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## LPT - Laboratoire de physique théorique

Rapport Hcéres

► **To cite this version:**

Rapport d'évaluation d'une entité de recherche. LPT - Laboratoire de physique théorique. 2015, Université Toulouse 3 - Paul Sabatier - UPS, Centre national de la recherche scientifique - CNRS. hceres-02034084

**HAL Id: hceres-02034084**

**<https://hal-hceres.archives-ouvertes.fr/hceres-02034084v1>**

Submitted on 20 Feb 2019

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# HCERES

High Council for the Evaluation of Research  
and Higher Education

Research units

HCERES report on research unit:

Laboratoire de Physique Théorique

LPT

Under the supervision of  
the following institutions  
and research bodies:

Université Toulouse 3 – Paul Sabatier – UPS

Centre National de la Recherche Scientifique

Evaluation Campaign 2014-2015 (Group A)

# HCERES

High Council for the Evaluation of Research  
and Higher Education

Research units

*In the name of HCERES,<sup>1</sup>*

Didier HOUSSIN, president

*In the name of the experts committee,<sup>2</sup>*

Emmanuel TRIZAC, chairman of the committee

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Under the decree N°2014-1365 dated 14 november 2014,

<sup>1</sup> The president of HCERES "countersigns the evaluation reports set up by the experts 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)

# Evaluation report

This report is the result of the evaluation by the experts committee, the composition of which is specified below.

The assessments contained herein are the expression of an independent and collegial deliberation of the committee.

Unit name:	Laboratoire de Physique Théorique
Unit acronym:	LPT
Label requested:	UMR
Present no.:	UMR 5152
Name of Director (2014-2015):	Mr Clément SIRE
Name of Project Leader (2016-2020):	Mr Bertrand GEORGEOT

## Expert committee members

Chair: Mr Emmanuel TRIZAC, Université Paris-Sud

Experts: Mr Peter HOLDSWORTH, Ens Lyon (representative of the CNU)  
Mr Ulrich SCHOLLWÖCK, Ludwig Maximilian University, Munich, Germany  
Mrs Patrizia VIGNOLO, Université de Nice (representative of CoNRS)

Scientific delegate representing the HCERES:

Mr Marc KNECHT

Representative(s) of the unit's supervising institutions and bodies:

Mr Éric BENOIST (director of the Doctoral School *Sciences de la Matière*)

Mr François DEMANGEOT, Université Paul Sabatier

Mrs Virginie MAHDI, délégation régionale CNRS

Mr Bertrand MONTHUBERT, Université Paul Sabatier

Mr Alexis VALENTIN, Université Paul Sabatier

Mr Bart VAN TIGGELEN, Institute of Physics, CNRS

## 1 • Introduction

### History and geographical location of the unit

The unit, located on the Paul Sabatier - Toulouse 3 campus, was officially created in 2003. It originates from a team of theoretical physicists which arrived in 1992 as a part of the *Laboratoire de Physique et Chimie Quantique*, in an effort to promote fundamental physics in Toulouse. The graft was particularly successful, so that it now forms a separate joint Université Paul Sabatier (UPS) - CNRS unit (*Unité Mixte de Recherche*). It belongs to the IRSAMC (*Institut de Recherche sur les Systèmes Atomiques et Moléculaires Complexes*) federation, together with three other units. Two of these share the same premises (building 3R1).

### Management team

The present director is Mr Clément SIRE, assisted by Mrs Malika BENTOUR (secretary) and Mrs Sandrine LE MAGOAROU (on a 50 % part-time position, in charge of computer aspects).

### HCERES nomenclature

ST2 - Physics.

### Brief description of activities

The fields of study pertain to condensed matter and statistical physics in the broad sense. The range of topics investigated at LPT is impressive for a unit of this size, from strongly correlated quantum systems to irradiation processes in clusters, including quantum coherence, mesoscopic physics, soft condensed matter, non-equilibrium and disordered systems. Several lines of research are directly relevant to closely related disciplines such as biology, mathematics, chemistry, astrophysics, computer sciences and social sciences.

### Unit workforce

The research staff consists of twelve CNRS researchers and nine faculty members. It is organized in four groups, assessed separately in section 3:

1. Strongly Correlated Fermions (headed by Mr Didier POILBLANC);
2. Quantum Coherence (headed by Mr Dima SHEPELYANSKY);
3. Statistical Physics of Complex Systems (headed by Mr Nicolas DESTAINVILLE);
4. Finite Fermionic Systems and Clusters (headed by Mr Éric SURAUD).

<b>Unit workforce</b>	<b>Number as at 30/06/2014</b>	<b>Number as at 01/01/2016</b>
<b>N1:</b> Permanent professors and similar positions	9	9
<b>N2:</b> Permanent researchers from Institutions and similar positions	12	13
<b>N3:</b> Other permanent staff (without research duties)	1.5	1.5
<b>N4:</b> Other professors (Emeritus Professor, on-contract Professor, etc.)		
<b>N5:</b> Other researchers (Emeritus Research Director, Postdoctoral students, visitors, etc.)	6	
<b>N6:</b> Other contractual staff (without research duties)		
<b>TOTAL N1 to N6</b>	<b>28.5</b>	<b>23.5</b>

<b>Unit workforce</b>	<b>Number as at 30/06/2014</b>	<b>Number as at 01/01/2016</b>
Doctoral students	14	
Theses defended	14	
Postdoctoral students having spent at least 12 months in the unit	16	
Number of Research Supervisor Qualifications (HDR) taken	3	
Qualified research supervisors (with an HDR) or similar positions	12	>12

## 2 • Overall assessment of the unit

### Global assessment of the unit

After a very positive round of evaluation conducted in 2009, the LPT has gained even more momentum, maintaining a first rate scientific production, appointing junior staff of excellent level, and securing funds from multiple sources with remarkable success. The research conducted is original, diverse and of excellent pedigree, highly visible and recognized. It is embedded in a convincing network of collaborations. This provides the grounds for a vigorous and sound outreach activity, knowledge dissemination and valorisation. The unit, furthermore is managed in an exemplary fashion, consequently it enjoys an excellent academic reputation and appeal. It ranks highly among theory laboratories in France and competes among the top 10 % at the international level. Twenty-two years after the initial transplant in Toulouse, the LPT has evolved into an outstanding research and teaching organization, constituting an ongoing success story.

### Strengths and opportunities in relation to the context

The experts committee has identified a number of strong points and opportunities, starting with the high level of scientific expertise of the staff. The lab shows a healthy age distribution, improved gender characteristics, and in spite of the disparity in size of the different groups, the activity for all is well balanced in terms of community service in the broad sense, and contract management. Praiseworthy are also:

- the collective dynamics within the unit, which is highly positive;
- the skilful and sterling management, be it on scientific or on administrative affairs;
- the success in outreach, knowledge dissemination, transferred knowledge;
- the supporting staff, highly efficient and appreciated;
- the commendably successful effort to establish collaborations with experimentalists, and outside physics;
- the interactions with IRSAMC federation, a convincing and efficient agora, common to four physics/chemistry units, which endows them with an impact and visibility at the local scale, that they would not reach with the same efficiency otherwise.

### Weaknesses and threats related to the context

Although no clear weaknesses have been identified in the course of the evaluation, a number of potential threats can be outlined, some of them being rather generic:

- the unit has significantly grown in size in recent years. It awaits appropriate support in terms of office space. Congestion looms;
- there are concerns on the lacuna-rich projection of fundamental unit's activities, such as the LPT, onto the regional, national and European strategies for research. This worry echoes recent ANR trend for 'low energy' theoretical physics activities, which, if not hostile, is at least unfavourable;
- the experts committee deplores the decrease of funding opportunities at doctoral level;
- compared to structures of a similar size and range of activities, LPT presents a notably weak administrative support in terms of numbers;
- career perspectives of supporting staff are thwarted. The experts committee encourages the unit to pursue sustained efforts towards the promotions of the managing secretary, and, at the level of IRSAMC federation, of the engineer in charge of computers, for instance encouraging and supporting the supervision of students. As emphasized above, this pair is of remarkable quality, providing invaluable assistance.

## Recommendations

Several issues deserve attention:

- the activity in the realm of biophysics and soft matter has witnessed critical weakening in the last two years. It is currently carried by teaching staff only. Reinforcing this domain of activity seems a priority, and a CNRS position would be highly desirable here;
- two professors have recently left, for personal reasons. Their scientific performances, during their stays at the LPT, were rather exceptional. The experts committee thus hopes that the recent professor position opening, submitted by the unit, will meet benevolence from the governing bodies. The proposed scientific profile is large, and promises a strong competition at the best international level;
- a convergent need has emerged in two groups, to benefit from the support of a computer scientist, in charge of optimization and development. What is at stake is not computer or hardware assistance, duly and competently covered already. Given the heavy and advanced computational nature of numerous LPT's research projects – several millions of CPU hours are used yearly at facilities such as IDRIS/GENCI, or the local excellent CALMIP – , such an opening, at '*Ingénieur de Recherche*' level, is fully justified, and endorsed by the experts committee. Loss of competitiveness is to be feared otherwise. A hiring of this kind has proven invaluable in other units of a similar size and it is evident that all four groups would enormously benefit from interaction with such a person. The experts committee anticipates a rewarding return on investment, not only for the range of activity where numerical efficiency is the keystone, but also for the whole lab;
- as in other institutions, the situation of faculty members (*'enseignants-chercheurs'*) is fragile, and often impeded by a heavy teaching load, to which unofficial but time consuming chores must be added. This work force within LPT, of exceptional quality, would benefit from a partial transfer of duties to CNRS staff. Such an evolution, which requires that the University accepts CNRS volunteers for teaching duty, would be a significant progress;
- finally, LPT took the lead on the '*École des Sciences Avancées de Luchon*', an endeavour to enhance interdisciplinary exchange between different sciences. It is of interest for a large number of researchers in the Midi-Pyrénées region, with a potential for matching the most notable realizations of the kind. It aims at providing the site with a structure for hosting schools and conferences, thereby contributing to the academic reputation and appeal of the entire Toulouse scientific scene. The experts committee enthusiastically supports this initiative, which merits proper funding. To this end, it is recommended that the School governing body and Scientific Council match, in their diversity, the proposed thematic breadth of the project.