Patrick Pangaud (pangaud@cppm.in2p3.fr)

cnrs IN2P3 Les deux infinis

CENTRE DE PHYSIQUE DES PARTICULES DE MARSEILLE CPPM

Aix*Marseille université Socialement engagée

Centre de Physique des Particules de Marseille

- A joint venture of:
  - CNRS/IN2P3
    - Centre National de la Recherche Scientifique
    - Institut National de Physique Nucléaire et Physique des Particules
  - Aix-Marseille Université

IN2P3
Les deux infinis

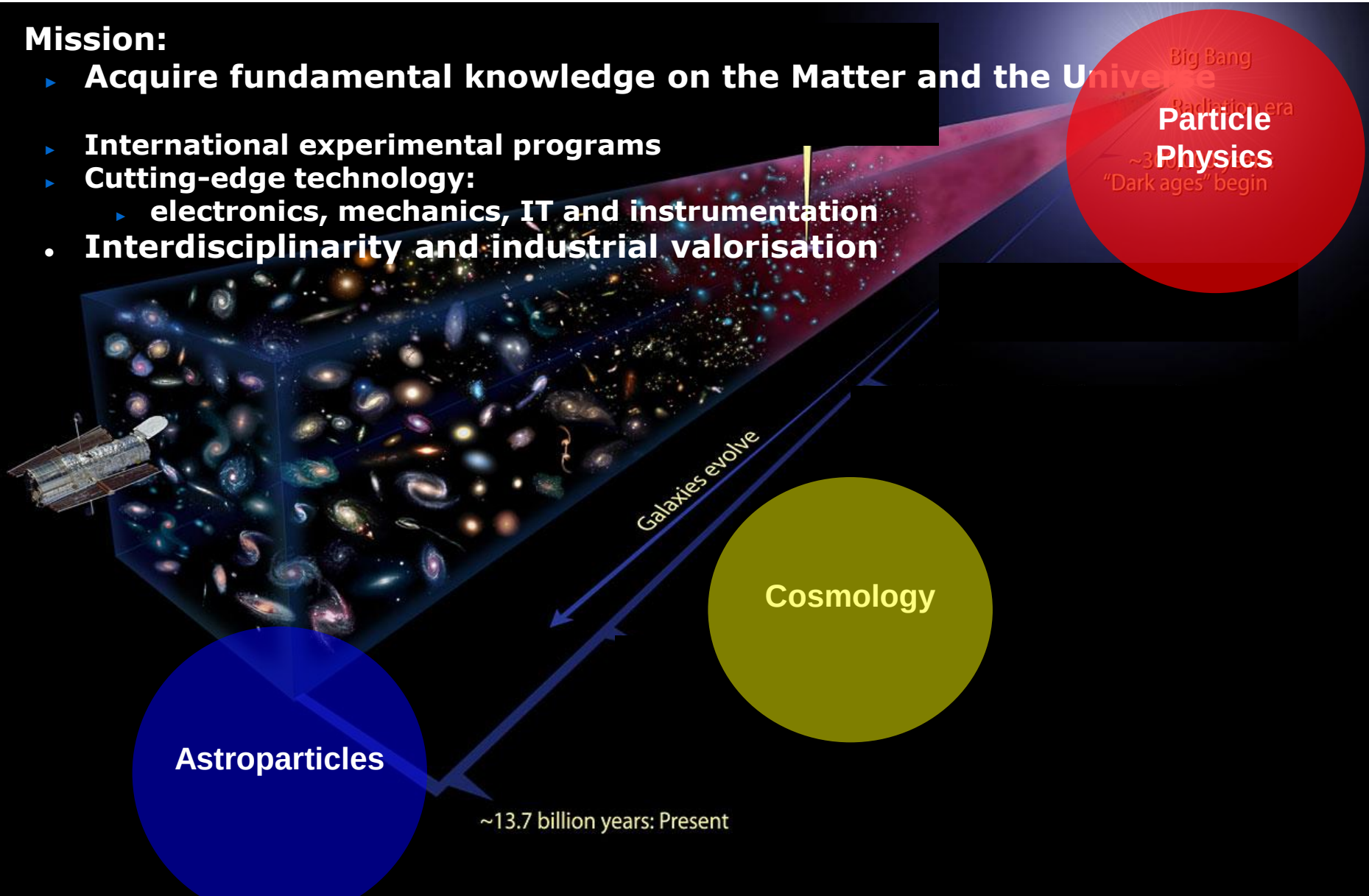
IN2P3's laboratories :

Aix*Marseille université
Initiative d'excellence

- Located south of Marseilles.
- >190 people strong (40 perm. scientists, 35 post-docs and PhD, 72 engin., technic. and admin. staff, + 60 sci. visitors/year)

Experimental Research at CPPM

- **Mission:**
  - **Acquire fundamental knowledge on the Matter and the Universe**
  - **International experimental programs**
  - **Cutting-edge technology:**
    - **electronics, mechanics, IT and instrumentation**
  - **Interdisciplinarity and industrial valorisation**



Particle Physics

Cosmology

Astroparticles

Laboratory Experiments

Cosmic Phenomena Observations

CENTRE DE PHYSIQUE DES PARTICULES DE MARSEILLE

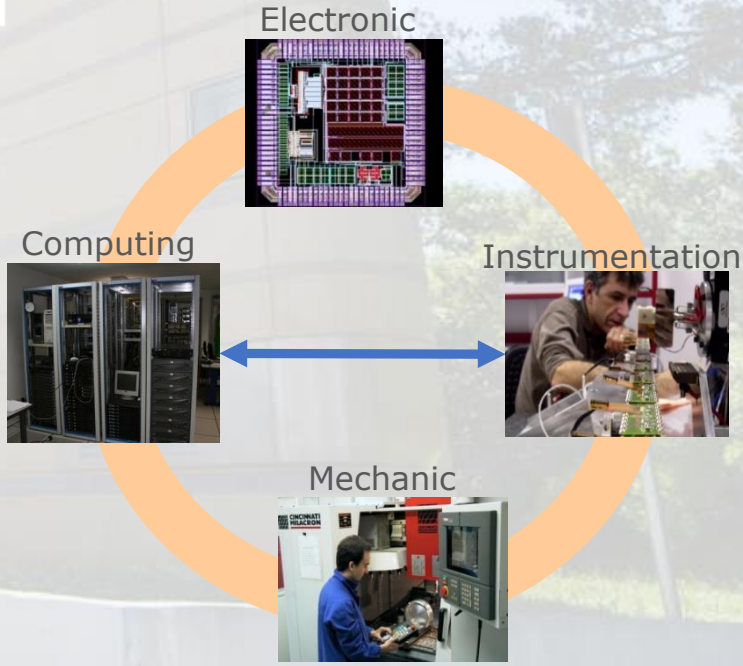
CPPM

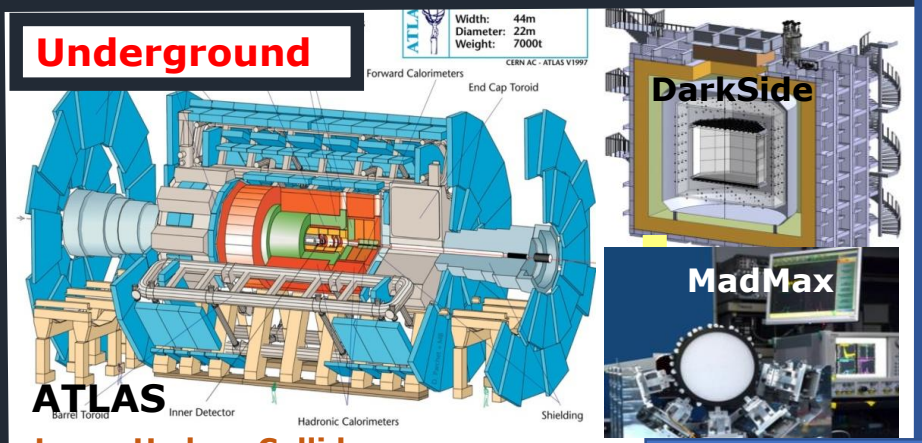
Research

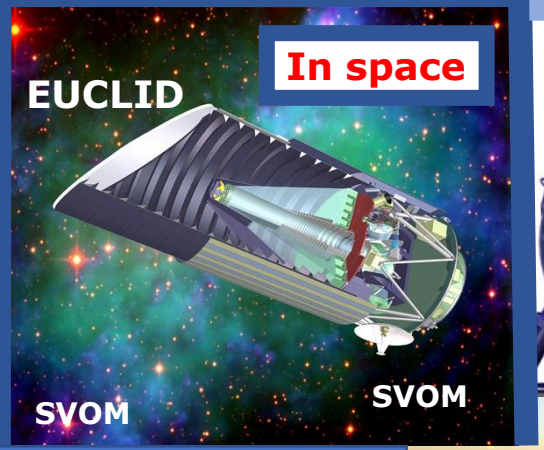
40 permanent researchers

Technology

72 permanent Technical personnel

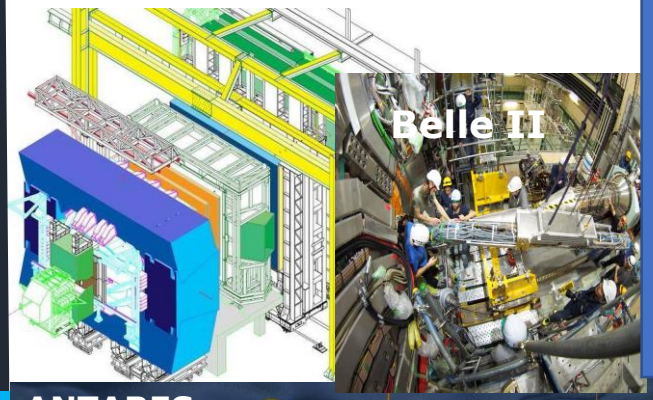






Large Hadron Collider

LHCb

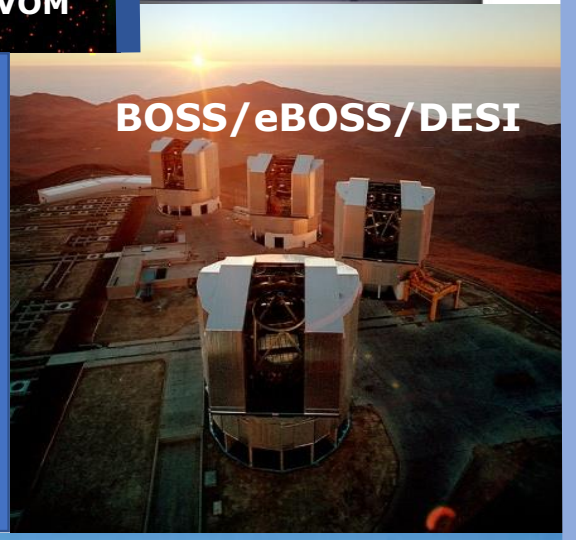


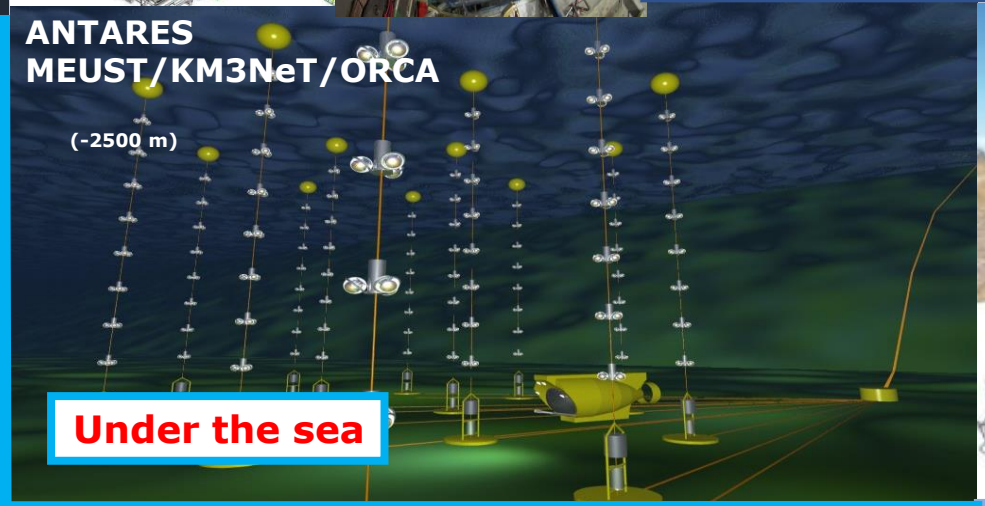
CENTRE DE PHYSIQUE DES PARTICULES DE MARSEILLE
CPPM

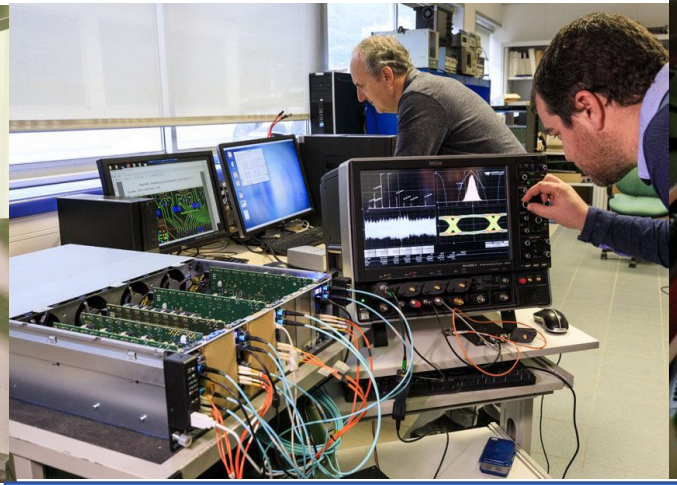
CPPM

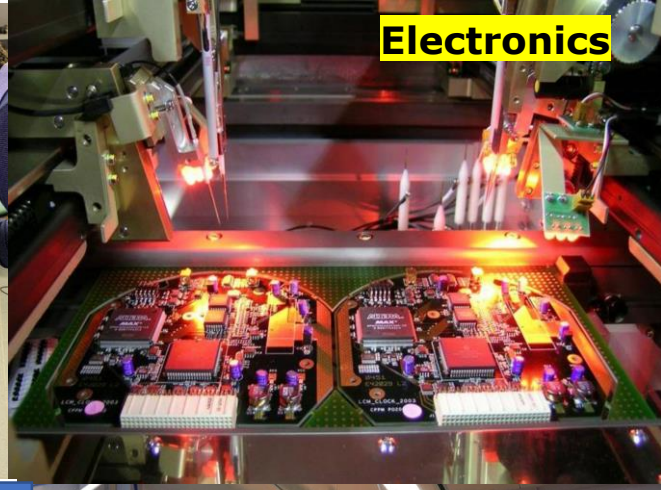
International Collaborations

Matter and Universe









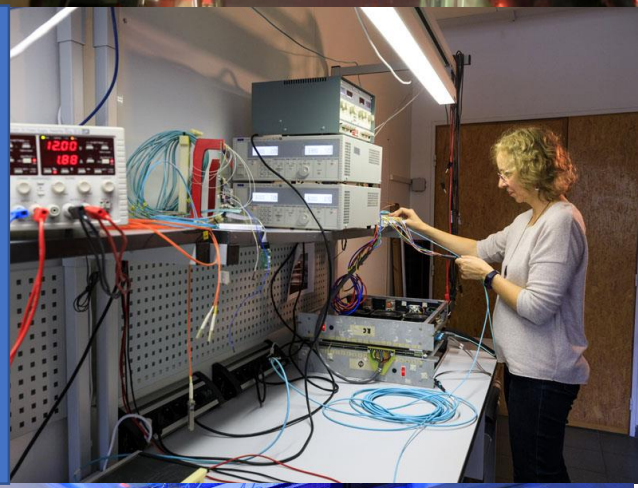
CENTRE DE PHYSIQUE DES PARTICULES DE MARSEILLE

CPPM

CPPM

Cutting edge Technology

Matter and Universe




Laboratoire Sous-marin
Provence Méditerranée
High-Performance
Computing platform
Crédits photos : Collaboration KM3NeT, CPPM ; Camille Moirenc
Création graphique : OuvreBoite
CENTRE DE PHYSIQUE DES PARTICULES DE MARSEILLE
CPPM
CPPM
High-Tech
Plateforms
Matter and Universe
Radon Plateau
Infrared Plateau

Electronics department

24 persons (staff, CDD, apprentice, PhD)

2nd floor @CPPM

Technical skills

- Design complex boards and ASIC (CAD – CADENCE)
- High density FPGA circuit
- High speed transmission on optical fiber
- Full custom radhard integrated circuit
- Test benches
- Electrical Powering distribution

Technical resources

- CAD for electronic and micro-electronic (CADENCE)
- Instruments and devices as 25 GHz scope
- Micro-electronic test 8-inches wafer on clean room
- Assembly, soldering and repair machines and workshop
- Climate Chamber
- X-Ray chamber for T&M

Technics and projects (1)

- ***Astroparticles***
  - KM3NeT/LSPM
    - On shore and off shore infrastructure at La Seyne sur Mer
    - Node for power and line distribution
    - Detection line: qualification, calibration, integration, deployment

- ***Cosmology***
  - LSST
    - Filter changer system for the telescope
    - Prototype and realization of the auto-changer
  - EUCLID
    - Infrared detectors characterization
    - Integration in the focal plan
    - Calibration on the instrument

Technics and projects (2)

- ***Particle physics***
  - ATLAS
    - Calorimeter: acquisition board LASP with high density FPGA
    - Hybrid Pixels chip: micro-electronic design and test for the upgrades
  - LHCb
    - Muons trigger: acquisition board PCIE40 - production of 600 boards
    - R&D on faster acquisition board (PCIE400)
  - BelleII
    - Monolitic Pixels chip for the BelleII Upgrade
  - Dark Matter
    - Prototype for WIMP direct search
- ***Biomedical imaging***
    - Hybrid pixel cameras for various applications in crystallography and biomedical imaging

Other projects

- ***Valorization/Interdisciplinarity***
  - TEMPORAL: SIPM acquisition board for camera on nuclear dismantling
  - CEGITEK partnership : design of the matrix pixels chip for X-ray detection

- ***Technology transfer:***
  - imXPAD startup: created in 2010 to produce X-ray detectors based on a circuit developed at CPPM for ATLAS and adapted to X-ray counting