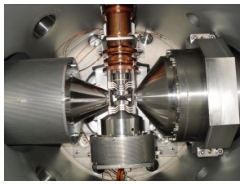
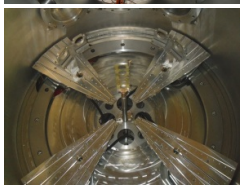


Journées LISA France

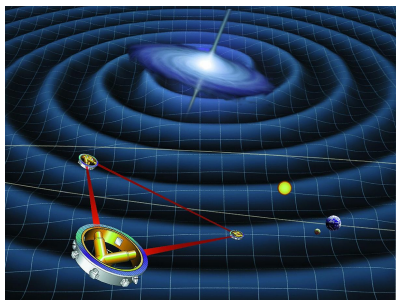
September 12-13th, 2017

Skills and resources for LISA DPC at LPC Caen

Jean Hommet, Yves Lemière, François Mauger

GRIFON GRoupe Interactions FOndamentales et nature du Neutrino

LPC Caen



LPC Caen in a nutshell

Basic informations

- LPC Caen : UMR6534 (ENSICAEN/UNICAEN/CNRS-IN2P3)
- Location : Université Caen Normandie, Caen, Normandie, France
- Created in 1947
- URL : http ://www.lpc-caen.in2p3.fr/
- Staff :
  - Physicists : 28 (12 @ CNRS + 16 @ UNICAEN/ENSICAEN),
  - Engineers/technicians : 40 (mechanics, electronics and microelectronics, instrumentation, software development),
  - PhDs + post-docs : $\simeq$12,
- A few more details about engineering services on my slides for the « LISA France AIVT kickoff meeting » (2017-09-22).

LPC Caen in a nutshell

Science topics (mostly experimental nuclear or low-energy astro-particle physics)

- 1947 $\rightsquigarrow$ 1970 : Cosmic rays,
- $<$ 1980 : Hadronic physics (@CERN),
- 1980, 1990 : Nuclear thermodynamics (INDRA@GANIAL, FAZIA)
  Neutrinoless double beta decay (DBD, $0\nu\beta\beta$) (search for Majorana neutrino and lepton number violation process, NEMO2@LSM),
- 1990 : Nuclear structure (@TRIUMF/GANIL/RIKEN), nuclear physics theory,
- $\approx$ 1995 : Back-end nuclear cycle, Fondamental Interactions (NEMO3@LSM, Lirat@GANIL*),
- $>$ 2000 : Neutrino physics* (NEMO3+SuperNEMO@LSM, Solid@BR2) nEDM@PSI*, Medical applications (hadrontherapy @ Archade),
- Today : 6 physics groups $\rightsquigarrow$ nothing to do with GW !

* GRIFON

Our local candidate LISA team

3.25 ± 0.25 RP* (90% CL)

- J. Hommet (IR), Y. Lemière (MCF), F.Mauger (PRU),
- Ph. Laborie (IR, project management and quality assurance at IN2P3),
- The team (but Ph. Laborie) has no former experience in spatial applications,
- But familiar with international collaborations ($\mathcal{O}(100)$ people).

* Real Person (not FTE!)

Our local candidate LISA team

Proposal for LISA DPC

- LISA DPC : interest in software design, software development (systems **and** science), long-term software management tools, data processing pipeline, physics simulation, data analysis,
- Current activities (related to LISA DPC) :
  - Search for very rare events in presence of backgrounds and simulation (DBD neutrino physics, NEMO3/SuperNEMO), precision measurement (n-EDM),
  - Software devel. (offline/online), Bayeux (generic C++ lib for pipelines data processing and simulation), Vire (generic C++ lib for role-based remote control and monitoring systems), Falaise SuperNEMO data processing and simulation software,
  - Faster generic DAQ system,
  - Also applied physics and software for medical applications, (PMRT project, software platform for radiotherapy modelling for physicians), industrial partnership (nuclear physics simulations), .

Our local candidate LISA team

Skills and experience

- Design, development and management of medium sized data processing software framework (nuclear/particle physics) for long term projects ($\mathcal{O}(10)$ y), simulations,
- Design of frontend electronics, trigger and DAQ systems ($\mathcal{O}(10^{3-4})$ readout channels),
- Design and development of control and monitoring systems ($\mathcal{O}(10^{4-5})$ params) (in coll. with LAPP staff on CTA),
- Search for rare signal, background analysis,
- Interface design between online/offline software systems, DB,
- Use of large computing farms for data storage, data processing, simulation production ($\simeq$25 y @ CCIN2P3),
- Open source development model.

Our local candidate LISA team

Tools

- Programming languages : C++, C, Python, ADA, Unix shell...
- Various libraries (Boost, GSL, Geant4...)
- Build and packaging tools : CMake, Linuxbrew, Docker,
- CVS, management and hosting : Git/GitHub, SVN/Trac, websites, wikis...
- Databases (ala MySQL), AMI (ATLAS Metadata Interface, LPSC Grenoble),
- Batch computing, data storage and transfer systems ($\mathcal{O}(10^4)$ cores @ CCIN2P3).

Conclusion

Towards the LPC Caen's contribution to LISA

- LPC Caen is a small (the smallest !) IN2P3 laboratory, with heavy workload at the moment : strong involvement in SuperNEMO construction and running, a $\mathcal{O}(3\ \mathrm{y})$ deep underground neutrino project,
- GW is new physics for us ! We have to learn a lot from the LISA community,
- Some of our skills/tools should/could be useful for LISA DPC,
- So far only 3 physicists/ITs in the group, but we will try to convince more (young !) people to join. . .
- We are ready to contribute ASAP to the LISA DPC, and participate to the LDC (software design, management and implementation),
- Probably no contribution to the LISA AIVT,
- We will gladly participate to the « GDR Ondes gravitationnelles »,
- We will have to defend these new activities at the LPC's Scientific Council before mid-2018 (also officially join the IN2P3 contribution).

Conclusion

Final word

- YL will retire in $\simeq$ 2050,
- JH $\simeq$ 2030,
- FM $\simeq$ 2034,
- $\rightsquigarrow$ 2018 : GRIFON : GRoupe Interactions FOndamentales et nature du Neutrino

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