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## LPS - Laboratoire de physique statistique de l'ENS

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

Section des Unités de recherche

Evaluation report

Research unit :

Laboratoire de Physique Statistique

(LPS) – UMR 8550

Ecole Normale Supérieure de Paris



March 2009



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## Evaluation report

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Le Président  
de l'AERES

Jean-François Dhainaut

Section des unités  
de recherche

Le Directeur

Pierre Glorieux

march 2009



# Evaluation report )

## The research unit :

Name of the research unit : Laboratoire de Physique Statistique

Requested label : UMR

N° in case of renewal : 8550

Head of the research unit : Mr Eric PEREZ

## University or school :

Ecole Normale Supérieure de Paris

## Other institutions and research organizations:

Université de Paris 6

Université de Paris 7

CNRS

## Date(s) of the visit :

February 2<sup>nd</sup> and 3<sup>rd</sup>, 2009

# Members of the visiting committee



## Chairman of the committee :

Mr Boris SHRAIMAN, KITP, Santa Barbara, USA

## Other committee members :

Mr Marileen DOGTEROM, FOM, Amsterdam, Pays-Bas

Mr Eberhardt BODENSCHATZ, Max Planck Institute Göttingen, Allemagne

Mr Jean-Marc LUCK, IPhT, Saclay

Mr Jean DAILLANT, CEA, Saclay

Mr Bernard CASTAING, ENS Lyon

## CNU, CoNRS, CSS INSERM, (représentant INRA, INRIA, IRD...) representatives :

Mr Emmanuel TRIZAC (CoNRS)

Mr Jean-Louis DÉJARDIN (CNU)

# Observers

## AERES scientific representative:

Mr Jean-Michel ROBBE

## University or school representative:

Mr Yves GULDNER, Directeur de l'ENS

Mr Jean-Michel RAIMOND, Directeur du Département de Physique de l'ENS

## Research organization representative (s) :

Mr Christian Chardonnet et Mr Patricio LEBOEUF, représentants l'Institut de Physique du CNRS

Mrs Andrea GAUZZI, représentant l'Université Paris 6

Mr Jean-Marie DUPRET, représentant l'Université Paris 7

## 1 • Short description of the research unit

- Number of lab members including researchers with teaching duties (16 + 1 emeritus), full time researchers (22 + 3 emeriti), engineers (2), PhD students (37), technicians and administrative assistants(7)
- Number of HDR (26) and of HDR who are PhD students advisors (16)
- Number of PhD students who have obtained their PhD (33) and average length of a PhD during the past 4 years (40 months)
- Number of PhD students currently present in the research unit (37)
- Numbers of PhD students with fellowships (37)
- Number of lab members who have been granted a PEDR (11)
- Number of “publishing” lab members (38) among researchers with teaching duties and full time researchers

## 2 • Preparation and execution of the visit

The *comité d'évaluation* du LPS on 2-3 February has reviewed the activities of the laboratory.

In preparation for the visit, committee members have received printed copies of the LPS report containing the description of the laboratory, progress reports from individual teams and outlines of proposed future research.

Schedule of the visit:

### February 2<sup>nd</sup> :

- 9h-9h30: First discussion of the visiting committee.
- 9h30-10h30: the director presents the LPS and his scientific policy
- 10h30-11h: oral presentation: The dynamo effect: experiments and models
- 11h00-11h30: oral presentation: Morphogenesis and multi-scale phenomena
- 11h30-12h00: pause
- 12h-12h30: oral presentation: Noisy fronts and models of evolution
- 12h30-13h00: oral presentation: Project: optical control of genetic expression
- 13h-14h30: lunch and meeting with the LPS students, postdocs
- 14h30-18h: visits of teams 1

### February 3<sup>rd</sup> :

- 9h-9h30: oral presentation: Structure and dynamics of genetic networks
- 9h30-13h00: visits of teams 2
- 13h00-14h30: lunch with LPS permanent researchers and staff
- 14h30-15h: meeting with the Conseil de Laboratoire
- 15h-15h30: meeting with the funding institutions
- 15h30-19h00: final discussion



All material presented to the Committee was of high quality and so was the organization of the day. Nevertheless, the Committee would have profited from more time for internal discussions and discussions with the management and speakers. Unfortunately the Committee did not have an opportunity to meet with the support staff, which would have been desirable because of the important role played by this staff in the life of the laboratory.

### 3 • Overall evaluation of the activity of the research unit

LPS presents a remarkably broad and diverse scientific profile ranging from experimental low temperature physics to theoretical neuroscience. LPS currently brings together quantum condensed matter physics with hydrodynamics, “soft” condensed matter physics, statistical physics and biophysics. It includes experiment, theory and computation. A number of outstanding research contributions in all of these areas have been noted by the committee as detailed in the reviews of teams. LPS is truly interdisciplinary with extensive integration of biology and applied mathematics into the physics environment.

The scientific diversity of LPS is a result of a unique research environment that has enabled its past and present members to change their research agenda and effectively move into new and emerging areas of science. Strong representation of interdisciplinary biology (ranging from single-molecule biophysics and biomechanics to modeling of evolution) among LPS research themes is a commendable outcome of the “scientific mobility” and innovation enabled by the lab. The scientific diversity of the lab is supported by the integration of different research themes into the wider scientific landscape of the ENS Dept of Physics and other departments.

LPS teams have presented a compelling portfolio of innovative research projects. The committee was pleased to note evidence of continued scientific mobility and risk-taking: in particular a continued effort to expand the domain of statistical physics and the growing range of collaborations with biologists at other institutions. Also commendable is the apparent mobility of LPS members between research teams and the internal call for proposals with LPS allocating “seed money” to enable germination of new research efforts.

LPS members are deeply involved in teaching and PhD student (currently numbering 39) training. Student members of the lab stand to specifically benefit from the multidisciplinary environment of LPS. LPS includes 17 professors and assistant professors at Paris 5 (1), Paris 6 (9), ENS (4) and Paris 7 (3). In addition, 10 CNRS researchers of the LPS also teach at the universities. Three members of the LPS are in the Institut Universitaire de France. LPS members carry important and prominent academic responsibilities including: “Direction des études” at ENS; supervision of the Master’s program at UPMC; direction of graduate schools and PhD programs (“Ecoles doctorales”); supervision of “Agrégation de physique”.

LPS members have been active and successful in attracting external funding from both national and European sources (international : 5, european : 12, national : 25 (ANR)+12 (ACI)) and overall have an excellent publication output (with all of its members active). LPS members enjoy extensive international recognition both as invited speakers at international conferences and as organizers of scientific meetings and schools (including those at Cargèse, KITP, Les Houches).

Overall, the committee recognized LPS as an outstanding research and teaching organization with world class standing particularly notable for its original, innovative and inter-disciplinary research and ability to produce breakthroughs on long-standing fundamental research problems.

LPS presents a healthy age distribution with its ~40 permanent members nearly equi-distributed (13:10:9:9) over four decades (30+, 40+, 50+, 60+). With the inclusion of doctoral students and postdocs the overall profile has a commendable strong bias towards younger age: more than half of the (100) lab members are below 33 in age.

LPS has a « conseil de laboratoire » representing all research teams and support staff which sets priorities. LPS is managed by its director in consultation with advisors representing experimental and theoretical components of the lab. LPS direction recognizes that the long term maintenance of scientific diversity of the lab requires balancing the needs of different sub-fields of research. It may be commended for its steps, such as “seed” funding, in promoting new research initiatives.



LPS has extensive connections with other physics (as well as chemistry and biology) labs within and outside ENS. These connections, by providing “critical mass” and complementary expertise, play an essential role in enabling the diverse scientific effort within LPS.

In summary, LPS is an outstanding source of innovative research and an excellent venue of graduate and postgraduate training.

## 4 • Evaluation of research teams

### Team 1: Wetting and Nucleation

The team “Mouillage et Nucléation” has performed remarkably clean experiments, providing clear answers to important problems. They have an outstanding international visibility, as proved by awards (London prize), regular visits of major scientists, and by their collaborations. The techniques developed by this team have revitalized physics of under-pressurized liquids, first helium, and now water. The current project on measuring, by Brillouin scattering, the sound velocity in the transient under-pressurized state, is very promising as demonstrated by the preliminary results. Their study of wetting on disordered surfaces is an excellent example of collaboration both within the laboratory and outside. The problem of the super-solidity in  $\text{He}^4$  is tackled in an original way, thanks to their experience with growing and visualizing  $\text{He}^4$  crystals. This group is obviously at the international level on this subject.

The team has played an important role in popularizing science, both via articles in scientific magazines, and books. They also have had a significant impact on the organization of teaching, in the University Paris 7, and for the recruitment. The performance of this team is outstanding, in all of the aspects considered here.

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+	Non noté	A+

### Team 2: Condensed Matter Theory

The CMT team consists of seven permanent members and a similar number of graduate students and postdocs. This group performs top-level and worldwide recognized research on a broad range of themes pertaining to statistical physics and theoretical condensed matter physics.

The research in condensed matter theory has been mostly focused on quantum atomic and molecular gases. This activity benefits from the proximity of the Laboratoire Kastler Brossel. Significant results have been obtained in the area of ultra-cold fermionic gases, on two-dimensional superfluid transition, on the frequency spectrum of collective modes and on the application of the four-body problem to gases of diatomic molecules.

The activity in the area of numerical statistical physics has successfully dealt with a range of problems, including especially the kinetic theory of lattice Boltzmann systems, the pioneer implementation of exact sampling algorithms, and the study of creep dynamics of pinned elastic objects.

Remarkable advances have been made in non-equilibrium statistical physics and its applications. These include a ground breaking investigation of fluctuations and large deviations in non-equilibrium steady states of driven systems. Equally outstanding is the pioneering work on modeling the dynamics of populations under selective pressure and the relation of these problems to the problem of velocity selection in propagation of fronts.

The members of this team are also actively involved in teaching and training students at various levels, both at the Ecole Normale Supérieure and in other universities in the Paris area.





The committee however noted that the age pyramid of the team is unbalanced toward the high side (with a mean age of 52 and only two members below 45). In order for the tradition of excellence in the research subjects covered by this team to be perpetuated, it is recommended that the recruitment of a young permanent researcher, especially in the area of theoretical and/or numerical statistical physics, be made a part of the hiring priorities of the laboratory in the near future.

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A+	A+	A+	Non noté	A+

### Team 3: Complex networks and cognitive systems

The team "Complex networks and cognitive systems" is interested in a broad gamut of subjects, from econophysics to synaptic transmission, including molecular biology. The group consists of 4 CNRS researchers, with the recent addition of the 5<sup>th</sup> member. Among the strong points the visiting committee would like to emphasize, are:

- the study of the dynamics of neural networks in the cerebellum, in collaboration with neurobiologists from the biology department,
- the work on the neural coding of categories,
- the resolution of inverse problems allowing to reconstruct the sequence of a DNA strand from unzipping experiments, or to determine Ising-like couplings from correlation functions and mean activities (measured in retinal cells),
- the modelization of loop formation in DNA, an important mechanism for structure and function,
- the study of the interplay between multiple equilibria in a monopoly market with heterogeneous agents and externalities.

A commendably successful effort is made to establish collaborations outside physics and to extend and apply physics ideas and methods to diverse subjects. Proposed lines for future research are of high quality and are timely and realistic; they deal with several aspects of neurosciences (perception and coding of categories, information coding in neural population), econophysics (dynamics of social segregation), or theoretical biology (deduction of effective interactions in various systems such as protein networks, from the measure of spatio-temporal correlations).

Some members of the team have an extensive involvement in teaching, both at the masters level, and in the training of PhD students. Finally, we note that the group may evolve in the near future due to some internal reorganization in the laboratory.

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A	A	A	Non noté	A+



#### **Team 4: Physics of bio-molecules**

The “Physics of Biological Molecules” team currently consists of 4 permanent members with a healthy balance between senior and junior researchers. The team furthermore hosts a remarkably large number of students and postdocs, which is testimony to the success of the team in obtaining external funding.

The team is outstanding in all respects, with an impressive publication record and a very high international visibility of its senior members. The team is recognized internationally as a world leader in the research of DNA-protein interactions on a single molecule level. They have pioneered the development of the magnetic tweezers as a tool for these experiments, an approach that has been copied by many laboratories around the world in recent years and that has led the team to launch the startup company “PicoTwist”. This company builds ready-to-use magnetic tweezers instruments, and although it is still early, the first signs of its commercial potential are starting to show.

In recent years, research effort of the team has mainly concerned studies on single DNA molecules and the interaction with DNA-binding proteins of different kinds. The team has seen a shift in focus from studying the pure mechanical properties of DNA molecules to using the mechanical signature of (supercoiled) molecules for the investigation of the dynamics of molecules that process DNA for different purposes. Highlights include (but are not limited to) the recent experiments on the bacterial motor protein FtsK, and the experiments involving the complex DNA replication machinery.

In addition to their further investigation of complex protein-DNA interactions, the team is starting a number of new projects for the future, which are all challenging, novel, biologically interesting, and in some cases completely different from their activities thus far. Examples are:

- The development of two-photon photoactivation techniques which allows to manipulate gene expression on a single cell level in live organisms (in collaboration with the Chemistry and Biology departments).
- The combination of single molecule near-field optical techniques with magnetic tweezers to be able to combine force information with protein binding kinetics.
- The study of evolutionary and competition processes in bacteria, both at the bulk and single cell level.

The committee was confident that the research plans of this team will produce equally successful and innovative results in the future, keeping up their high standard of scientific achievement. Also commended was the tradition of collaboration, both within the team and with colleagues in chemistry and biology.

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#### **Team 5: Structured molecular surfaces**

This team currently consists of 4 permanent members and 4 non-permanent members supported by outside grants (including an international HFSP grant), and 1 visitor. The team appears very vital and active and benefits from strong internal collaborations and dynamic leadership.

Research in the team has focused in recent years on problems in biophysics with direct relevance for biology, where the team has successfully exploited their expertise in applying physical techniques to the study of surfaces and interfaces. The team has produced a number of important and sometimes surprising new results that are of very general relevance to the biophysics community. For example, the team has demonstrated that diffusion of small molecules in lipid bilayers follows a different scaling behavior (with molecule size) than what has been assumed by the community for a very long time. Also, the team demonstrated that care has to be taken when using force spectroscopy to study interactions between biomolecules at the single molecule level, as the results can be sensitive to the conditions under which molecular bonds are made. For their studies of membrane and cellular adhesion they have developed a unique set of (micromanipulation) tools that are increasingly used by other groups in the field as well.



The team has build up a very strong network of collaborators outside physics, from very strong (international) biology groups to collaborations in the medical field. This now allows the team to tackle problems that are of direct medical relevance, such as the adhesive interactions between gametes. These last experiments are technically very challenging, but the team appears to have exactly the right (and unique) expertise that is required to bring them to a successful end.

The publication record of the team is excellent which contributes to the growing visibility of the team in the international biophysics community.

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A+	A+	A	Non noté	A+

#### **Team 6: Non-linear theory of instabilities**

This team currently consists of 5 permanent members and 5 non-permanent members that have postdoc positions. The team is very successfully working on a wide range of problems bridging nonlinear dynamics and pattern-formation with material science and biophysics.

Research topics include in particular: fluid dynamics (viscous fingering, wetting, dynamics of moving contact lines, turbulence, MHD), biophysics (biological membranes, morphogenesis of growing tissues, biomechanics - growth and elasticity of soft tissues, rafts, inclusions, in-silico genetic evolution, dynamics of excitable biological systems, synchronization of excitable tissues including neurons), solid mechanics (crumpled paper, exact elasticity, soft tissues, wave turbulence, crack propagation) and hard condensed matter physics (supersolids). This range of topics, although very broad, is well addressed by different team members.

The committee particularly noted the growing connection between applied mathematics research and (experimental) biology, including in particular the study of mechanical effects in growth and development. Another highlight is provided by the highly original effort to model, in silico, evolution of regulatory networks - a novel development which is likely to acquire an extensive following. Many of the projects involve strong international collaboration. There is also extensive record of collaboration with other LPS teams, as evidenced by joined publications.

In addition to research, some of the team members are heavily involved in teaching. The team is also internationally active in organizing schools and workshops (SIAM, Cargese, and Les Houches). The team is very successful in acquiring outside funding. Although overall, inter-teamwork is exceptional, in few cases a better interaction of theoretical efforts with experiment would be beneficial.

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#### **Team 7: Morphogenesis and multi-scale phenomena**

This is a newly created team lead jointly by two young researchers with background in theoretical statistical physics and applied mathematics. The team pursues a broad range of research focused on classical physics and non-linear phenomena and combines theoretical and experimental efforts.



Recent and ongoing research projects of this team can be grouped into several themes:

- friction and fracture dynamics,
- mechanical instabilities and buckling,
- packing and crumpling,
- self-organized patterns,
- dynamics of growth.

For example, one interesting subject is the study of packing of one and two-dimensional elastic objects. A recent study addressed the problem of confinement of elastic rods in an enclosed volume - a study relevant to the problem of packing DNA in a virus capsid. This work used Mean Field Theory to identify the possibility of a phase transition between ordered and disordered rod packings as a function of the radius of the confining sphere. Although the analysis did not include electrostatic interactions and therefore was not directly applicable to the DNA/virus capsid problem, it provided a rather deep insight into the effect of steric repulsion on packing. Another recent project experimentally examined the packing of two dimensional elastic sheets as they were pulled through a rigid circular hole. This is a simple but very original experiment, with a unique strength provided by the theoretical sophistication in the interpretation of the experimental results: the authors used their observations to define an effective temperature governing the distribution of energies in this profoundly out-of-equilibrium system. Yet another ongoing project involves a combination of experimental and theoretical study of buckling of thin (composite) elastic sheets, which in addition to its fundamental applied math interest is also relevant to industrial processes. The team has established a connection with Saint Gobain Recherche that provides partial funding for this project.

Another notable research direction of the team addresses mechanical effects in plant growth and the possible role of mechanical stress in controlling cell differentiation: e.g. formation of veins. This work combines development of models and numerical simulation of the growth/differentiation process with the interpretation of experiments with plants. It involves an extensive network of international collaborations. Notably, the two team leaders have recently coorganized an international summer school on Geometry and Mechanics of Growth in Biological Systems at Cargese (July, 2008).

The group currently includes one postdoc and four students and derives additional funding from an EC Network grant, ANR and Saint Gobain Recherche. It has been extraordinarily productive in its recent publication output with work of consistently excellent quality and notable for its originality. This team has reinforced the non-linear/statistical physics thematics at LPS, although its primary strength remains on the theoretical side. This young team has created an atmosphere of great intellectual vitality which the committee felt will ensure future growth in its scientific impact.

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**Team 8: Soft matter, instabilities and phase transitions**

Research interests of the team are centered around the rheology of complex fluids and surface phenomena, in particular wetting. This team is very active and has an outstanding publication record. This is exactly the kind of excellent experimental group one could expect to find in a statistical physics laboratory. Numerous interesting results obtained during the last four years include:

Rheological work on simple or complex fluids where a number of puzzling observations like rod-climbing, liquid rope coiling, the formation of satellite beads during the detachment of a drop of a viscoelastic fluid, or the impact of water or non-newtonian droplets on solid surfaces. In most cases, simple explanations have been found by comparing well designed experiments and numerical simulations. Another example is the interpretation of the shear thickening behavior of cornstarch suspensions as a jamming transition.



The work on the glass transition in colloidal systems, including the use of microrheology which enabled them to check the absence of violation of the fluctuation-dissipation theorem over several decades in frequency for all aging times, and the demonstration that colloidal gels and glasses are basically free-energy minima in the same energy landscape.

The very original work on ultra-low surface tension like the surprising evidence for drop formation by thermal noise breakup or the puzzling observation of capillary wave suppression by a shear flow. The evidence for the role of fluctuation forces on thick wetting layers in these systems makes the connection to the wetting studies, and nicely continues the work on long-range critical wetting in molecular systems.

Study of wetting phenomena, in particular, wetting of droplets on “fakir” surfaces has been clarified and the extremely difficult and practically relevant problem of the spreading and evaporation of volatile droplets has been attacked in a very fruitful collaboration with LPS theoreticians.

Another interesting piece of work was the careful investigation of liquid crystal films where the interplay between elasticity, anchoring and wetting has led to the discovery of very puzzling morphologies. All these experiments are extremely delicate and artefacts from previous measurements have been identified and avoided.

The proposed projects which include cavitation in soft adhesives, wetting on multi-scale rough surfaces spreading of volatile droplets and liquid crystals are all interesting.

The team is excellent and has a high international visibility. However, one of the senior group member is now emeritus and a younger member will soon join another laboratory, leaving the group with only 2 permanent members. A recruitment would be important to keep the potential for the future, in to maintain the impressive know-how in wetting and liquid crystals. Hopefully, this would also improve the disappointing level of collaboration within the group.

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### **Team 9: Non-linear physics**

The team consists of 4 permanent members, three students, and two visitors. The research program is concerned with the investigation of self-organization and fluctuations of nonlinear systems. The team is the world-leader in the investigation of self-generating magnetic fields due to turbulent magneto-hydrodynamical flows and is leading the world-renowned VKS experiment in Cadarache.

The team conducts both experimental and theoretical investigations. Recent achievements include the attainment and study of magnetic field generation in turbulent flow of liquid sodium and an insightful theoretical analysis, based on dynamical systems methods, of the different modes of magnetic field production in the flow. The theory successfully explains much of the complex dependence on flow parameters observed in the experiment.

Another interesting experiment addresses statistics of wave turbulence generated by the vibrations of a suspended thin metal plate. This study poses an important challenge for the theory of wave turbulence and is likely to stimulate extensive follow-up work, both theoretical and experimental.

The committee was impressed by the outstanding quality of research and by the excellence of the young researchers. The team is highly recognized internationally and has extensive engagement in teaching. The visiting committee noted that the space situation of the group is less than ideal and welcomes the initiative of the laboratory to provide new and renovated space.



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## 5 • Appreciation of resources and of the life of the research unit

### Challenges:

Scientific diversity presents LPS with a unique set of challenges. Cross-laboratory connections are particularly important for research sub-fields with the relatively smaller number of lab members. For example, in the case of quantum condensed matter theory the “critical mass” is provided by the existing common CMT seminar which combines LPS with LPT and LKB. The existing department-wide biophysics seminar brings together biology oriented efforts in different laboratories (LPS, LKB, LPT). Interaction and coordination of efforts between different labs should be strongly encouraged to achieve synergy and provide balanced long-term development of research efforts across all fields of research.

Scientific diversity of LPS presents a challenge to its own lab-wide seminar. This seminar nevertheless could play an important role in promoting intellectual cohesion of the lab and cross-fertilization of different efforts. This can be accomplished by managing it as a “colloquium” with special attention given to the talks with broadly scientific focus and aimed at the non-specialist component of the audience. Colloquia of this type are also particularly beneficial for the students. It is most unfortunate that there does not seem to be an auditorium which could accommodate ~80 LPS researchers for a lab-wide seminar.

Space is a major limitation at LPS. This is obviously a difficult problem for a Paris location.

Presently, LPS administrative support staff consist of only two people, which is clearly insufficient for the needs of a lab with about 80 members. The situation is likely to be exacerbated in the future by an increase in administratively demanding EU contracts.

Experimental efforts at LPS extensively rely on the in-house mechanics workshops. While the wetting and nucleation group gets help with cryostat construction from the central ENS Physics Dept workshop, other teams rely on the internal LPS workshop, which is at present critically understaffed with only two members. The committee has been assured that steps are being taken to hire a third technical employee and restore the LPS workshop to its previous workforce strength.

## 6 • Recommendations and advice

### – Strengths :

The overall strength of LPS is in its unquestionable scientific excellence covering a broad range of subjects from low temperature physics and hydrodynamics to biological physics and including both experimental and theoretical efforts. LPS has high stature internationally and a number of its members are recognized as leaders in their fields of research.

LPS is remarkable for its scientific breadth which currently bridges physics and biology and for the tradition of scientific curiosity and interdisciplinarity. Many of LPS members are scientifically active in multiple sub-fields of science. Many LPS members have changed their research directions bringing methods, concepts and tools of physics to other disciplines. LPS is an intellectually vibrant environment which appears to be supportive of risk taking and innovative research.



– What needs to be improved :

The scientific diversity within LPS has understandably created partial segregation of different subfields within the lab. The committee has also noted several instances of apparent lack of communication between closely related research efforts of different teams and between theory and experiment.

While LPS ranks includes a number of postdoctoral researchers, it does not have the ability to offer multi-year postdoctoral appointments, which is necessary in order to compete (for postdoctoral candidates) with foreign academic institutions of a comparable stature. This difficulty appears to be in common with other physics labs at ENS and elsewhere in France.

– Recommendations :

The committee discussed the challenge presented to the internal cohesion of LPS by the scientific diversity of research portfolio and considered, hypothetically, the pros and cons of establishing a separate biological physics administrative entity. The committee unanimously felt that maintaining scientific breadth of the laboratory has an advantage of encouraging and enabling the ongoing process of scientific mobility among LPS members and may be particularly advantageous for the student and postdoctoral members of the lab. Maintaining harmony and balance between diverse research efforts within LPS will require continued attention to balance in future hiring and the distribution of space and other resources, as well as making sure that all interests are suitably represented in setting the priorities of the lab. Maintenance of the scientific diversity may require extra institutional resources which would represent a most worthwhile investment.

The committee noted the importance of “horizontal integration” of related research efforts between all of the physics laboratories at ENS, which is especially needed for maintaining the critical mass for the smaller of the research efforts within (and outside) LPS. Existing ENS-wide specialized condensed matter and biophysics seminars were seen as important steps in this direction. The diversity of LPS poses a difficulty for its own lab-wide seminar, which can be resolved by an effort to run the latter as a “colloquium” with broad survey talks aimed at non-specialists. Such a colloquium would also be helpful to the students. Additional efforts should be made to provide incoming PhD students and postdocs with a broad introduction to LPS members and their research. This can be achieved through an annual lab-wide “retreat”-type meetings consisting of informal presentation of on-going research highlights by different teams. Such gatherings could also help mitigate the few instances of apparent lack of communication between researchers that were noted by the committee.

Recent and ongoing reorganization of hiring practices in research has created an important niche for postdoctoral fellowships for young scientists. Postdoctoral positions give young scientists time to develop their independent research agenda before they move on to more permanent jobs in academia or industry. Postdoctoral fellows also enliven scientific environment of the host laboratory and enhance its research productivity. The stature of LPS in the international scientific community would allow it to successfully compete for the best and the brightest postdoctoral candidates. However, in order to be internationally competitive LPS must have an ability to offer 2- and preferably 3-year post-doctoral fellowships. This problem could be solved by establishing an institutionally funded or endowed line of LPS/ENS Postdoctoral Fellowships which would compete with the prestigious international fellowships, such as Pappalardo Fellowships at MIT or CTS (Center for Theoretical Science) Fellowships at Princeton.

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+



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Ref : YG/EF 2009.016

Paris, le 30 mars 2009

**OBJET : Rapport d'évaluation du Laboratoire de Physique Statistique (LPS) -  
UMR 8550**

Je vous prie de bien vouloir trouver ci-joint les observations du Directeur du Laboratoire de Physique Statistique de l'ENS (LPS), UMR 8550, concernant le rapport d'évaluation de son unité.

Avec nos salutations les meilleures.

Yves GULDNER



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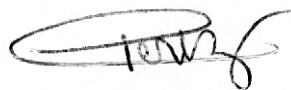
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30 March 2009

I would like to thank the visiting committee for the hard work they have been doing in analyzing all aspects of the life in the LPS, including the role played by the support staff.

Rather than discussing the positive overall evaluation of the LPS-ENS, I prefer to focus on the recommendations all of which I intend to take into account. The recruitment priority is on the team 8 (Soft matter, instabilities and phase transitions), and also on a young permanent researcher in the area of theoretical and/or numerical statistical physics. The comments on the seminar are important but we cannot make it as general as a colloquium because there is already one in the department (the "séminaire général"). However, we will ask the speakers to make at least one third of the seminar understandable by an audience with general scientific culture. In order to improve the internal communication, an annual labwide meeting with informal presentation of ongoing research highlights will replace the annual "newcomers seminar". I am eager to maintain our scientific breadth which is the best stimulation for mobility for all LPS-ENS permanent and non-permanent members. The space is indeed a major limitation at LPS-ENS. The situation of the "non-linear physics group is currently dealt with and this team will shortly see its space increased, of course within the limited possibilities of the LPS-ENS. Steps have definitely been taken to hire a third technical employee for the mechanics workshop.

I welcome the remarks on multi-year postdoctoral appointments, and I hope that our institutions will implement such fundings in order to compete for candidates with foreign academic institutions of a comparable stature.



Eric Perez

Directeur du LPS-ENS