



## PHYS - Laboratoire de Physique

### Rapport Hcéres

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agence d'évaluation de la recherche  
et de l'enseignement supérieur

Section des unités de recherche

AERES report on the unit:

Laboratoire de Physique de l'ENS Lyon

University or school

École Normale Supérieure de Lyon

June 2010



agence d'évaluation de la recherche  
et de l'enseignement supérieur

Section des Unités de recherche

# Rapport de l'AERES sur l'unité :

Laboratoire de Physique de l'ENS Lyon

## Sous tutelle des établissements et organismes

École Normale Supérieure de Lyon

Le Président  
de l'AERES

Jean-François Dhainaut

Section des unités  
de recherche

Le Directeur

Pierre Glorieux

Juin 2010



# Unit

Name of the unit : Laboratoire de Physique de l'ENS Lyon

Requested label : UMR

No. in case of renewal : 5672

Unit director : Mr Jean-François PINTON

## Members of the expert committee

### Chairperson :

Mr Jean-Marc DI MEGLIO, Université Paris Diderot

### Reviewers :

Mr Fabian ESSLER, Oxford University

Mr Marc HENNEAUX, Université Libre de Bruxelles

Mr Henrik JENSEN, Imperial College, London

Mr Werner KRAUTH, École Normale Supérieure, Paris

Mr Dan LATHROP, University of Maryland

Mr Éric MOULINES, École Nationale Supérieure des Télécommunications, Paris

Mr Eduardo WESFREID, ESPCI, Paris

### Reviewer(s) nominated by the staff evaluation committees (CNU, CoNRS, CSS INSERM ...) :

Mr Emmanuel TRIZAC, CoNRS

Mr Dominique SALIN, CNU

## Representatives present during the visit

### Scientific delegate representing AERES:

Mr Claude LECOMTE

### University or School representative:

Mr Jacques SAMARUT, Président de l'ENS Lyon

Mr Olivier FARON, Directeur Général de l'ENS Lyon

### Research organisation representative:

Mr Patricio LEBOEUF, CNRS



# Report

## 1 • Introduction

- Date and conduct of the visit :

The visit of the committee took place on the 5th and 6th of February 2010. After a welcome meeting, the committee was exposed to the laboratory by the director. After meeting the Conseil de laboratoire and the assembly of students and post-docs, the second half-day was dedicated to science talks and ended by a first closed meeting of the committee. The committee visited the laboratory and met the representatives of the authorities (CNRS and ENS) during the third half-day. The university faculty and the directors of the institutes related to the laboratory met the committee during the last half-day which ended by a private interview with the director. The committee is pleased to congratulate all the members of the lab for the perfect organisation of the visit, the quality of the talks and presentations and for the quality of the provided documents.

- History and geographical location of the unit and brief description of its field of study and activities :

The Laboratoire de Physique was founded in 1987 with the École Normale Supérieure de Lyon. It is located in the buildings of the École Normale Supérieure on the Jacques Monod science campus and occupies a surface of 2300 m<sup>2</sup>, with a few projects hosted in the Joliot-Curie laboratory. The field of study covers a wide area of physics, from string theory until the design of new devices for air treatment; nine domains can be distinguished: mathematical physics, condensed matter, statistical physics and complex systems, signal and infophysics, soft matter, turbulence and hydrodynamics, biophysics, geophysics and instrumentation. The laboratory is now organised in four groups (Soft matter and physics of biological systems, Non-linear physics, Signal and infophysics - Statistical Physics of Complex Systems and Theoretical physics) with strong interconnections, overlap and common projects.

- Management Team :

Jean-François Pinton is the Director of the laboratory since 2007 and will lead the laboratory for the next term (2011-2014). He is assisted by the Conseil de laboratoire (lab council) of the unit which has regular meetings (at least 5 meetings per year); half of the council is elected, the other half is nominated and the council also counts representatives of the faculty of physics. The heads of the four research groups are among the nominated members.



- Staff: (according to the dossier submitted to AERES) :

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	17	18
N2: Number of EPST, (Public scientific and technological institution) or EPIC, (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	38	34
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)	1 +17 post-docs	1
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	11	10
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)	2 CDD (12 mois)	1 CDD (12 mois)
N6: Number of doctoral students (see Form 2.8 of the unit's report dossier and 2.7 of the unit's project dossier)	25	7*
N7: Number of persons accredited to supervise research and similar	26	24

\* + students starting in 2009, 2010

## 2 • Assessment of the unit

- Overall opinion :

The committee has been very much impressed by the quality of research produced by the unit which has gained an international deserved reputation over the years and certainly is one of the flagship laboratories of the French physics.

- Strengths and opportunities :

The research at the Physics lab of the ENS Lyon is characterised by a very high level of modelisation, a questioning of the physics concepts even in the simplest experiments and a development of sophisticated and novel instrumentation. It is an example of a successful interconnection between theory and experiments. The laboratory has a wide spectrum of activities and is good and competitive in every single one. This wide spectrum provides a substantial potential to engage collaborations at the interface of physics and others fields. The committee has also been impressed by the quality of the students in the laboratory and their involvement in their research, and also by the strong implication of all the laboratory members in the teaching of Physics at the ENS.

- Weaknesses and threats :

The committee feels that the laboratory should try to increase the number of its PhD students considering the high quality of the training and supervision offered by the research and academic staff. This could be done by opening more widely the recruitment of foreign students. The Physics lab of the ENS Lyon is a powerful magnet for researchers and this dynamics has to be encouraged: the present lack of lab space clearly bothers this dynamics and the ENS direction should absolutely help one of its leading labs to acquire new surfaces. Another concern is the number of administrative officers that should be definitively increased to face the numerous and demanding tasks of the *modern way* of laboratory management.



- Recommendations for the unit director :

The committee has very much appreciated the quality of the research but also the excellent working atmosphere and the collegiality. This is certainly one of the reasons for the success of the laboratory and the committee would like to congratulate the director for his fantastic work. The committee recognises the great quality of the project: the variety of subjects is already very large and the direction should take care to not extend the number of addressed physical domains, in order to preserve the present cohesion of the laboratory.

- Data on work produced :

(See [http://www.aeres-evaluation.fr/IMG/pdf/Criteres\\_Identification\\_Ensgts-Chercheurs.pdf](http://www.aeres-evaluation.fr/IMG/pdf/Criteres_Identification_Ensgts-Chercheurs.pdf))

A1: Number of <i>produisants</i> (professors and researchers whose names appear in a minimum number of "publications" over a 4-year period) listed in N1 and N2 in the project column	50
A2: Number of <i>produisants</i> among the other staff listed in N3, N4 and N5 in the project column	1
A3: Proportion of <i>produisants</i> in the unit $[A1/(N1+N2)]$	96%
Number of theses for accreditation to supervise research defended	3
Number of theses defended	31
Any other data relevant for the field (please specify)	45 post-docs

### 3 • Detailed assessments

- Assessment of work produced and scientific quality :
  - Relevance and originality of the research conducted, quality and impact of the results :

Excellent research, internationally competitive characterised by a very high level of modelisation, a strong interconnection between experiments and theory and an impressive development of instrumentation (particularly in hydrodynamics and force measurements at mesoscales) with a deep implication in the teaching of physics at the higher level. The laboratory has been the seed of a world premiere : the VKS (von Karman Sodium) experiment which constitutes a crucial step towards the understanding of the origin and evolution of the magnetic field of planets and stars.

- Quantity and quality of publications, papers, theses and other work :

For the period 2005-2009: 543 publications (cited more than 3300 times), 265 invited conferences, 31 PhD theses.

- Quality and solidity of contractual relations over time :

During the last four years, the lab has maintaining a very high level of success rate to grant applications, raising every year more than three times the amount of recurrent funding.



- Assessment of the influence, appeal and integration of the research unit in its environment :

- Number and reputation of the prizes and distinctions awarded to the unit members, including invitations to international events :

One IUF nomination; 2 CNRS bronze medals; fellowships of international societies, Awards from the Belgium Academy of Science, the French Academy of Sciences, Associate professorships: Liège, Shanghai, Chainai, Navarra.

- Ability to recruit top-level researchers, post-doctoral and other students, especially foreigners :

45 post-docs during the 2005-2009 period (70 % foreigners), 17 new academic staff have joined the lab while 5 have left to other institutions (3 of them with a promotion), 27 invited professors.

- Ability to obtain external financing, to respond to or launch calls for tenders and to participate in the activities of competitiveness clusters :

The laboratory has been able to raise (on average) more than ~ 1 M€ in addition to its recurrent funding by the state (~0.4 M€).

- Participation in international or national programmes, existence of important collaborations with foreign laboratories :

12 international collaborations, 3 European programs, more than 20 partnerships with foreign institutions.

- Valuation of research and socio-economic or cultural relations :

12 industrial partnerships, good activity of science popularisation.

- Assessment of the strategy, governance and life of the unit :

- Relevance of the unit's organisation, quality of its governance and internal and external communication :

The committee has unanimously noticed the lively and pleasant working atmosphere in the laboratory, which is clearly a result of the work of the director assisted by his *conseil de laboratoire*, taking all decisions in a collegial manner.

- Relevance of initiatives aimed at scientific coordination and the emergence and taking of risks :

The direction has implemented an internal grant (*BQR labo*) to support emerging research activities, attributed by the *conseil de laboratoire*: a very good initiative.

- Involvement of the unit's members in teaching activities and in organising research in the region :

The implication of the lab members in teaching is a striking feature of the laboratory and certainly one of the reason of its success. The implication of the CNRS researchers is exemplary.

The laboratory is an essential member of the *Fédération de Physique André-Marie Ampère*, which is effectively equivalent to the Faculty of Physics of the PRES of Lyon, of the *Fédération Lyonnaise de Calcul* and of the *College of Engineering*. Its participation in the *Institut des Systèmes Complexes*, in the the *Centre Blaise Pascal*, the development of research projects in the *hotel à projets Joliot-Curie* shows that the Laboratoire de Physique of the ENS Lyon is a cornerstone of the research system in Lyon.





- Project assessment :

The research project includes both the continuation of present studies and more risk taking options but still in the line of previous activities that makes the committee confident in their achievement.

#### 4 • Team-by-team and/or project-by-project analysis

Name of the team : Soft Matter and Biological Physics

Name of team leader : M. Patrick OSWALD

- Team staff or staff allocated to the project (according to the dossier submitted to AERES) :

	In the report <sup>1</sup>	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	7	7
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	15	9
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)	1	1
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	1	
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)		
N6: Number of doctoral students (see Form 2.8 of the report unit's dossier and 2.7 of the project unit's dossier)	14	3*
N7: Number of persons accredited to supervise research and similar	10	8

<sup>1</sup> also includes staff/students leaving for the Joliot-Curie lab in 2011 and not enrolled in the project

\*+students starting in 2009, 2010

The team presents a compelling portfolio of research activities. It has grown in recent years by the recruitment of excellent researchers (full time, or part-time personnel with teaching duties: 5 new faculties including one full Professor from abroad). The team has a commendable bias towards young age. This team has developed research projects in the Joliot-Curie and has thus benefited from a biological environment.

Research efforts have concerned in particular : the dynamics of soft glassy materials (such as the behaviour of colloidal gels or clay dispersions close to their yield stress), instabilities in granular assemblies (such as the washboard effect that may be an engineering plague on some roads and that has been shown to be regrettably robust), the dynamics of disordered elastic media, complex fluids such as liquid crystal, polymer solutions, lamellar phase, geophysical driven studies of degassing through complex materials (granular media), fracture physics. In addition, efforts have been paid to develop a powerful technique of ultrasonic rheo-velocimetry, which enables to probe local velocity fields. The team is also developing numerical methods for the study of granular media.



Covered by this team are of course physical aspects of biological objects in modelling nucleic acids and protein stability, DNA sequence effects and genome organisation and AFM experiments. The covered topics scale from the study of the fluctuations of the base pairing until the study and design of new devices for air cleaning purposes. The numeric simulation of DNA segregation in the nucleus using a polymer approach seems to be a real achievement that has particularly seduced the visiting committee.

We also note that the team has built a strong network of collaborators at the local, national, and international scale. The publication record of the team is excellent (140 RICL and 3 books) and contributes to its international visibility (80 Invited conferences and 12 organised conferences). It leads also 3 awards and honours. Note that 4 patents have been obtained or are pending. The team was successful getting external financing (ANR and 2 supports).

- **Project assessment :**

The scientific project is two folds: continuation of successful ongoing long term research (liquid crystals (Lehmann effect), complex fluids rheology (eg washboard effect), bubble degassing, air cleaning, bacteria swimming, dynamic light scattering of the cell nucleus, cellular adhesion etc.) and new projects (plasticity of liquid crystal doped phases, foam rupture, AFM of HIV virus capsid, yeast study...). Maybe the effort on granular media has to be defined more precisely with respect to the granular research community in France and abroad. The committee also positively acknowledges the modification of the contour of the team, which leaves most of the genomic part to the Joliot-Curie laboratory and thus preserving its efforts to the meso- and macroscopic world.

- **Conclusion :**

- **Opinion :**

If not in all the topics, this research is at the top of international level

- **Strengths and opportunities :**

Young talented people are working together on well identified topics with a lot of imagination.

- **Weaknesses and threats :**

The research on granular systems has to be reconsidered with respect to the work done at the French and European level, even if the work in Lyon is characterised by a superior modelling effort. The project for the next four years is very exciting but would need more manpower to be completed (students).



Name of the team : Non-Linear Physics

Name of team leader : M. Jean-François PINTON

- Team staff or staff allocated to the project (according to the dossier submitted to AERES) :

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	4	5
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	8	9
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)		
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)	1	1
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)		
N6: Number of doctoral students (see Form 2.8 of the report unit's dossier and 2.7 of the project unit's dossier)	5	2*
N7: Number of persons accredited to supervise research and similar	6	6

\*+students starting in 2009, 2010

The nonlinear physics team in ENS-Lyon Laboratoire de Physique holds an international reputation for creative scientific projects of excellence. They have a solid publication record in top journals, and a track record for obtaining external funding for their scientific projects. While publication and citation statistics are subject to errors of search, an ISI Web of Science search was performed for the faculty listed for this team, where also ENS-Lyon was credited. The search obtained 235 refereed publications, with 5487 citations and an average of 23 citations per publication. This is a quite strong record that shows a sustained scientific productivity and is some evidence for the importance of their work. The team members are also well regarded in the outside scientific world due to many visible invited talks at international conferences and workshops. Indeed, this team is one would probably regarded in the top five nonlinear physics laboratories worldwide. The research of this team is broadly described as related to geophysics or in turbulent hydrodynamics; for both areas there is ample evidence for significant accomplishments and recognition.

### Geophysics

The ENS-Lyon team is part of a French effort (VKS experiment) including ENS-Paris and CEA-Saclay that have created self-excited magnetic field dynamos in CEA-Cadarache. This experimental effort is undertaken in order to better understand how a turbulent flow might generate magnetic fields, such as occurs in the core of the Earth. This project was developed by mixing a homogeneous volume of liquid sodium in a technically challenging experiment. The experiment has exceeded all expectations for the rich dynamics that have been discovered, including steady, oscillatory, and reversing magnetic field states. This ongoing experimental project is a world leader in nonlinear liquid metal dynamos.

There are notable ongoing projects in geophysical fluid dynamics including geophysical convection and the propagation of internal waves relevant to ocean dynamics. In addition there are ongoing projects in nonlinear geophysics at ENS-Lyon about the modelling of complex granular flows, including the dynamics of Strombolean volcanos, granular fracture, and the development of granular waves on a vehicle driven surface. In each case these projects bring creative experimental teams and theoretical analysis to discover new processes relevant to understanding the earth.



## Hydrodynamics and turbulence

The ENS-Lyon nonlinear hydrodynamics team has a balanced mixture of advanced theory, creative experiments, and novel instrumentation design. The ongoing experimental work includes important projects on Rayleigh-Benard convection and superfluid turbulence, turbulence modelling and simulation, and theory and experiments on inertial particles. In these subjects the ENS team are recognised as leaders and in addition to the excellent evidence in the scientific literature and international recognition in invited talks, this team has also obtained at least on patent and works toward the creation of small businesses in the region.

### - Strengths :

The strengths of this research team are four-fold: high level nonlinear dynamics theory, creative world-leading experiment design, expert experimental fabrication, and excellent esprit-de-corps.

### - Weaknesses :

The main limitations for this research team include: space constraints for both laboratories and office space for young researchers, limited terms (often only one year) for post-doctoral researchers, and the challenges of fitting cross-disciplinary research into a *labelled discipline* organised national scientific structure.

**Name of the team :** Signal and Infophysics & Statistical Physics of Complex Systems

**Name of team leader :** M. Patrice ABRY

- Team staff or staff allocated to the project (according to the dossier submitted to AERES) :

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	2	2
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	5	5
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)		
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)		
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)		
N6: Number of doctoral students (see Form 2.8 of the report unit's dossier and 2.7 of the project unit's dossier)	4	1*
N7: Number of persons accredited to supervise research and similar	4	4

\*+students starting in 2009, 2010



- **Assessment of work produced and scientific quality :**

The quality of the research is very good. This group has produced interesting work on a number of subjects. The combination of expertise in signal analysis and statistical mechanics applied in a consorted way to tackle problems in complexity science is very timely and already well developed.

The approach covers a very timely need in complexity science and the group's effort is likely to become a leading effort as the expertise gained in current case studies gradually are brought to bear on other problems.

- **Research highlights include :**

- The group has unveiled most of the theory behind for the empirical mode decomposition (which was initially formulated as an algorithm), leading to natural higher-dimensional extensions. The group has also revisited the notion of stationarity, developing a family of tests based on the use of surrogates.
- The group has recently has made remarkable advances on wavelet leaders for the analysis of multifractal data, which yield to statistically well-founded estimators. The group has also introduced the interesting idea of bootstrapping over time-scale strips of wavelet coefficients or leaders.
- The group has made significant contributions to dynamic graph by combining high dimensional signal analysis and statistical mechanics methodology (these tools are very well suited for a range of important problems in complexity science). This new research activity has already produced interesting results in epidemic diffusion on a graph, dynamics of living cell nucleus and the bicycle rental system in Lyon...

- **Assessment of the influence, appeal and integration of the team or the project in its environment :**

The team has a strong international scientific profile and high visibility. It is pursuing research projects of the highest level. The group has developed much collaboration both nationally and internationally with the best teams in the field, resulting in joint publications. The group participates actively to the animation of the French signal and image processing community; in particular, it has created and currently led a very active summer school.

The group visibility has been ensured by publication of results in mathematics, physics and signal processing journals as well as in more broad journals like PNAS. The group collectively received the « Simone e Cino Del Duca » award from the Institut de France, 2007.

- **Assessment of the strategy, governance and life of the team or project:**

The interaction between signal and physics is productive and goes in both directions. Exploiting the information contained in experimental data calls for advanced methods in signal processing; on the other hand, the design of such methods also benefit from ideas and concepts whose origin can be found in statistical physics and mathematics.

The general approach of the complexity group to do specific projects in collaboration with experts from the relevant fields (physics, economics, transport engineering, etc.) ensures that the research is not only theoretically sophisticated, which it is, but also well tuned to the specific research field engaged in the collaboration.

The internal organisation of the team appears to proceed smoothly and to be well integrated in the running of the laboratory. The group is also involved in various regional initiatives and in particular in the IXXI. The team also regularly (co)organizes international workshops and conferences.

- **Project assessment :**

The research projects presented are attractive, ambitious and in the line of their previous activity. The committee is confident that these promising research directions will continue.



- Conclusion :

The group has made many significant contributions which have, and will continue having, a clear impact on the development of their respective fields of research.

- Strengths and opportunities :

The group is dynamic and the research program is ambitious. It covers a wide spectrum of researches in information processing and complex systems.

- Weaknesses and threats :

The international awareness of the group's work is indicative of a potential for further scientific impact, which can be developed by increasing significantly the number of PhD students and (to a lesser extent) post-docs, if funding for this can be obtained. The group could exploit the leverage effect offered by industrial funding to expand its activity.

Name of the team : Theoretical Physics

Name of team leader : M. Jean-Michel MAILLET

- Team staff or staff allocated to the project (according to the dossier submitted to AERES) :

	In the report	In the project
N1: Number of professors (see Form 2.1 of the unit's dossier)	4	4
N2: Number of EPST, <i>Établissement public à caractère scientifique et technologique</i> (Public scientific and technological institution) or EPIC, <i>Établissement public à caractère industriel et commercial</i> (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier)	11	11
N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier)		
N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier)		
N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier)		
N6: Number of doctoral students (see Form 2.8 of the report unit's dossier and 2.7 of the project unit's dossier)	4	1*
N7: Number of persons accredited to supervise research and similar	6	7

\*+students starting in 2009, 2010



- **Assessment of work produced and scientific quality :**

The team “Physique théorique” is composed of two research units “Mathematical Physics and Fundamental Interactions” and “Condensed Matter Theory”, which both cover a very broad spectrum of interests. The unit “Mathematical Physics and Fundamental Interactions” has a long-standing record of excellence at the leading international level in rigorous methods in statistical physics and integrable models. It has made highly significant and original contributions during the period covered by this report. The scientific productivity of the team is impressive both in terms of quantity and quality. The unit has extended and enhanced its research in supergravity and quantum gravity. The “Condensed Matter Theory” unit has a long-standing interest in (frustrated) magnetism. It has more recently added research directions on the study of mesoscopic systems, and on cold-atom physics. This predominantly young unit has successfully entered several new and exciting research directions and has already produced a strong record of publications in prestigious journals.

- **Research highlights include :**

- Quantum gravity and supergravity : the group has made remarkable advances in the elucidation of the structure of gauged supergravities in all space-time dimensions, developing an expertise which is recognised world-wide. Fascinating connections with hidden symmetries and infinite-dimensional algebras have been uncovered, paving the way to further profound developments.
- Integrable systems : the group has accomplished a major breakthrough in the long-standing problem of calculating (dynamical) correlation functions in the spin-1/2 Heisenberg model. The impact of this work ranges from mathematical physics (first derivation of large-distance asymptotics in a fully interacting theory) to the analysis of neutron scattering experiments.
- Condensed Matter : following a remarkable recent theoretical proposal that a class of materials known as spin ice support excitations that can be viewed as magnetic monopoles, the group has identified clear experimental signatures and provided a convincing interpretation of existing experiments in terms of monopole dynamics. This essentially established the theoretical proposal as experimental fact.

- **Assessment of the influence, appeal and integration of the team or the project in its environment :**

- **Distinctions :**

Two young members of the team have been awarded the CNRS bronze medal during the period 2005-2009. Another young recruit has received one “chair of excellence” at ENSL. The members are all regularly invited to international conferences to present their work.

- **Recruitment :**

The group has been able to attract 4 new members with strong records in the last four years, three of whom were coming from abroad. The group has also hosted several superb graduate students and postdoctoral fellows. Given its scientific level and dynamism, the group has a substantial potential for training that could perhaps be further exploited. Given the particularly wide range of research directions of the condensed matter group, it would benefit from an increase in the number of graduate students and postdocs in order to develop the depth needed to continue holding their own against the steep international competition in all the fields covered (magnetism, mesoscopes, spin glasses).

- **Financing :**

Besides the laboratory support from CNRS and ENSL, the group has obtained funding through several ANR projects and exchange programs with foreign institutions.



- Collaborations :

The group is well integrated at the regional level and has also developed much collaboration both nationally and internationally with the best teams in the field, resulting in joint publications. The condensed matter unit has been very active in setting up collaborations with experimental laboratories such as the London Centre of Nanotechnology, the Institut Néel and the mesoscopics group at LPA-ENS. This close contact with experimental groups elsewhere is bound to ensure the future pertinence of the theoretical work performed.

- Assessment of the strategy, governance and life of the team or project:

- Organisation :

The internal organisation of the team appears to proceed smoothly and to be well integrated in the running of the laboratory. Seminar series are organised on a weekly basis. The group is also involved in various regional initiatives. To take an example, they coordinate with the particle physics group at the University of Lyon the hiring of a new professor working on particle physics theory, an initiative which is judged to be quite appropriate by the committee. The team also regularly (co-)organizes international workshops and conferences.

- Teaching :

The group includes several professors and assistant professors and takes an active part in the teaching at the ENSL. One of its senior members is head of the Physics Department. Most CNRS members also participate in the Master through lectures and exercises as well as in the training of the PhD students and postdocs.

- Project assessment :

The research projects presented by both units are attractive, challenging and in the line of their previous activity. The committee is confident that these promising research directions will continue.

- Conclusion :

- Opinion :

The group is among the top tier of Theoretical Physics groups in Europe. The members have made many significant contributions which have, and will continue having, a clear impact on the development of their respective fields of research. Some of the research is world leading. The team has undoubtedly a strong international scientific profile and high visibility. It is pursuing research projects of the highest level.

- Strengths and opportunities :

The group is young, dynamic and ambitious. It has diversified interests covering a wide spectrum of areas in theoretical physics.

- Weaknesses and threats :

As stated above, the group has a great potential for training in view of its remarkable scientific level and dynamism. This potential could be further exploited by hiring more postdocs and directing the work of more PhD students. The Committee feels in particular that the recruitment basis of the students should be further enlarged beyond the French borders. The reputation of the group provides in that respect a unique opportunity. The hiring of more postdocs would in addition stabilise some of the research activities which might perhaps run otherwise the risk of becoming understaffed, limiting their natural development.

- Recommendations :

The funding should definitely be continued.





Note de l'unité	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A+	A+	A+

Nom de l'équipe : Soft Matter Condensed Physics, Biological Physics

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A+	A+	A

Nom de l'équipe : Non Linear Physics

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A+	A+	A+

Nom de l'équipe : Signal and Info Physics

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A+	A+	A+

Nom de l'équipe : Theoretical Physics

Note de l'équipe	Qualité scientifique et production	Rayonnement et attractivité, intégration dans l'environnement	Stratégie, gouvernance et vie du laboratoire	Appréciation du projet
A+	A+	A+	A+	A+



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**Le Directeur général de l'ENS de Lyon**

à

Monsieur Pierre Glorieux  
Directeur de la section  
des Unités de recherche  
AERES  
20, rue de Vivienne  
75002 – PARIS

Lyon, le 22 mars 2010

Monsieur le Directeur,

Vous m'avez transmis le rapport du Comité d'experts concernant l'évaluation de l'unité « laboratoire de Physique » UMR 5672.

L'ENS de Lyon a apprécié la qualité de l'analyse et l'encouragement très valorisant apporté aux équipes pour poursuivre leurs activités ; le rapport d'évaluation représente un outil précieux pour le pilotage et le positionnement de l'unité. L'ENS de Lyon réaffirme son soutien à l'unité en vue du maintien de sa politique d'excellence.

Vous trouverez ci-joint la réponse du directeur de laboratoire ; elle comporte des observations sur le rapport d'évaluation.

Je vous remercie ainsi que les évaluateurs pour la qualité de leurs travaux et vous prie d'agréer, Monsieur le Directeur, l'expression de ma plus haute considération.

**Olivier FARON**



**Réponse de l'unité Laboratoire de Physique – UMR 5672**

Directeur : Jean-François PINTON

Le laboratoire remercie l'ensemble du comité pour le travail effectué et pour son analyse de l'activité scientifique de l'unité.

Nous apprécions sincèrement la reconnaissance de notre activité, de l'investissement des membres du laboratoire en enseignement et en recherche.

Le comité a pu noter que le Laboratoire est organisé en équipes administratives qui ne recouvrent pas complètement les regroupements thématiques. Ce choix, conjugué au format du rapport, a pu nuire à la lisibilité de certaines activités pourtant internationalement reconnues – comme par exemple la mécanique statistique des systèmes hors équilibre ou à longue portée.

Nous espérons vivement pouvoir maintenir le dynamisme et le niveau d'activité du laboratoire dans les années à venir. Trois points soulevés par le comité impliquent un soutien actif de nos tutelles, ENS de Lyon et CNRS : l'augmentation de la surface disponible pour le laboratoire, l'accroissement de notre support technique et administratif, l'augmentation du nombre d'étudiants en thèse.

Lyon le 18 mars 2010,

Jean-François Pinton

