques pulses : faisceau de H+, 30 mA à 50 keV (juillet 2011)


Quarks and Gluons
Hadrons
Early universe
Today

Irfu


L'UNIVERS
DÉCOUVREZ SES MYSTÈRES
ANNÉE MONDIALE DE L'ASTRONOMIE
2009