



# LPNHE - Laboratoire physique nucléaire et hautes énergies

Rapport Hcéres

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## REPORT ON THE RESEARCH UNIT:

Laboratoire de Physique Nucléaire et Hautes  
Énergies  
LPNHE

## UNDER THE SUPERVISION OF THE FOLLOWING INSTITUTIONS AND RESEARCH BODIES:

Sorbonne Université (S)  
Université Paris Diderot  
Centre National de la Recherche Scientifique -  
CNRS

**ÉVALUATION CAMPAIGN 2017-2018**  
GROUP D



In the name of Hcéres<sup>1</sup> :

Michel Cosnard, President

In the name of the expert committee<sup>2</sup> :

Tiziano Camporesi, Chairman of the  
committee

Under the decree No.2014-1365 dated 14 November 2014,

<sup>1</sup> The president of HCERES "countersigns the evaluation reports set up by the expert committees and signed by their chairman." (Article 8, paragraph 5);

<sup>2</sup> The evaluation reports "are signed by the chairman of the expert committee". (Article 11, paragraph 2).

This report is the sole result of the unit's evaluation by the expert committee, the composition of which is specified below. The assessments contained herein are the expression of an independent and collegial reviewing by the committee.

## UNIT PRESENTATION

<b>Unit name:</b>	Laboratoire de Physique Nucléaire et Hautes Énergies
<b>Unit acronym:</b>	LPNHE
<b>Requested label:</b>	UMR
<b>Application type:</b>	Renewal
<b>Current number:</b>	UMR 7585
<b>Head of the unit (2017-2018):</b>	Mr Gregorio BERNARDI
<b>Project leader (2019-2023):</b>	Mr Gregorio BERNARDI
<b>Number of teams or themes:</b>	4

## COMMITTEE MEMBERS

<b>Chair:</b>	Mr Tiziano CAMPORESI, CERN, Suisse
<b>Experts:</b>	Mr Alain BLANCHARD, CNRS Mr Olivier BOURRION, CNRS (supporting personnel) Ms Anne EALET, CNRS (representative of CoNRS) Mr Andrii NERONOV, université de Genève, Suisse Mr Philippe ROSNET, université Clermont Auvergne (representative of CNU) Mr Georges VASSEUR, CEA Saclay
<b>HCERES scientific officer:</b>	Mr Yannis KARYOTAKIS
<b>Representatives of supervising institutions and bodies:</b>	Ms Ursula BASSLER, CNRS Mr Matteo CACCIARI, université Paris Diderot Mr Bertrand MEYER, Sorbonne Université

## INTRODUCTION

### HISTORY AND GEOGRAPHICAL LOCATION OF THE UNIT

The LPNHE is a mixed research unit (UMR) of Sorbonne Université (ex: Pierre et Marie Curie, UPMC), Paris-Diderot (UPD) and CNRS. Inside CNRS, it is part of the Institut National de Physique Nucléaire et de Physique des Particules (IN2P3).

LPNHE is located on the Pierre et Marie Curie campus of SU, tower 22-12, 1<sup>st</sup> floor, 4 Place Jussieu, Paris 75005.

### MANAGEMENT TEAM

The LPNHE is directed by Mr Gregorio BERNARDI.

### HCERES NOMENCLATURE

ST2 Physics  
    ST2\_1 Nuclear Physics and particles  
ST3 Earth and space sciences  
    ST3\_3 Astronomy, space

### SCIENTIFIC DOMAIN

The research activities of LPNHE are mainly experimental and are grouped in four thematic teams aiming at answering the following questions and their extensions:

- What is the nature of the fundamental masses and interactions?
- What is the origin of the matter-antimatter asymmetry and the origin of flavor?
- What is the nature/origin of high energy cosmic particles and of dark matter?
- What is the nature and the evolution of dark energy?

## UNIT WORKFORCE

Unit workforce	Number 30/06/2017	Number 01/01/2019
<b>Permanent staff</b>		
Full professors and similar positions	5	6
Assistant professors and similar positions	18	17
Full time research directors (Directeurs de recherche) and similar positions	12	11
Full time research associates (Chargés de recherche) and similar positions	15	17
Other scientists ("Conservateurs, cadres scientifiques des EPIC, fondations, industries, etc.")	0	0
High school teachers	0	0
Supporting personnel (ITAs, BIATSSs and others, notably of EPICs)	43	42
<b>TOTAL permanent staff</b>	<b>93</b>	<b>93</b>
<b>Non-permanent staff</b>		
Non-permanent professors and associate professors, including emeritus	6	
Non-permanent full time scientists, including emeritus, post-docs	13	
Non-permanent supporting personnel	6	
PhD Students	21	
<b>TOTAL non-permanent staff</b>	<b>46</b>	
<b>TOTAL unit</b>	<b>139</b>	

## GLOBAL ASSESSMENT OF THE UNIT

The Committee unanimously has an excellent impression of the unit, it is a world class laboratory. The scientific activities around the themes of particle physics, astroparticle physics and cosmology allow a strong contribution within the theme and effective multi-disciplinary synergy.

The strong technological component is one of the strength of the unit. This allows the teams to have a strong impact in the international collaborations where the research effort is strongly correlated to the technical achievements and deliverables.

The success of the unit is linked to the ability to take important technical responsibilities.

Thanks to its diverse scientific engagement, the unit has established a reputation of excellence at the national and international level within important research programs.

The main axis that the committee has identified as key to the contributions of the unit are: the Collider Physics with the contributions to D0, ATLAS (past, present and future), BaBar and now LHCb and the R&D for the possible future Linear Collider, the cosmic ray physics with Auger, HESS, CTA, the starting collaborations in dark matter searches, DAMIC, DarkSide and Xenon, and cosmology continuing the seminal work of SNLS with Subaru/HST and leading contributions in LSST and the new role being played in DESI/eBOSS contributing to the understanding of the dynamics of the universe.

The unit technological developments and skills in the domain of analog and digital electronics, the experience accumulated in the domain of photodetectors, silicon sensors and CCD are a major asset and allow the researchers of the unit to participate in a prominent way in the international collaborations.

The unit success relies on its personnel where ~35% is formed by temporary personnel (Doctoral students, post-docs and limited duration contracts): the evolution of funding for these resources is unclear and often based on competitive national calls (e.g. LABEX and ANR). The large spectrum of long term programs might be affected by fluctuations in availability of human resources.

The goal of this research is to go beyond the « knowledge frontier » but also to develop new technologies which can be applied elsewhere, while constructing detectors for our research. The scientific project of the LPNHE for the years to come is to progress in these four main directions.

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