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*IN2P3 Director*



**IN2P3**

Institut national de **physique nucléaire**  
et de **physique des particules**

**IN2P3 CSI meeting**  
**Paris June 2013**

[www.in2p3.fr](http://www.in2p3.fr)

With my sincere apologies



# KEY FIGURES

**40** major international projects  
**17** international research networks

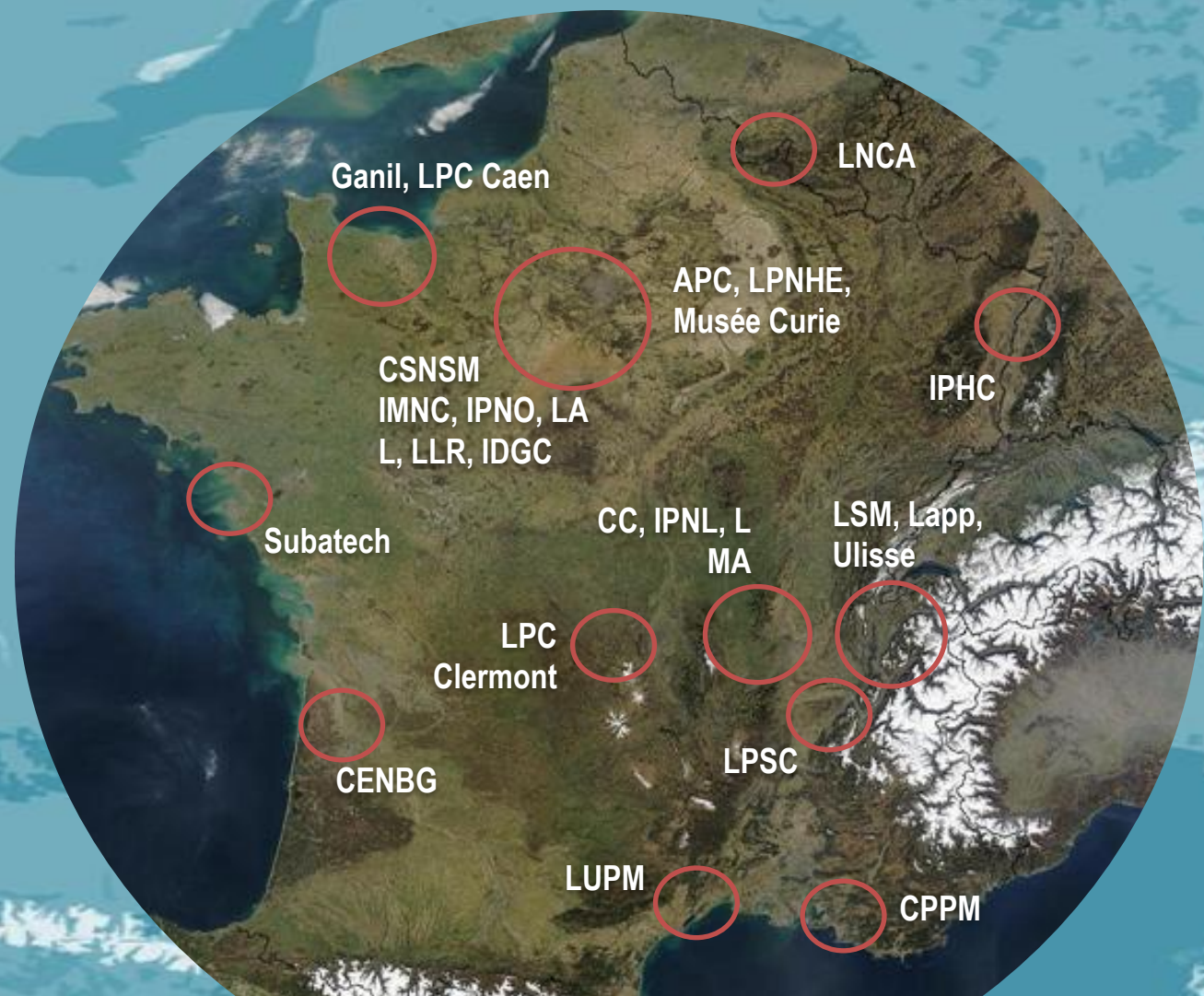
**77 M€**  
annual budget  
(excluding salaries)

**3 100**  
researchers,  
engineers and  
technicians

**25** laboratories  
and platforms



# NETWORKED LABORATORIES



# SCIENTIFIC THEMES

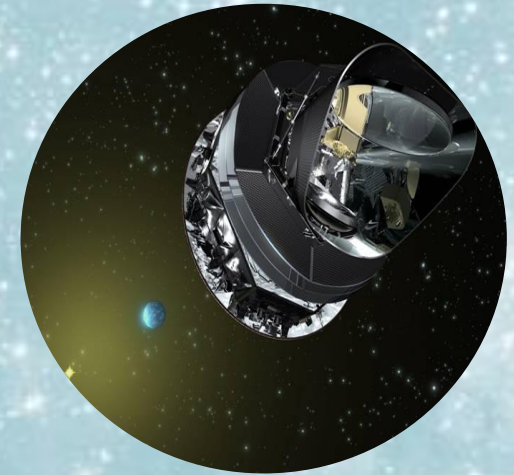
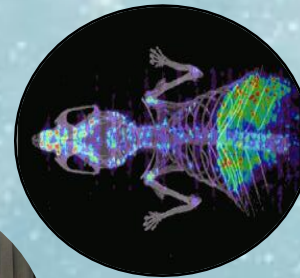
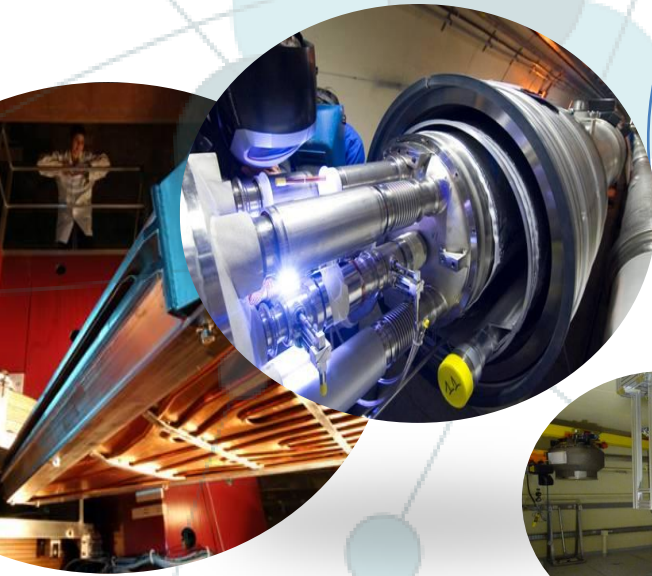
**Particle physics**  
**Nuclear and hadronic physics**

Matter's most elementary constituents  
and fundamental interactions  
Structure of nuclear matter

Theory  
Instrumentation  
Computing grids  
Accelerator R&D

Nuclear energy  
Medical applications

**Astroparticle physics and neutrinos**  
Universe's composition and behaviour



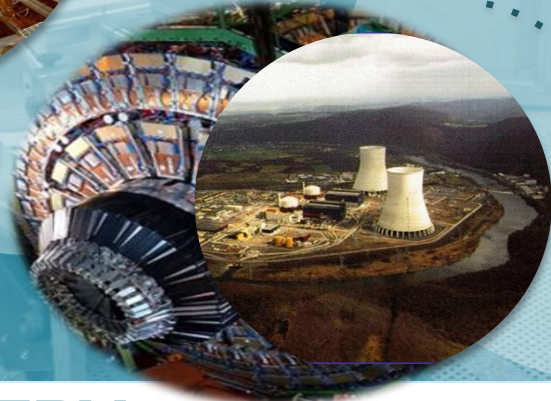
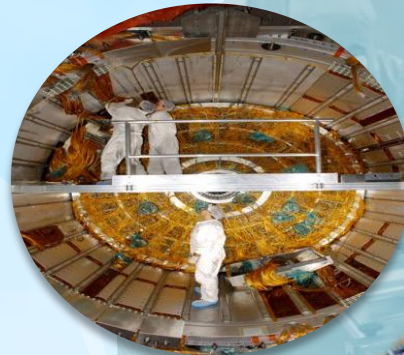
## ELEMENTARY CONSTITUENTS, FUNDAMENTAL INTERACTIONS

- Particles' mass
- New physics
- Supersymmetry
- Antimatter
- Neutrino's nature and mass

### Priorities:

**LHC @14 TeV + upgrades**

**Neutrino Long Baseline**



COLLISIONS  
HIGGS BOSON

SUPERSYMMETRY  
DETECTORS

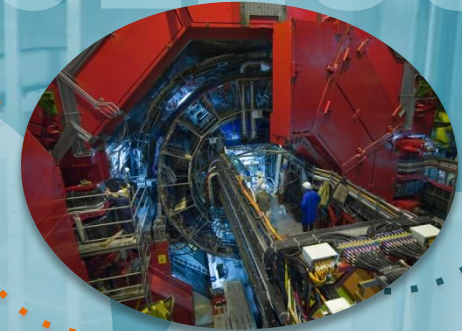
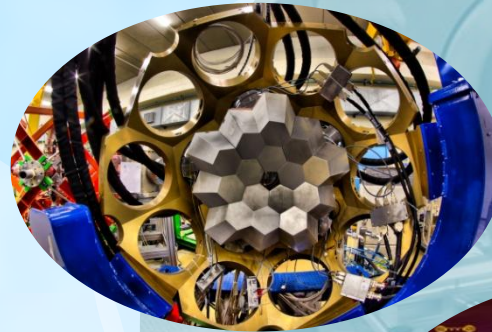
ANTIMATTER  
STANDARD MODEL

## PROTON AND NUCLEI: THE EMERGENCE OF COMPLEXITY

- Quark-gluon plasma
- Proton's structure
- Nuclear structure
- Exotic nuclei
- Nuclear astrophysics

### Priorities:

**Ganil-Spiral2, LHC-Alice, JLab**



EXTREME STATES  
EXOTIC NUCLEI

STABILITY  
SUPERHEAVY

GLUONS  
QG PLASMA



## UNIVERSE'S COMPOSITION AND BEHAVIOUR

- Universe's history
- Dark matter and dark energy
- Cosmic rays
- Gravitational waves
- Neutrinos

### Priorities:

Virgo, LSST, Hess-CTA, Edelweiss,  
SuperNemo,  
DChooz, Auger



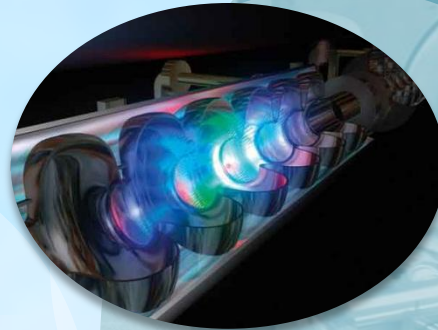
COSMIC RAYS  
DARK ENERGY

UNIVERSE  
SUPERNOVAE

BIG BANG  
GRAVITATIONAL

## ACCELERATOR R&D, TECHNOLOGICAL PLATFORMS

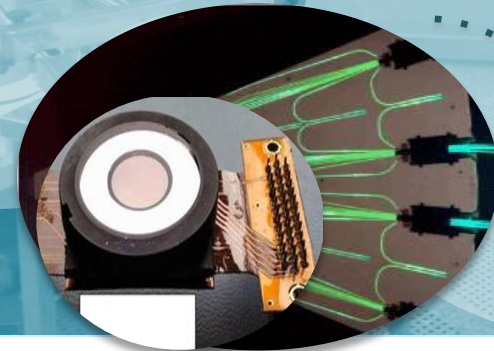
- Superconducting accelerator cavities and cryotechnology
- Ion and electron sources
- Target/source for radioactive beams
- Beam dynamics
- Laser acceleration



INTENSE BEAMS    LASERS    SUPERCONDUC  
ION SOURCES    PLATFORMS    CRYOTECHNOLOGY

## INSTRUMENTATION, DETECTORS, TECHNOLOGY TRANSFER

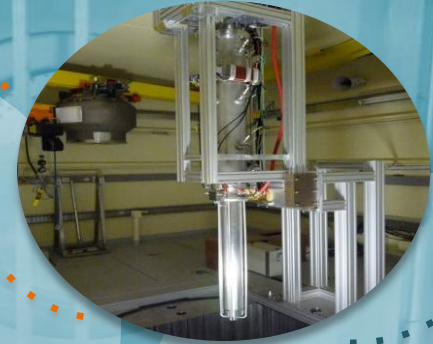
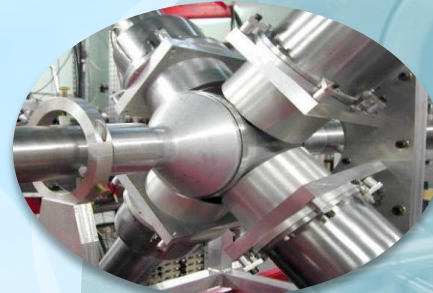
- Silicon detectors
- Photo-detectors, new generation scintillators
- Gaseous detectors
- Bolometers
- Microelectronics



MICROELECTRONICS    BOLOMETERS    CMOS  
HODOSCOPES    IMAGERS    ULTRA-GRANULAR

## BACK-END OF THE NUCLEAR FUEL CYCLE, NUCLEAR ENERGY

- Transmutation of nuclear waste by ADS
- Innovating nuclear systems with low wastes (thorium)
- Waste storage radiochemistry



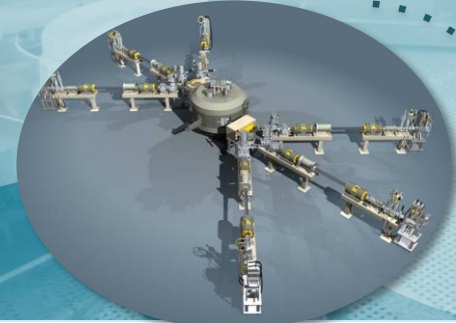
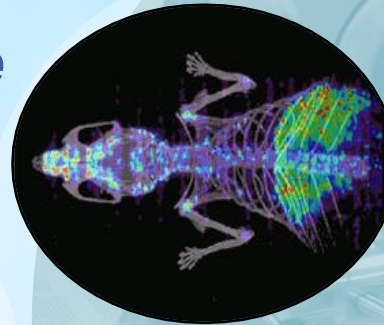
TRANSMUTATION    MOLTEN SALTS    REACTORS  
RADIOCHEMISTRY    NUCLEAR WASTES    ADS



## NEW DIAGNOSTIC AND THERAPY TOOLS

→ *Strong involvement of IN2P3 in the fight against cancer*

- Radioisotopes, radiobiology, radiotherapy
- Dosimetry / beam monitors R&D
- Accelerator technology
- Imaging, simulations (Geant, Gate)



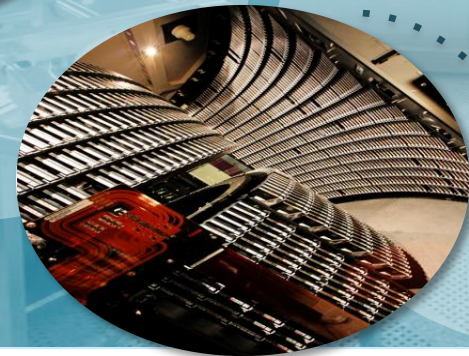
BEAM MONITORS  
RADIOBIOLOGY

SIMULATIONS  
HADRON THERAPY

IMAGING  
RADIOISOTOPES

## LARGE DATA-SET PROCESSING

- *European and International level*
- *Major contribution of CC-IN2P3 (Lyon) and TIER-2's*
- High energy physics (LCG)
- Biomedical applications

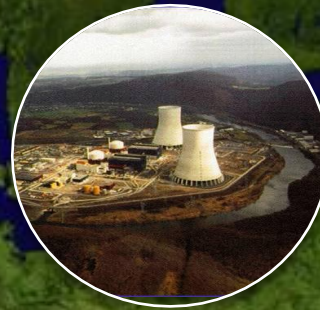


INFRASTRUCTURES DATA STORAGE NETWORKS  
INTERFACES COMPUTING CENTERS LCG

# FRANCE : LARGE INFRASTRUCTURES



**Spiral2 / Ganil**

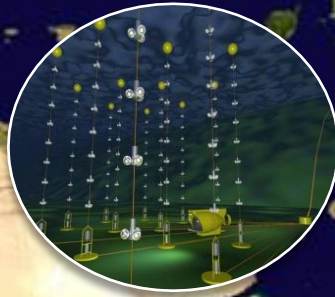


**DChooz**



**CC-IN2P3**

**Antares**



**Edelweiss, Nemo / LSM**

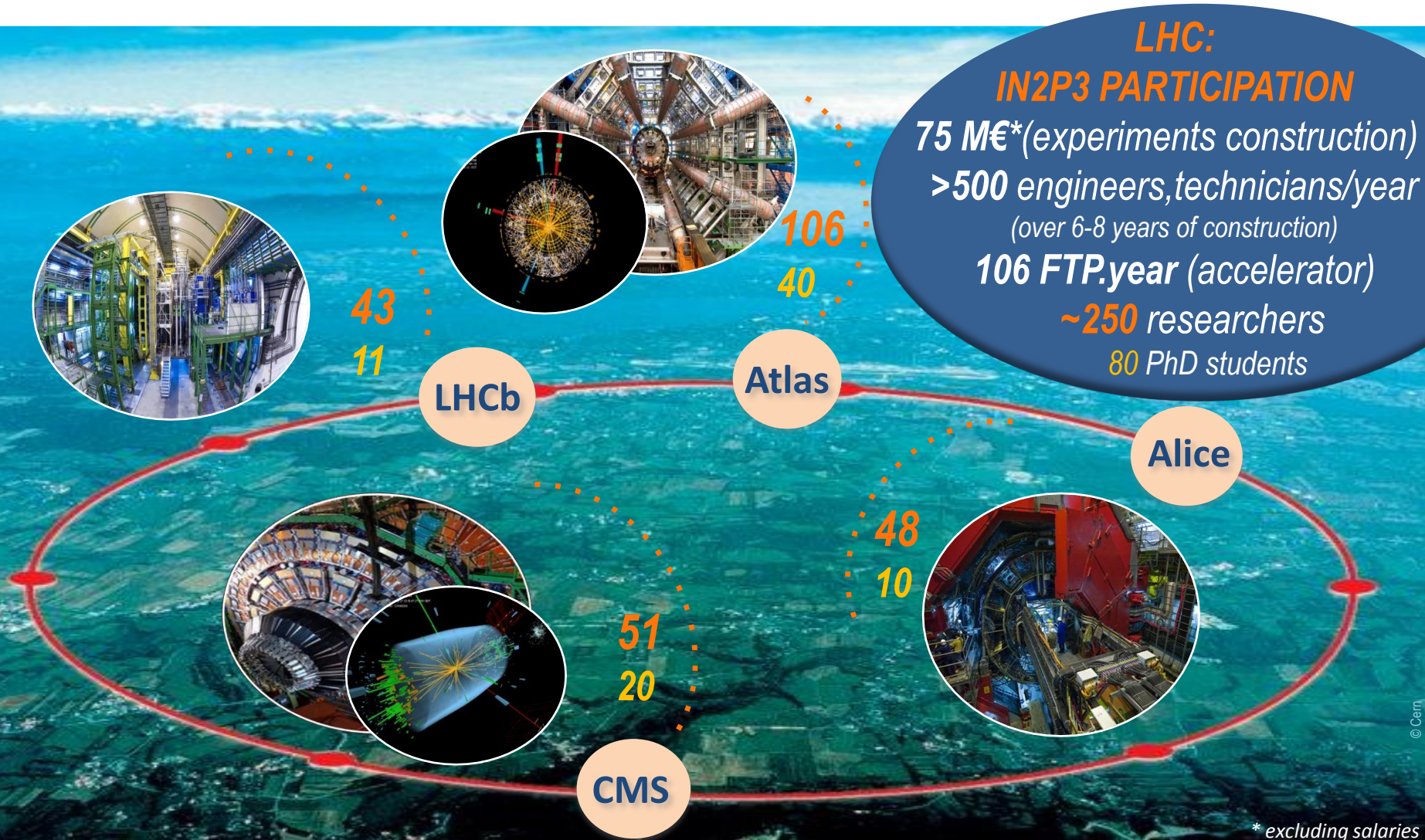


# INTERNATIONAL COLLABORATIONS



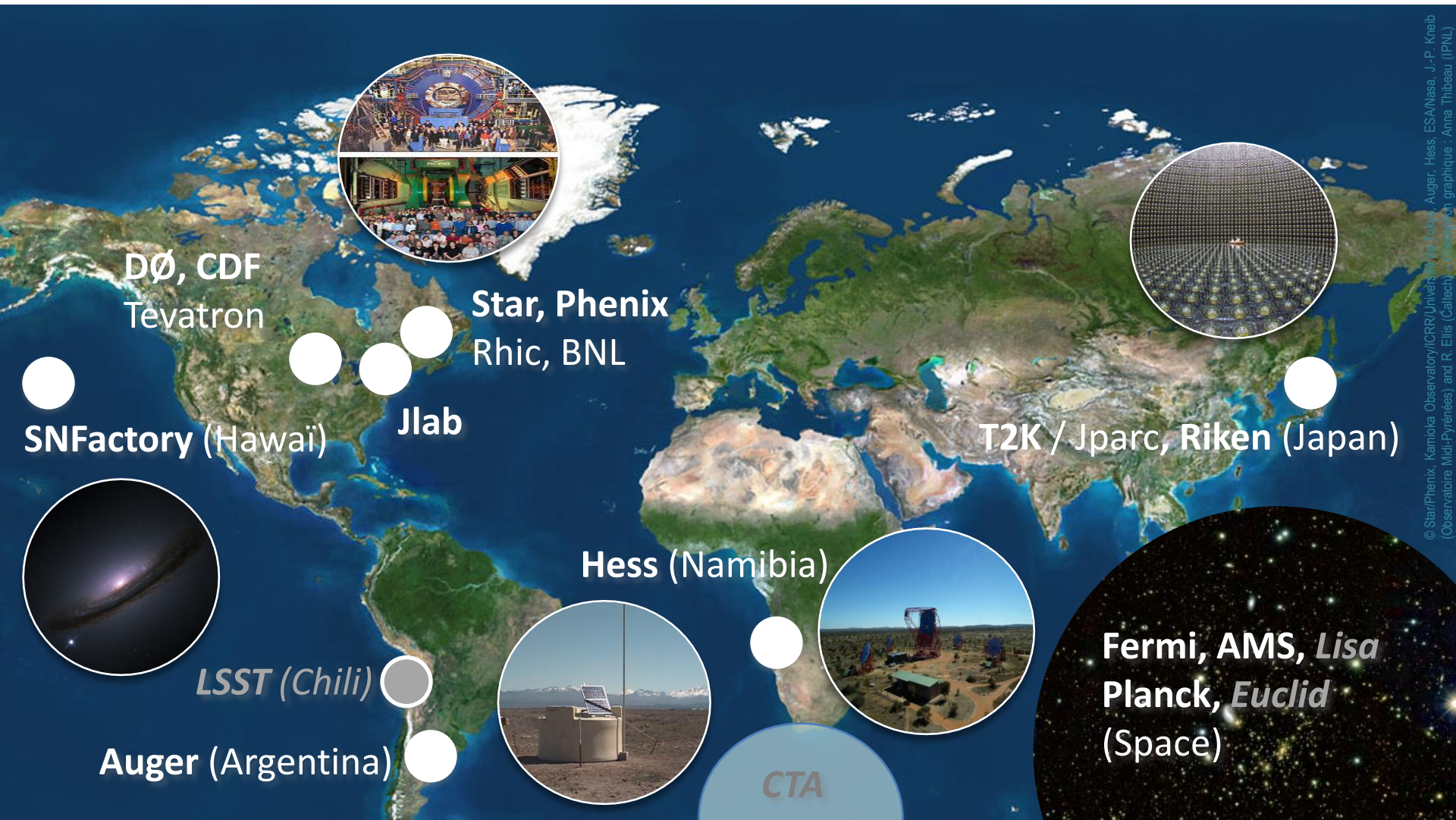


# INTERNATIONAL COLLABORATIONS



\* excluding salaries

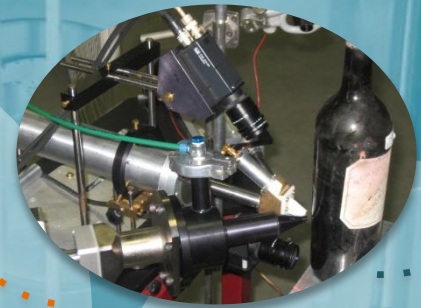
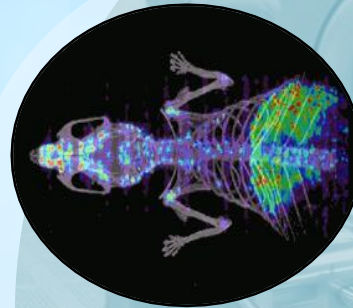
# INTERNATIONAL COLLABORATIONS



## INDUSTRIAL PARTNERSHIP AND APPLICATIONS

→ *Expertise / high technology resources transferred to industry*

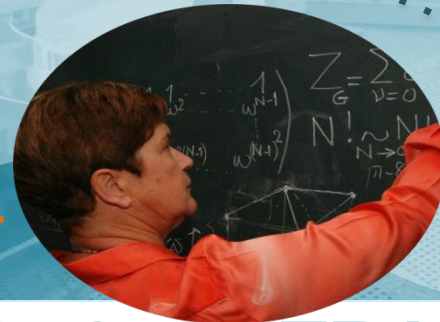
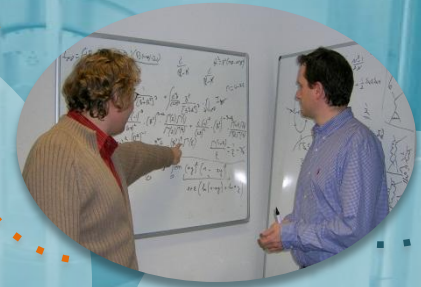
- Health (medical imaging)
- Space industry
- Environment (radioactivity measurements, Becquerel network)
- Electronics



MICROELECTRONICS    PRECISION OPTICS    TECHNOLOGY  
MEDICAL IMAGING    SIMULATIONS    EXPERTISE

## PARTNERSHIP, CONTRACTUALISATION, TRAINING, TEACHING

- IN2P3 projects → visibility of universities/*grandes écoles* (Europe and International)
- Laboratory “UMR” contracts
- Regular meetings IN2P3 / Universities’ presidents
- Teaching
- Students’ training



LABORATORIES COLLABORATIONS TRAINING  
YOUNG RESEARCHERS CONTRACTS VISIBILITY

## INCREASING VISIBILITY, PROMOTING RESEARCH ACTIVITIES

- **Press and media**
- **Conferences**
- **Education/teacher programs and resources** (Masterclasses, “Cosmos à l’école”...)
- **Partnership and networks** (IN2P3 labs, Cern, CEA, “Science à l’école”, Interactions, Ippog)
- **Publications, website, exhibitions...**



EXHIBITIONS PRESS AND MEDIA PROMOTION  
EDUCATION PROGRAMS NETWORKS VISIBILITY