

AstroParticule et Cosmologie (APC)

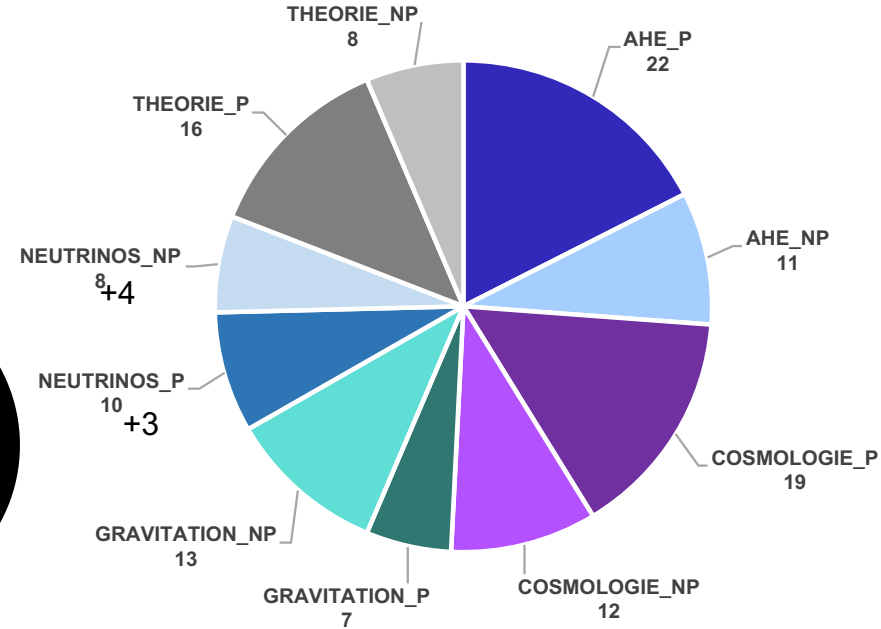
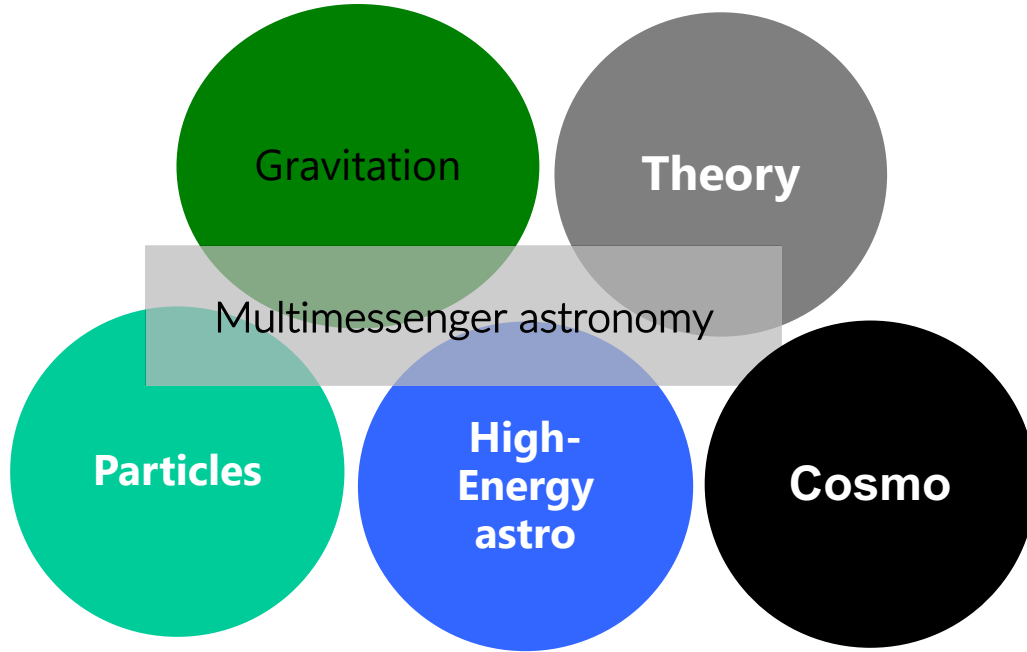
CNRS & Université Paris Cité
CEA, Observatoire de Paris, CNES

[ET-France meets Industry \(at APC\)](#)



Topical groups and related observables

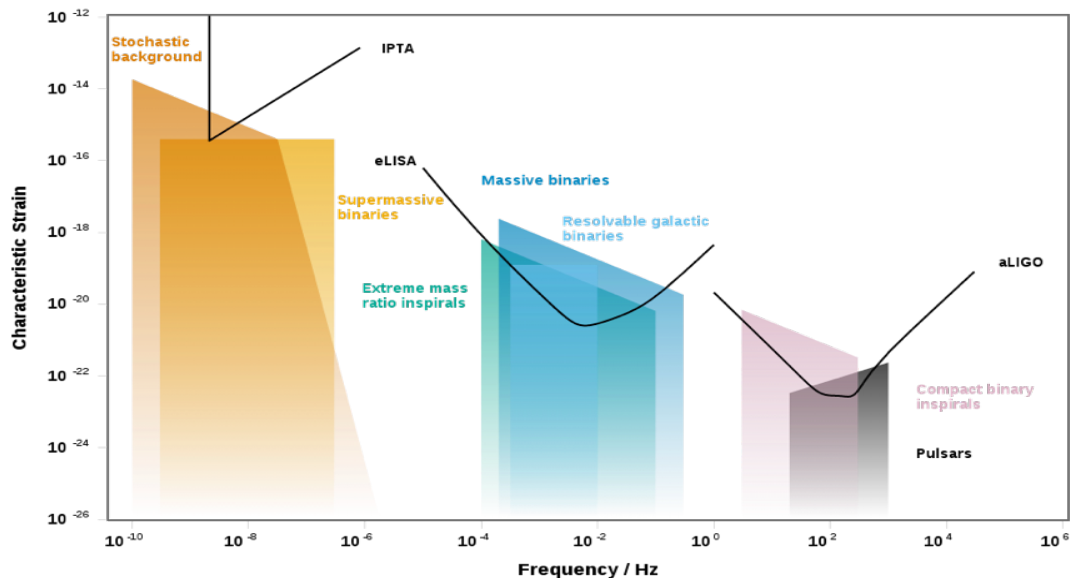
(P:Permanent / NP: Non Permanent)



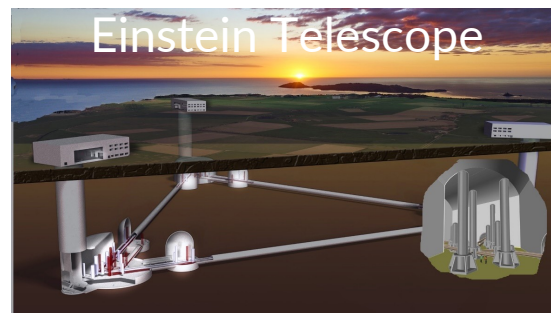
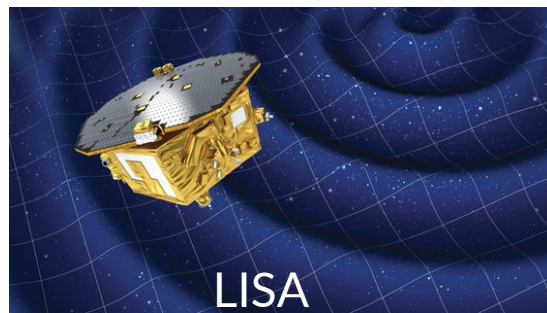
~200 members: 70 researchers /teachers, 70 technical staff
60 docs/postdocs/fixed-term

Gravitation

- Is gravitation described by general relativity or an alternative theory?
- Is general relativity valid in the strong field regime?
- How many black holes are there? What are their properties?
- How did they form?



Pushing down to ~ 2 Hz the observational bandwidth
(compared to ~ 10 -20 Hz today)



Cosmology

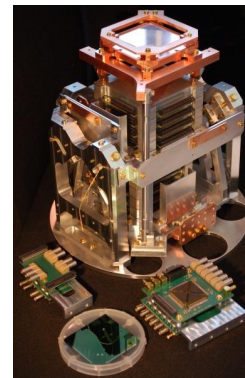
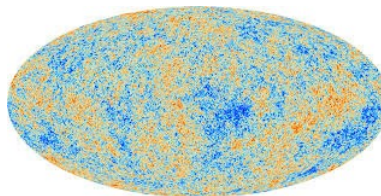
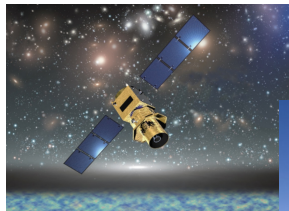
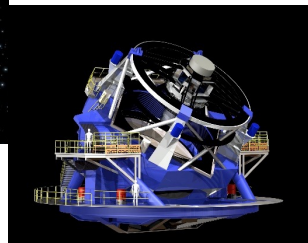
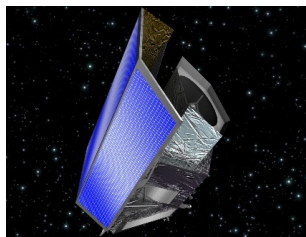
- What is the origin and fate of the Universe?
- Is the theory of cosmic inflation correct?
- What is dark energy?
- What is the identity of dark matter?
- Galaxy Formation ...

Wide-field galaxy surveys

- Euclid
- LSST
- LEM?

Cosmic micro-wave background

- Litebird
- Simons array
- Qubic
- CMB-S4



High-energy astrophysics, from keV to EeV

- What are the physical processes at work close to neutron stars and black holes?
- How do relativistic jets and winds really work?
- Where do ultrahigh energy cosmic rays come from? How are they accelerated? ...



● Gamma- and X-rays

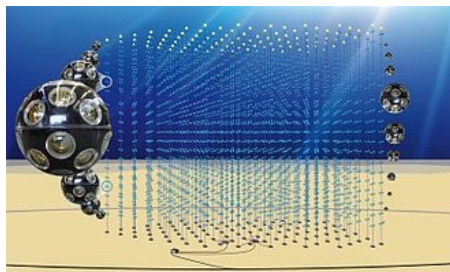
- SVOM
- Athena
- CTA

● High-energy neutrinos

- KM3NeT (ARCA)

● Cosmic rays

- JEM-EUSO



Strong Involvement in Europe



Particles

- Do neutrinos have mass?
- Do neutrinos follow Dirac or Majorana statistics?
- Is the mass ordering normal or inverted?
- Direct search for Dark Matter
- Higgs couplings

- Neutrino experiments

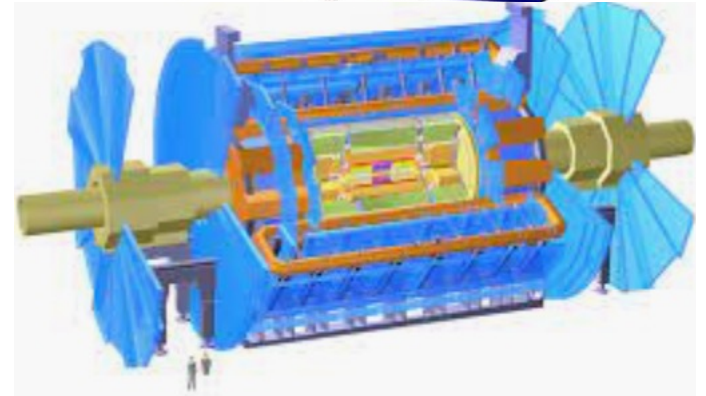
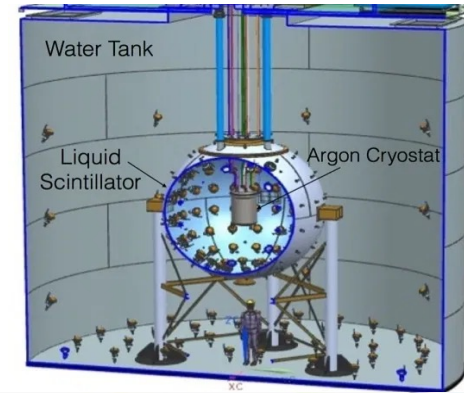
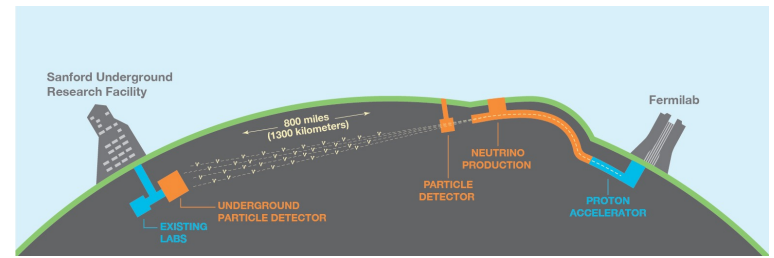
- DUNE
- KM3NeT (ORCA)

- Dark matter experiments

- Dark side

- Higgs Physics

- ATLAS
- FCC



Theory

Cosmology, gravity and string theory

Inflation, dark energy and cosmological perturbations

Topological defects

General relativity, modified gravity theories

Gravitational waves

Duality and holography

Quantum Field Theory

Non-abelian gauge theories and deconfinement

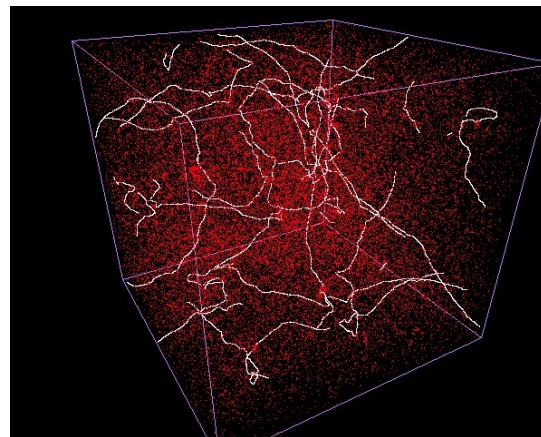
QFT in curved geometries

Astroparticle and neutrino physics

Neutrino physics and astrophysics

MHD and astroparticle propagation simulations

Cosmic rays physics

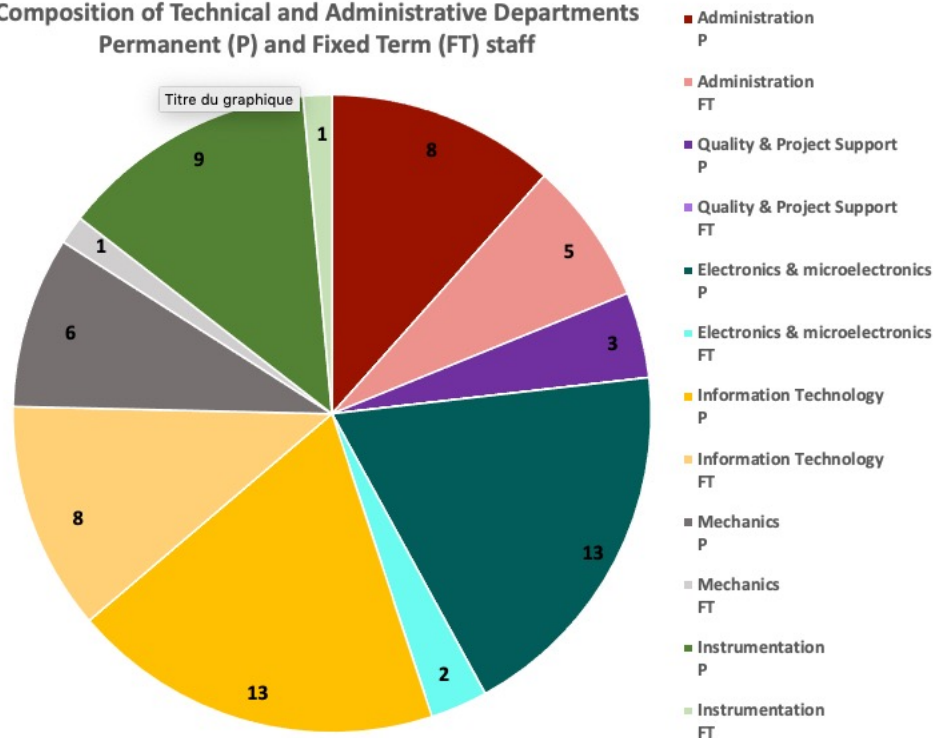


Organisation of the laboratory



Technical Services

Composition of Technical and Administrative Departments
Permanent (P) and Fixed Term (FT) staff



Technical platforms and know-how

Millimetric wavelengths

- Cryogenic detection chains and detectors (TES & KIDS)

Laser interferometry and high-precision metrology

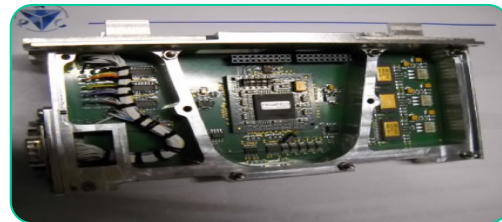
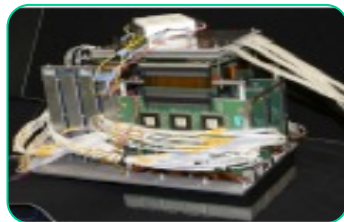
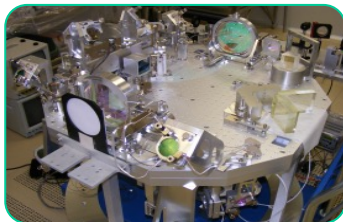
- Low-loss optics

Photodetection

- Prototyping and integration of photodetection elements (PM, MaPMT, SiPM)

Experiment design with space qualification

- Micro-electronics and electronic chains, Mechanical engineer



Einstein Telescope at APC

Management:

ET Executive Board - Ed Porter

ET Observational Science Board - Ed Porter (co-chair)

ET Preparatory Phase (EU ET-PP) - Joseph Martino-

- systems engineering task specification
- risk management

Instrument Science - Matteo Barsuglia/Eleonora Capocasa

- frequency dependent squeezing

Scientific Operations - Ed Porter

- Waveform model development
- Cosmology
- Algorithmic development for parameter estimation by Bayesian inference
- Nuclear equation of state extraction

Welcome to you all !

Have a fruitful meeting