



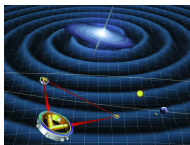
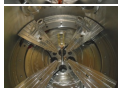
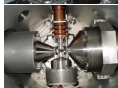
LISA AIVT kick-off meeting

September 22th, 2017

Technical activities and skills at LPC Caen

François Mauger

GRIFON GROUPE Interactions FONDAMENTALES et nature du Neutrino
LPC Caen



Basics

- LPC Caen : UMR6534 (ENSICAEN/UNICAEN/CNRS-IN2P3)
- Location : Université Caen Normandie, Campus 2, Caen, Normandie, France
- Creation in 1947,
- URL : <http://www.lpc-caen.in2p3.fr/>
- Staff :
 - ▶ Physicists : 28 (CNRS+ENSICAEN+UNICAEN),
 - ▶ Engineers/technicians : 40,
 - ▶ PhDs, post-docs : $\simeq 12$.

Science topics (mostly experimental)

- < 1980 : Cosmic rays, hadronic physics (@CERN),
- 1980, 1990 : Nuclear thermodynamics (INDRA@GANIAL, FAZIA)
 $\beta\beta$ decay (NEMO2@LSM),
- 1990 : Nuclear structure (@TRIUMF/GANIL/RIKEN)
Nuclear physics theory,
- \approx 1995 : Back-end nuclear cycle
Fundamental Interactions (nEDM@PSI, Lirat@GANIL, NEMO3@LSM),
- > 2000 : Neutrino physics (SuperNEMO@LSM, Solid@BR2)
Medical applications (hadrontherapy@ARCHADE).

Technical services

- Mechanics,
- Electronics and microelectronics,
- Instrumentation,
- Software.

Physics @ LISA

- F.Mauger (Pr), Y. Lemière (MCF), J. Hommet (IR),
- LISA DPC : software, simulation, data analysis.

Design office

- Staff : 4,
- Full chain : design, simulation, production, assembly, tests,
- Nuclear instrumentation, support frames and structures, vacuum chambers, calibration systems, motorization, shielding. . .
- For experimental physics, industrial quality achievements,
- Design tools : CATIA, ANSYS.

Mechanical workshop

- Staff : 3,
- Production (small quantities, small/medium size devices),
- Equipment : CNC lathe + basic devices,
- Welding (TIG, aluminium),
- Material : metal (inox, copper, aluminium), plastic (plexiglass)...

R&D office

- Staff : 7,
- Design, simulation, test benches, commissioning, cabling,
- Front-end low noise electronics, preamplifiers (charge, current),
- ASIC : for charge measurement, multi-channels high-resolution time measurement ($0.35\text{-}0.18\ \mu\text{m}$, $\Delta t < 20\ \text{ps}$), analog signal processing,
- Electrotechnics : RF generators (ion trap),
- Design tools : CADENCE.

R&D office

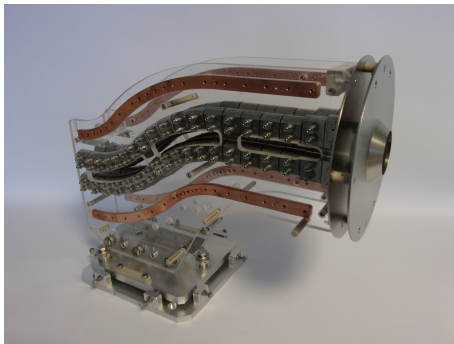
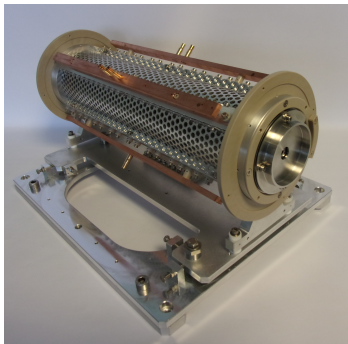
- Staff : 8,
- Numerical electronics, signal processing, firmware (VHDL), DAQ, slow control, vacuum techniques, radioactivity measurements,
- Detector : gas, diamond, wire chambers, scintillation,
- Flagship project : FASTER, an integrated data acquisition system (HW+SW) for experimental physics and the industry,
- Facilities : gray room (a few m^2), 1 m^3 vacuum chamber, metal deposition device,
- Design tools : Altium, Quartus.

R&D office

- Staff : 6,
- Design and implementation : real-time systems,
- Data acquisition systems for physics experiments,
- Control/command systems,
- Test benches (vacuum, [μ -]electronics, interfaces between on-line and off-line systems),
- Languages : C, Python, Ada, LabCVI.

Interoperability and cooperation

- Inter-service coordination, system integration,
- International collaborations,
- Other partners at IN2P3 : LAL (electronics, mechanics),
- Contracts with industrial partners,
- Possible access to facilities through our partnerships, networks and contacts (radioactivity measurements, radioprotection, radiation resistance, underground labs, beam lines...),
- No former experience in spatial applications,
- 1 senior engineer with former experience in spatial applications (INSU), involved in project management and quality assurance at IN2P3.



- LPC Caen is a small IN2P3 laboratory, with heavy workload at the moment,
- Broad range of technical skills, mostly in the context of experimental and applied nuclear physics, low-energy astroparticle physics and medical applications,
- We are ready to examine LISA's demand and to contribute if our competences and resources match the LISA program's requirements.