

# **L.I.A.<sup>(\*)</sup> Subatomic physics : from theory to applications**

## **History and Aims**

Jaume Carbonell



**Kickoff Meeting : June 12-13, ITA Sao Jose dos Campos**

**(\*) Laboratoire International Associé**

# HISTORY

Former Projects involving French (IPNO,IPHC) and brasilian (ITA, USP, IFT) theorists

FAPESP 2013-2014

PICS 2015-2017

faced an increasing and varied **request for collaboration**

- PhD students and Postdocs
- Experimentalists involved in ALTO and GANIL projects
- CNEN (R. Cotta direction) for Applied Nuclear Physics
- ITA graduate students program at Ecole Polytechnique

which was impossible to satisfy within such a limited tools

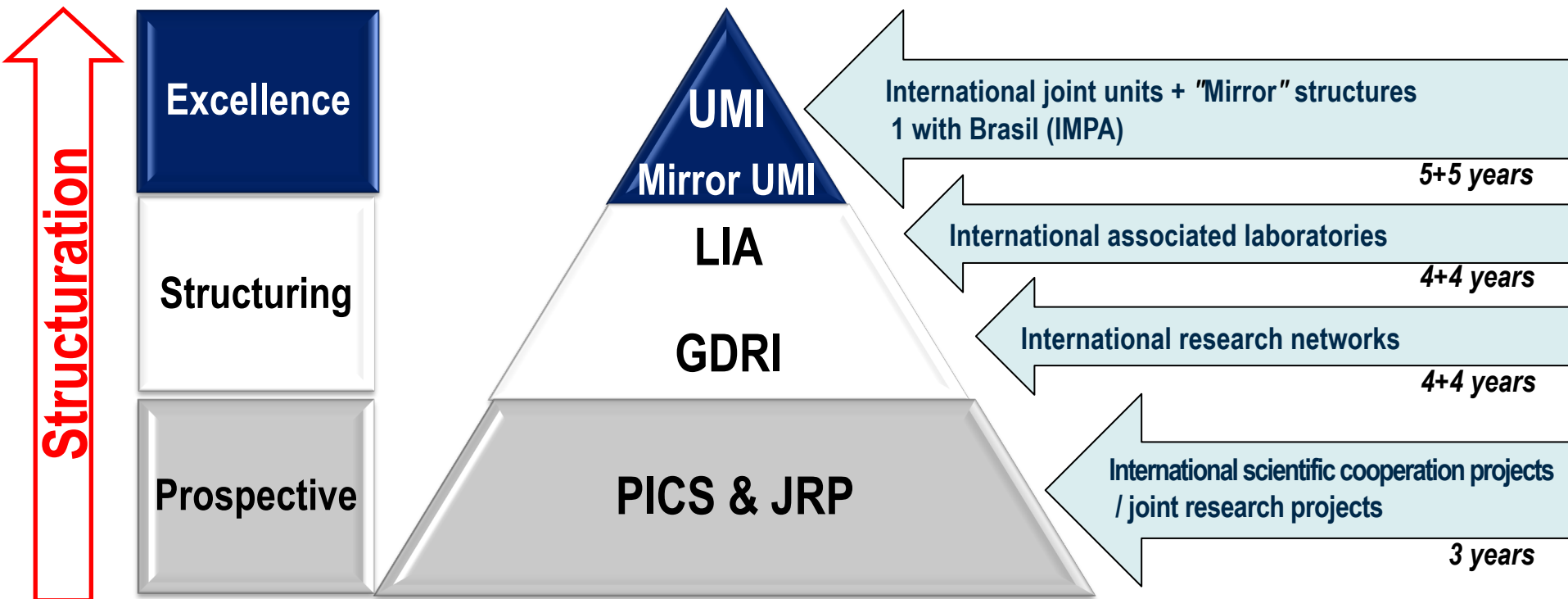
CNRS (2016) suggested to **increase the level of collaboration**, provided one was able to find a critical number of persons, projects and Institutions in both countries:

**L.I.A.**

...and we **started collecting scientists and Institutions** interested on that !

# CNRS INTERNATIONAL COOPERATION

The CNRS plays a key role in global structuration & has developed a range of cooperative tools functioning on a competitive basis



The answer of both communities was quite positive: your presence here testifies !  
...despite several - but relevant – absences

I will briefly summarize the **main identified projects** that... until today :

## Relativistic models for hadrons and nuclear matter equation of state

Applications of DFT to compact stellar objects (neutron stars, supernova...)

B.V. Carlson (ITA)

in China this week

M. Malheiro (ITA)

D. Menezes (U. Sta Catarina)

travelling to France this week

F. Gulminelli (LPC Caen)

...waiting for Debora !

J. Margueron (IPN Lyon)

now at INT Seattle

[Benefits from a CAPES-COFECUB 2015-16 + 2017-18](#)

## Experimental study of nuclear reactions of astrophysical interest

Involves GANIL, ALTO, RIBRAS... on a rich variety of interesting projects

Valdir Guimaraes

USP

Marlete Assunção

UNIFESP

Edilson Crema

USP

Viviane Morcelle

UFRRJ

Fairouz Hammache

IPNO (head of the group NESTER)

Nicolas de Sereville

IPNO

Iulian Stefan

IPNO

Alain Coc

CSNSM

François de Oliveira Santos

GANIL

Behyan Bastin

GANIL

[Benefits from a FAPESP 2017-18](#)



## Laser-electron Interaction: ThomX project and X-ray production.

Involve Laboratoire Accélérateur Linéaire d'Orsay (LAL) and are interest in :

- Medical applications (Radiotherapy).
- Organized a Laser/Beam School in Brésil (LAL/INFN).
- Particle Accelerators using laser techniques
- ELINP in Roumanie

Fabian Zomer	LAL Orsay
Kevin Dupraz	LAL Orsay
Aurelien Martens	"
Kevin Cassou	"
Hugues Monard	"
Marie Jacquet	"
Geraldo Cernicchiaro	CBPF/MCTI Rio de Janeiro

**Could interest ITA in relation with radiation effects in materials**

## Physics beyond the standard model (supersymmetry)

Research around dark matter

Sabine Kraml	LPSC Grenoble/CNRS	... coming next month
Jérémie Quevillon	"	
Andre P. Lessa	Centro Ciências Naturais e Humanas/UFABC S. Andre	
Chee Sheng Fong	"	
Sylvain Fichet	IFT/UNESP	
Eduardo Ponton	IFT/UNESP	
Enrico Bertuzzo	USP	

Benefits from a FAPESP: 2017-18

## **Physico-chemical evolution of icy bodies in space exposed to cosmic rays**

Experimental project at GANIL and ALTO to mimic cosmic radiation effects in planets and satellites

Already published results in Astrophysics reviews

Philippe Boduch GANIL/CIMAP/ENSICAEN Univ Caen

Hermann Rothard GANIL/CIMAP/ENSICAEN CNRS

Sergio Pilling Univ Vale do Paraiba

**Unfortunately contact with S. Pilling is lost !**

## **Relations between Euclidean and Minkowski solutions of Relativistic Theories**

Longstanding program in collaboration with Roma and Moscou

T. Frederico ITA

Wayne de Paula ITA

Rafael Ydrefors ITA Postdoc

V. Karmanov Former ITA visitor (2017)

J. Carbonell

Several PhD and PD

## **Universality and Relativity in Strong-Interacting Systems**

It follows from the PICS 2015-17

L. Tomio IFT

T. Frederico

U. van Kolck

R. Higa USP

R. Lazauskas IPHC

Gastao Krein IFT

.....

Several projects related to CEN where blocked after the change of diretor (2017)

The large number of collected projects was convincing enough for CNRS deputy Directors and they agreed to support the creation of this new LIA

From the beginning we included 4 components :

- **Experimental Nuclear Physics** : Reactions of astrophysical interest, halo nuclei
- **Applied Nuclear Physics** : Radioisotopes, Fusion, Radiodosimètrie, Neutrino reactors
- **Theoretical Physics** : Few Body, EFT, Nuclear Reactions, Hadron Physics
- **Students training in research** (including PhD cotutela)

Untill now 40 (Br) + 32 (Fr) physicists showed their interest

France: **IPNO**, **LAL** and **CSNSM** in Orsay, **GANIL** Caen, **Univ. Strasbourg (IPHC)**

LPC Caen, IPN Lyon, LPSC Grenoble

Brasil: **ITA**, **USP**, **UNESP/IFT**, **CNEN(?)**

IFSC, UNIFESP, UFF, UFRRJ, UFVP, UFABC

**Things are still open** : some of the talks in this meeting do not cover the above listed projects

- M. Ploszajczak , J. Lubian on many- body physics
- A. Depmann and J.C. David about the **Spallation Sources**
- Tereza Mendes about LQCD
- CNEN ??? **Welcome Frederico Genezini !!!**
- K. Dupraz's talk can rise some wider interest in applications
- Some french physicists (Z. El Bitar) - interested in Monte Carlo simulations applied radiology et la radiobiology - collaborate with Pr. Bernal (UNICAMP)
- Fabio ?

.....

## **AIMS TO DO LIST**

**Came with a list of projects** as precise as possible to include in the agreement

**Sign it !!!** (before the end of this year) the collaboration agreement for the LIA

CNRS funded this « year 0 » devoted to prepare this crucial documents

It is now waiting for the signature of Brazilian partners: **ITA, USP, IFT, CNEN?**  
to start the 1 + 4 (+4) years collaboration

Other Universities and/or institutions are considered as participants  
They can join the « list of agreement signants » if they want

**Everything is flexible but we have to start with something  
...if we want to start !**

**Create a Web page would be very helpful: is there any « master » around ?**

## **Today's e-mail from Alahari Navin, Director of GANIL**

This is to wish the collaboration a great start. I really miss being there

Please convey my best wishes to my Brazilian colleagues (and friends) on this occasion and please apologize profusely for not able to make to this important event

# IN2P3: Key Figures

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

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

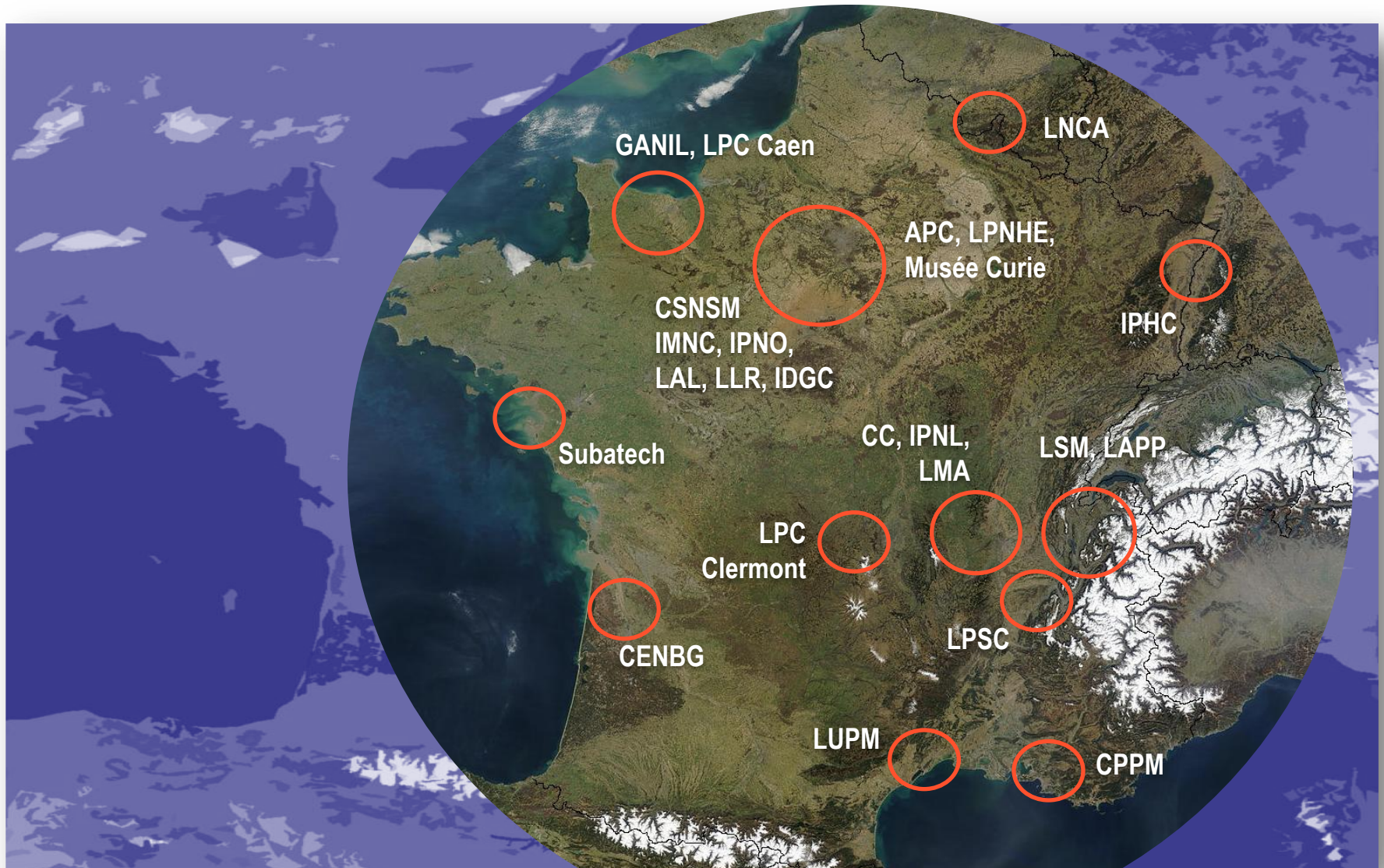
**TGIR**

**1000** CNRS and Univ. researchers  
**1500** engineers, technicians and administrative staff  
**600** temporary positions

**17** laboratories  
**8** technical support units



# Networked Laboratories





# Research Areas

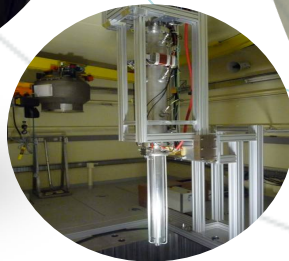
## Particles & hadronic physics

Matter's most elementary constituents and fundamental interactions



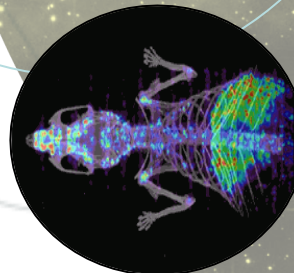
## Nuclear physics & Applications

Structure of nuclear matter, nuclear energy and medical applications



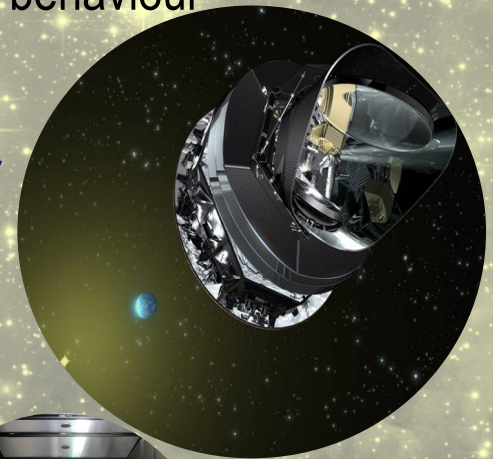
## Accelerator & Technology

Major R&D domains



## Astroparticle physics and Cosmology

Universe's composition and behaviour



## Computing & Data

Data Science and Computing research

