LERMA - Laboratoire d'étude du rayonnement et de la matière en astrophysique et atmosphères

Rapport Hcéres

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

Section des Unités de recherche

Evaluation report

Research unit :

Laboratoire d'Études du Rayonnement et de la Matière en Astrophysique (LERMA) – UMR 8112

de l'Observatoire de Paris

April 2009

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

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de l'Observatoire de Paris

Le Président de l'AERES	Section des unités de recherche
	Le Directeur
Jean-François Dhainaut	**Pierre Glorieux**

april 2009

Evaluation report

The research unit :

Name of the research unit : **Laboratoire d'Études du Rayonnement et de la Matière en Astrophysique**

Requested label : **UMR**

N° in case of renewal : **8112**

Head of the research unit : **Mr Michel PERAULT (since 01/01/08)**

University or school :

Observatoire de Paris

Other institutions and research organization:

CNRS

Ecole Normale Supérieure

Université Pierre et Marie Curie (Paris 6)

Université de Cergy-Pontoise

Date(s) of the visit :

March 11th and 12th of 2009

Members of the visiting committee

Chairman of the commitee :

Mr François-Xavier DESERT: Laboratoire d'Astrophysique, Observatoire de Grenoble

Other committee members :

Mr Paul GOLDSMITH, Jet Propulsion Laboratory, Pasadena, USA

Mr Ludovic HALLO, Centre des Lasers Intenses et Applications, Université Bordeaux 1

Mr Andrew KING, Dept. of Physics and Astronomy, University of Leicester, Royaume-Uni

Mrs Annick POUQUET, National Center Atmospheric Research, Boulder, USA

Mr Stephan SCHLEMMER, Physikalisches Institut, Université de Cologne, Allemagne

Mr Simon WHITE, Max Planck Institut für Astrophysik, Garching, Allemagne

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

Mrs Françoise GENOVA , CoNRS

Mr Philippe AMRAM, CNAP

Mr Antoine JOLLY, CNU

Observers

AERES scientific representative:

Mrs Rosine LALLEMENT

University or school representative:

Mr Daniel EGRET, Président de l'Observatoire de Paris

Research organization representative (s) :

Mr Jean-Marie HAMEURY, CNRS/INSU (partly)

Mr Paul INDELICATO, Laboratoire Kastler Brossel, UPMC representative (partly)

Mr Yves GULDNER, ENS representative (partly)

Mr François GERMINET, University Cergy-Pontoise representative (partly)

Evaluation report

LERMA is one of the six laboratories of the Observatoire de Paris. In the following, we give a description of the laboratory and how the Committee's visit unfolded. Broad statements and recommendations on LERMA are followed by remarks dedicated to each team.

1 • Short presentation of the research unit

- Permanent research staff : 42 (all numbers at 01/10/2008)
  - University (enseignants-chercheurs) : 15
  - CNAP : 8
  - Organismes : CNRS 16, DGA 1, +2 'Ecoles'
  - Professeurs, Astronomes et Directeur de Recherche : 19 (+1DGA)
  - Maîtres de Conférences, Astronomes adjoints et Chargés de Recherche : 22
  - Titulaires de l'HDR : 22
  - Titulaires de la PEDR : 7
- Non permanent research staff :
  - PhD students on 1/12/08 : 22
  - Post-docs : 6
- Permanent technical and administrative staff : 33
- Non Permanent technical and administrative staff : 3
- Number of permanent researchers publishing : 40 /42
- Number of papers in refereed (Rang A) journals 2004-2008 : 826
- Number of invited reviews 2004 - 2008 : 120
- Number of books 2004 - 2008 : 30

Presently, LERMA groups are situated on 5 sites in the Paris area: mostly at the Paris Observatory and the ENS (Paris), but also at Meudon Observatory, at Cergy-Pontoise University, and at Ivry/Jussieu Paris 6 University.

We were presented with 4 teams made of 9 groups :

DSA : "Dynamique des Systèmes Astrophysiques" ("Champ magnétique, Réactions, Accrétion" ENS group, "Galaxies and Cosmologie" Obs. Paris group, "Étoiles et Environnements Stellaires" Obs. Paris group)

PAME : "Physique Atomique et Moléculaire, Expériences" ("Atomes, Molécules, Plasmas dans l'Univers", Meudon group, "Interactions gaz/surface – réactivité hétérogène", Cergy group)

IT : "Instrumentation et télédétection" (GEMO group: "Études Micro-Ondes", TASP group: "Télédétection des atmosphères et Surfaces planétaires")

GRUP : "Gravitation, Relativité et Univers Primordial" ("Gravitation et relativité", Ivry/Jussieu, "Physique de l'Univers Primordial", Observatoire de Paris)

2 • Preparation and execution of the visit

The program for the visit was established by the LERMA director and management, following the recommendations of the AERES representative. Public presentations were given at the laboratory level, a general introductory presentation by the director and highlights by selected scientists of LERMA. The committee then split into two or three groups and got presentations and posters from different groups of each of the four LERMA teams.

The committee visited some LERMA sites, (Cergy, ENS, GEMO), sometimes, at the cost of some loss in efficiency. But in all cases, these visits proved useful to understand the local situation, and the relationship of each group with their local scientific environment.

The committee had a series of private (huis-clos) sessions: 1) with a large fraction of the scientists of each team and individuals who so wished to convey some message, 2) a representative sample of the PhD students and post-docs, 3) the administrative and technical staff (ITA), 4) the former director of LERMA 5) the « conseil de Laboratoire » (without the management) 6) the LERMA "tutelles" and 7) the present management team of LERMA (director, vice-director, administration manager, and finance manager).

The discussions were mostly held in English. The present document is based on a collegial report that emerged from the two-day visit and on the 550-pages documents that the committee received a few weeks before the visit (except for the final prospective). The committee appreciated all the efforts made towards a smooth organization by the LERMA management team and in particular by its director. Concerning AERES organization, choosing a hotel closer to LERMA would have been preferable.

3 • Overall appreciation of the activity of the research unit, of its links with local, national and international partners

Broadly, the scientific achievements of LERMA are outstanding. The scientific production is excellent with a total of more than 900 refereed articles over the 2004-2008 period, which represents more than 4 publications per year per permanent staff member. The exact number depends on whether the associates are included or not (-20 %). Similar number of contributions has appeared in conference proceedings.

At the end of 2008, the number of PhD students is 21. There are 17 Post-Docs and 32 ITA/IATOS and 5 temporary ITAs (CDD). Typically 6 PhDs are defended each year and they are recruited to academic positions (after several years of post-docs) in 3/4 of the cases.

The CNRS scientists are linked with 5 different sections, naturally including astrophysics (17), but also electronics (8), theoretical physics (2), atoms and molecules (4) and Earth (19).

The involvement in teaching is large. It is connected to the different Universities to which the laboratory is attached. CNU sections 29, 30, 34, 35 and 63 are represented in these teaching activities.

The scientific outreach is done through many channels (conferences, books, web sites...) and the scientists are extensively involved in communications with the public.

LERMA also has made major contributions to the production of diagnostics for large experimental set-ups, for teledetection but also in UV spectrum measurements in the spatial domain. Measurements of electromagnetic fields are also an area which must be emphasized, since these kinds of diagnostics could be used in other disciplines (large experiments with PetaWatt lasers in plasma physics for instance).

The national and international collaborations and programs, of which quite a few are lead by LERMA, are numerous, strong and long-lasting. Collaborations with external numerical teams (CEA, ENS) give very interesting results for the interpretation of experimental and theoretical results.

4 • Broad statements and recommendations of the research unit

The international Committee was baffled by the complexity of the French system and in particular of the LERMA, and it took some time to comprehend the different dependencies of the laboratory (basically 4 Universities/Grands Établissements [OP, UPMC, UGP, ENS], the CNRS and INSU) and the various bodies of researchers (CNRS, CNAP, Universities). The LERMA structure is "unbelievable". Given this complexity, the laboratory's achievements are great. Our first obvious recommendation is not to add any more complexity. The move towards a smaller number of teams is mandatory.

Interdisciplinarity has been at the core of the laboratory since its creation, and even before in several of the teams which joined to form the LERMA. This is one of its most notable characteristics, and proven very fruitful in some cases. It also explains in part the complexity of the organization and the number of "tutelles"

We note the active collaborations with many associate scientists and a significant number (16) of retired but still very active scientists.

The population pyramid shows a fair balance between junior and senior scientists. Recruiting young full-time scientists and assistant-professors is mandatory, however, to maintain this balance in the future.

The committee also notices varying ratios of the number of PhD students to permanent scientists among the different groups. Each team has to think about their situation and possible strategies to increase the involvement of graduate students.

The laboratory should be commended for the role which minorities and women play in its scientific and administrative life.

Teams which are now in LERMA were at the origin of IRAM, PCMI. LERMA has trained many scientists who thrive now in other laboratories. Nevertheless, LERMA must define its strategy for the future, in particular with respect to its participation in large projects.

Recommendation : As soon as feasible, the senior staff should agree on a global (2-page) strategic vision for the laboratory, based, for example, on the obvious medium-term possibilities with Herschel, Planck, etc. and on longer-term possibilities with Alma and other big forthcoming projects.

Some (but not all) group leaders are insufficiently involved in management decisions. Reciprocally, the management is not always aware of key decisions (financial, office space, staff) made by some groups.

Recommendation : The "conseil de direction" must meet more often to synchronize the management and "the base" in both directions. One has to ensure that leaders of the active groups are invited to the « Conseil de Laboratoire » meetings on a basis of at least 5 to 6 times a year. The management has to truly delegate some work (with "chargés de mission").

Recommendation : LERMA must further improve further cross-team communications. Physical separation is certainly a problem but there are now new ways of staying in touch (teleconferences, video-conferences...), in addition to email, and these should definitely be investigated.

The committee noticed many links between the different presentations and group documentations (interstellar medium at the galactic and extragalactic scales, cluster cooling flows, dark matter, dark energy, turbulence, Magellanic Clouds, laser experiments, Z-pinches in jet formation, turbulent processes, convective instabilities...) and several important topics would benefit greatly from improved cross-team communication and discussions.

Moreover, throughout the laboratory and especially among its young staff members there is a general ignorance of what is going on at other sites.

Recommendation : Every other year, the laboratory could organize a two-day *all-LERMA* meeting in order to improve cross-boundary scientific communications and social interactions; the latter are not unimportant for scientific collaborations! This meeting could either be at a "neutral" site not part of LERMA, or else it could rotate among the different LERMA sites. Although the latter might have some logistical challenges, it would have the advantage of getting all LERMA staff familiar with all the sites that comprise the research entity.

The post-docs thrive happily in LERMA and are broadly given the means to do excellent research.

Recommendation : The laboratory needs to organize better the interactions between students and post-doctoral fellows in the different groups, based on a series of actions that can be set up in part by the young researchers themselves; a small budget should be allocated for it: regular dinner with seminar speakers, the ability to invite their own speakers, regular (e.g. 4 times a year) internal meetings to discuss their own research, …

Due to the change in research structure in France, the number of post-docs is now quite significant. They come from all over Europe and elsewhere. We think that help for new-comers to the laboratory should be organized at the Observatoire de Paris level (some help may already exist but it is not well known within LERMA).

Recommendation : The committee wishes the Observatoire de Paris to have a "Livret d'accueil" and series of commitments to help post-docs (and PhD students) from abroad to go through the hurdles of French bureaucracy (« carte de séjour, aide au conjoint, Sécurité Sociale, logement, transport... »).

Databases and Virtual Observatory (VO) are an essential and modern way of giving access to information otherwise spread in many locations. This is encouraged by the LERMA management and several teams are developing VO-compliant databases and services. This however takes resources, and the impact of actions must be measured to ensure they are effective.

Recommendation : It will be critical for the success of any database/VO activity to advertise the product to its potential user base, and measure its impact (by hits on the web sites, down-loads of data, usage in publications). The GalMer site is impressive and could also be made into an appealing interactive tool for teaching/outreach.

5 • Specific appreciation team by team and/or project by project

Dynamics of astrophysical systems (DSA)

The team is among the world leaders in galaxy dynamics and evolution, the dynamics of young stellar objects, turbulence in the interstellar medium and in accretion disks, and the theory, simulation and experimental exploration of astrophysical MHD.

Particularly influential work has focussed on the dynamically driven evolution of galaxies, on the structure and evolution of molecular clouds, and on links between cloud dynamics and the formation of stars. That the initial stellar mass function is or is not linked with the structure of the ISM is one of the fundamental questions of present-day astrophysics. The team has been driving analysis of the effects of turbulence on the structure and chemistry of the ISM. The level of national and international collaborations is outstanding, a very successful work within a European Network studying jets being particularly notable.

Senior leaders plus young enthusiastic researchers make up the fabric of this team. A remarkable feature is the synergy between top of the line observations, numerical simulations and even experiments (turbulence at ENS and plasma recombination) together with more theoretical modelling work. The team has had a healthy production of PhD students who are taking up significant positions throughout France and Europe. We note an interesting monthly dual seminar on MHD (experiments/modelling).

The numerical simulation group should anticipate that with the ever-increasing power of large computers, man-power is needed to create codes that deal with ever more complex hardware structures.

Recommendation : If the team at large wants to continue to be primarily end-users of code rather than producers (this is understandable and is in line with the philosophy of the Horizon project for example), it should strengthen collaborations that ensure that the people who will develop the code for next generation architectures are aware of their needs.

Recommendation : Grands Établissements should help by improving the middle-scale (méso-équipement) front-ends of these major computing efforts.

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+

Instrumentation and teledetection (IT)

TASP group: this is an emerging group that has obtained interesting new results and it is well focused. It is moving forward at an impressive rate. The group size is slowly increasing. While waiting for a new permanent scientist, who will be very much needed within the coming 4 years, we recommend that new post-docs be considered.

GEMO group: this instrumentation group has a record of world-class successes including its contribution to Miro/Rosetta and most of all the mixers for Herschel HIFI Band 1. This last project was done under the demanding conditions linked to a space experiment, something relatively new for GEMO and which produced some stress in its membership. The committee welcomes the recruitment of 2 energetic and promising young scientists. This group is in a transition phase, with some anticipated further staff changes. Only involvements in projects can assure the group's sustainability at the present level of staffing/budget in the context of an astronomy laboratory, and it is emphasized that the priorities on projects must be driven by the expected scientific return. This is not contradictory with some high-quality R&D.

Recommendation : The work program must be controlled and mutually agreed between the laboratory management, GEMO and a supervising committee that must be set up by the management.

Otherwise the risk of a headless technology drift is a real concern. It is important that this group exploit the availability of strong physics-based research in the Paris area. This gives them an important advantage in keeping at the "state of the art", but balance is needed.

The GEMO group with young researchers has the potential to make a major contribution to the astrophysical and other observational aims defined by LERMA management. However, it is vital that the GEMO expertise and interests be properly included in the discussion of their future activities.

It is recommended that as part of an effort to define the future direction of the laboratory, that LERMA management works (with an appropriately composed committee) to develop an integrated plan that includes GEMO activities.

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

Atomic and Molecular Physics+Experiments (PAME)

The Meudon group is an active group in fundamental calculations and measurements of atomic and molecular properties relevant to the interstellar medium. The committee welcomes the arrival of two new members and the dedication to make public databases in order that very specific and hard-fought atomic and molecular knowledge be preserved.

Nevertheless, the group's activity was felt to be too scattered and that different parts have uneven importance. Some aspects are excellent but no individual program combines excellence of concept, execution and application.

Recommendation : the group must find more focus. Plasma physics and molecular kinetics are among the most important paths to encourage for the future.

Implantation of a new group in the recently created University of Cergy-Pontoise has also been a challenging task. Teaching activities and laser experiments have been successfully implemented with young scientists and professors. This team has got some funding from the ANR agency.

New interesting results were obtained on the icy grain analogues which are worth pursuing. The experiment is worthwhile in the international competition through some specific apparatus choices. But enhancing the equipment is not necessarily the best way out.

Laboratory astrophysics is now a main stream activity and is a must in the understanding of the complexity of the interstellar medium. Its needs an appropriate mixing of theoretical works, carefully controlled experiments, data analysis and astrophysics feedback.

The committee welcomes the expected arrival of two professors in the group.

Recommendation : All the senior scientists should take part in the decisions within this group.

Recommendation : In a similar manner as for GEMO, it is recommended that the management and governing bodies of the LERMA be involved in a long-term plan to ensure sustainability of the team within LERMA. Laser plasma physics experiments constitute a possible federative theme for the whole PAME team.

Recommendation : Increase collaboration between PAME and the astrophysics teams at LERMA. The connection to astrophysics seems too loose. Convergence should also be sought with LUTH theoretical approach of the hydrogen formation on grains. A bi-monthly meeting would bring synergies between these teams.

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	B	A

Gravitation, Relativity and Primordial Universe (GRUP)

The group is involved in theoretical studies related to gravitation, general relativity, statistics and the primordial universe. The link with the main astrophysical activities of LERMA is very tenuous and the group is dwindling. It has not been able to attract students for some years. Some people have retired. The Committee thinks that there are some active people in this group whose scientific production is appreciated, but that changes are required.

Recommendation : Having this group remaining in LERMA in its present form is not a viable solution. A new arrangement must be found by the laboratory management with discussions with the GRUP staff and other laboratories whose main topics are much closer to the GRUP activities, in order to find a more relevant framework for active staff members.

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

Miscellaneous

- The ENS group badly lacks a part-time engineer to set up the network, printers, and computers, a basic support that could be found internally.
- The LERMA website could be updated and homogenized between the different teams.
- A motion supporting the university and research in France was handed to the Committee by the Conseil de laboratoire.
- Security of access seems assured at the Observatory but less so at the Cergy laboratory.
- Some points related to safety were addressed and some problems were noted (laser safety, wires near water supplies, the number of protective glasses). They can easily be addressed by a group made of the ACMOs of the different sites (not just by a single person).

6 • Recommendations and advice

– Strong points :

The scientific production and dynamism of LERMA make it one of the top astrophysics laboratories in France. The issues of the interstellar medium and the galaxy evolution are tackled at a very fundamental level and put LERMA at the forefront of the international competition.

– Weak points :

The PAME team needs a better management organization and the GRUP team is not viable.

– Recommendations :

There are management issues, previously detailed in this report, that should be solved, including closer contacts between the teams and between the scientific teams and the management team.

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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Laboratoire d'Astrophysique, Observatoire de Grenoble
Président du comité d'évaluation AERES

Réf. : FMC/FG/JLL .09.S00504

Cergy, le 27 avril 2009

Affaire suivie par : Pauline Dreux-Palassy
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Objet : Remarques de fond sur le rapport de l'AERES du laboratoire LERMA - UMR 8112 - équipe de Cergy-Pontoise

Cher collègue,

L'université de Cergy-Pontoise remercie le comité pour son travail, et est attentive aux remarques effectuées à l'adresse de son unité. La qualité du dispositif expérimental de cette équipe et le rayonnement des résultats scientifiques issus de ces expériences sont clairement soulignés par le rapport. La politique de l'université consistera à soutenir cette activité, au sein du LERMA, et en partenariat avec le CNRS.

Recevez, cher collègue, mes salutations distinguées,

La présidente

Françoise Moulin Civil

l'Observatoire de Paris | LERMA

Laboratoire d'Étude du Rayonnement et de la Matière en Astrophysique

Paris, le 1er mai 2009

Monsieur Pierre Glorieux
Directeur de la Section des unités

AERES
20 rue Vivienne
75002 PARIS

Monsieur le Directeur,

Le laboratoire a pris connaissance avec attention du projet de rapport préparé par le comité d'experts que vous avez désigné pour l'évaluation du LERMA. Nous nous réjouissons de l'appréciation très positive qui y est donnée de l'ensemble de nos activités. Le choix du terme *outstanding* et la qualification de *one of the top astrophysics laboratories in France* réjouissent le directeur et confortent le laboratoire dans l'enthousiasme qu'il dédie à sa mission ambitieuse de recherche fondamentale.

En conséquence, excepté pour corriger quelques remarques injustes, et qui ont inutilement blessé quelques uns de mes collaborateurs, ainsi que pour remercier le comité d'un certain nombre de suggestions qui, elles, nous semblent très utiles, et dont nous tiendrons compte attentivement, les réponses qu'appellent le rapport sont d'un intérêt secondaire. Il faudra donc les lire, au mieux, comme une correction à l'ordre 2 ou 3 du simple mais lumineux constat de la haute qualité de la contribution du LERMA à la science.

I now switch to English, so that all the members of the Committee can read my reply easily if they wish so.

Important corrections of inaccuracies

A serious issue concerns the *Gravitation and Relativity* group. Two brilliant thesis were defended end of 2007, one in experimental gravity, the other one in relativistic statistical physics (after only 2 years, and with 7 articles in refereed journals). A previous student of the group (2004) has got a permanent position in Jussieu. Several undergraduates complete a project within GRUP every year. **It is thus unfair to write** that this group *has not been able to attract students for some years.* I agree though that LERMA is not offering an optimal environment for students in these domains.

It also is unfair to my colleagues to blandly state that *GRUP is not viable* : I agree that it is not a viable research team, because it simply is not a research team. Although loosely connected to the laboratory, the LERMA scientists in this field have a remarkable scientific productivity and do interact with communities outside of the lab, mostly abroad. LERMA has always tried to remain a hospitable laboratory, and will not exclude cooperative members against their will.

An effort was made in order to give a scientifically transparent presentation of the laboratory, by clustering the scientific groups in 4 blocks (*pôles*) : DSA, IT, PAME and GRUP. As explained in the reports and during the visit, these clusters are not the functional units of the laboratory. As a consequence **criticisms on the cluster management are irrelevant**. More specifically the *weak point* listed for PAME missed its target, and ought to have been phrased differently.

Although these clusters have much different sizes, a more homogenous treatment in the review of the different scientific areas would have been more fair : e.g. uniformly quoting (or ignoring) contracts and networks.

Needed clarifications

A quick look at the Committee's report provides a fair impression of a thorough analysis of LERMA's activities and productions, and of a clear analysis of the strengths and weaknesses of the laboratory. A careful reading however leaves several obscure or contradictory areas, that I try and list below.

Section 3

The phrase on *PW in plasma physics* paragraph is obscure : PW likely stands for Petawatt lasers, but the proposed connections between observational and experimental diagnostics should be clarified.

The ENS numerical team being part of LERMA, the last sentence is unclear.

Section 4

Given this complexity, the laboratory's achievements are great. If the phrase means that once the complexity is put aside, the achievements are fair or even mediocre, the statement is in contradiction to the global appreciation expressed in the report.

The move towards a smaller number of teams is mandatory. The groups clustering based on scientific themes presented is a move in this direction although the number of team or group leaders is not reduced. It would be useful to know whether « groups », « functional teams », « sites » or « projects » are specifically addressed in this recommendation. Or what the recommended team size is.

Strategic vision recommendation : the scientific strategy of LERMA since its foundation has indeed been explicitely based on the synergies developed around the IRAM observatories and the Herschel and ALMA projects, and to a lesser extent the Planck project. The point is now rather to define the lab's commitments into future yet undecided projects, while scientifically exploiting these 3 major missions, which will soon start to observe. A stronger focus of the laboratory onto these major structuring activities is certainly needed and has been encouraged by the management for years.

Conseil de direction recommendation : as only the functional team leaders are part of the *Conseil de direction*, some group leaders intervene only through their team leader, or if they are members of the *Conseil de laboratoire*. Note is well taken of the need for much more frequent meetings. On the other hand c*hargés de mission* have been nominated to help the management in four important domains: scientific prospective, relations with Universities, communication and information systems. Could the committee be more specific on the lacks ?

Cross-team communication recommendation : this is indeed a serious difficulty. A cooperative intranet site is also being developed in order to improve the situation.

Section 5 / DSA

Numerical codes recommendation : the 3 groups performing intensive numerical simulations are much involved into code development. It is their concern to keep up to date with hardware developments, and this is in part achieved through tight collaborations with external teams. If the recommendation is to strengthen these collaborations, it is a well received recommendation.

Section 5 / PAME

The Meudon group's activity was felt to be too scattered ... no individual program combines excellence of concept, execution and application. This harsh statement needs clarification. If one considers the group's contributions to the preparation of Herschel and ALMA science through its major and leading participation to the *Molecular Universe* network, with the calculations of inelastic collision rates, for instance, my feeling is that the committee's statement – if I understand it correctly - is unfair. As a matter of fact the group's implications ranged from theoretical research on Schrödinger's equation numerical solutions to the consolidation of the data created within the atomic and molecular physics virtual observatory services, from concept to application, with undisputed leadership. However the near future perspectives of this group are currently a matter of concern.

Grains analogs ... but enhancing the equipment is not necessarily the best way out. It is unclear what *the best way out* means. The best procedure ? The best strategy ? It is furthermore in clear contradiction to the decisions of expert bodies having approved the enhancement of the equipment through ANR and Region Ile de France funding. What should we do with this statement ?

Laser plasma experiments constitute a possible federative theme for the whole PAME team : it is unclear to me in what sense laser plasma experiments are federative for low temperature molecular physics which is the main activity within PAME.

Section 5 / miscellaneous

Security of access... The universities are primarily in charge of security issues and do have clear policies enforced. LERMA has a group of security *correspondants*, coordinated by one engineer in charge, in close connection with the director. It is unclear what are the security gaps addressed.

Management of LERMA

Management levels and institutional support

Management issues take a significant share of the report and there are several levels of criticisms : national, institutional, and local mostly at lab or team level. Locally the director is certainly the one to be blamed. I heard the authors had other targets in mind, but the messages targetting the other levels of the hierarchy are not clear. So, being openly criticized, I take the opportunity and the liberty to stress what I understand is the main point : our lab certainly has to tighten and feed its internal links, but it also needs its tutelles' full support in order to provide the research groups with adequate working conditions, as well as proper connections between the different parts of the lab.

While a fair support is obviously granted, its level of implementation is not uniform among the 4 institutions. The support is excellent at ENS and at Cergy University but the endless construction works degrade the working conditions in both places. The support of UPMC has been fair until now, but the prolongation of the exile to Ivry-sur-Seine until 2013 as well as to date insufficiently attractive return conditions make it worse than problematic. Observatoire de Paris is our central base, and we suffer from the dispersion between 2 sites, Paris and Meudon, and from the absence of shared common space in Paris. Such convivial and office space is absolutely necessary for developping lively exchanges within the different parts of the lab. As a consequence there is an urgent request to the Observatory management to allocate resources for the laboratory to be capable of *simplifying* itself while improving its internal functioning. These resources are mainly office and lab space on the Paris campus, and the restitution of technical positions lost during recent years.

Management structure

The internal structure of LERMA has been a puzzle to the committee. It was also a puzzle to me, while trying to match the presentation with AERES requirements. Teams are something undoubtedly important in research, and LERMA does have teams, like any other lab. It also has sites, scientific themes, projects and transverse activities. As a consequence there is a functional structure, mostly based on the sites

and hosting institutions, there is a scientific structure, mostly based on research themes and expertise, there is a project structure which accommodates the activities on the major projects of the lab. There are also rare personal constraints, independent from these logics, which need to be accommodated. LERMA is thus not a mere federation of teams, and cannot be partitioned as requested by AERES instructions.

We did try to adapt, and give the Committee enough material to work onto and to elaborate their recommendations, within the AERES framework. This was the main reason for presenting these 4 clusters of thematic groups, in continuity with earlier status reports. But it clearly arises from the Committee's report that I failed in this attempt, and that the reality of the links and connections inside the lab partly escaped the analysis of the Committee. Hence the judgment which I feel is excessively severe on some issues. I agree though that the complex logics requires more communication, not only externally but also internally. And that simplifications need to be made, wherever possible.

I need to say, however, that distinguishing functional, thematic and project logics is not a LERMA specificity. Matrix structures of human activities are commonly presented, with different types of links in different directions. It is my conviction that the mismatch between the simple lab model of AERES and the structure of LERMA is not a proof that the AERES' model is adequate. The relevant entity is the laboratory, not an ensemble of independent competing teams, and I am proud to be the director of a laboratory where excellence and solidarity can be reconciled.

Acknowledgements

LERMA did appreciate the intense work provided by the Committee before, during and after the visit, in a very short time lapse. In spite of the few errors noted, we are convinced that the recommendations provided will trigger the further evolution of the laboratory, and encourage our *tutelles* to provide support and resources at an adequate level. I thank the Committee members and its chairman very much.

Recevez, Monsieur le Directeur, l'expression de mes salutations respectueuses,

Michel PERAULT
Directeur du LERMA (UMR 8112)