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

Section des Unités de recherche

Report from the visiting committee

Research unit :

Laboratoire de Physique Nucléaire et de Hautes Energies (LPNHE) – UMR 7585

Université Pierre et Marie Curie

February 2008

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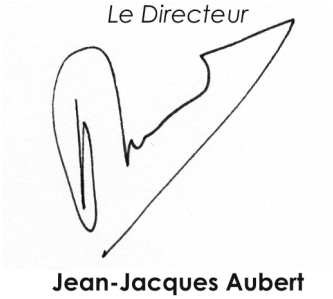
Le Directeur



Jean-Jacques Aubert

february 2008

Report from the visiting committee

The research unit :

Name of the research unit : **Laboratoire de Physique Nucléaire et de Hautes Energies (LPNHE)**

Requested label : **UMR**

N° in case of renewal : **7585**

Head of the research unit : **Pascal DEBU**

University or school :

Université Pierre et Marie Curie Paris 6

Other institutions and research organization:

Université Denis Diderot - Paris 7

CNRS / IN2P3

Date(s) of the visit :

November, 26th of 2007

Members of the visiting committee

Chairman of the commitee :

Mr Umberto DOSSELLI, Professeur – INFN Padova (Italy)

Other committee members :

Mr Guillaume UNAL – CERN

Mrs Angela OLINTO – APC/ Université Paris 7

Mr Michel MUR – CEA/DAPNIA

Mrs Geneviève BELANGER (commission CNRS 02)

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

Mr Pierre HENRARD (CNU)

Mr Dominique PALLIN (commission CNRS 03)

Observers

AERES scientific representative:

Mr Etienne AUGE

University or school representative:

Mr Paul INDELICATO (Paris 6)

Research organization representative (s) :

Mr Jean-Marie DUPRET (Paris 7)

Mrs Barbara ERAZMUS (DSA CNRS/MPPU)

Mr François LE DIBERDER (DSA CNRS/IN2P3)

Mr Stavros KATSANEVAS (DSA CNRS/IN2P3)

Report from the visiting committee

1 • Short presentation of the research unit

- Numbers of lab members: 120 including researchers with teaching duties : 25, full time researchers : 27, ingeneers, Phd students : 20, technicians and administrative assistants : 48
- Numbers of HDR : 29 and of HDR who are PhD students avisors : 17
- Numbers of PhD students who have obtained their PhD : 19 and average lenght of a PhD during the past 4 years
- Numbers of PhD students currently present in the research unit : 20 ; Numbers of PhD students with fellowships : 20
- Numbers of lab members who have been granted a PEDR : 6
- Numbers of "publishing" lab members : 52

2 • Preparation and execution of the visit

The committee met on november 26th at 8 :30 in the amphitheatre ' B. Grossetete' of the LPNHE. After a short welcome and introduction by the Director of the lab the Committee heard presentations about the various research activities carried out by the lab. The Committee also met the 'conseil de laboratoire' where it discussed with representatives of the various technical areas different aspects of the working life of the lab.

The Committee then had a working lunch with the lab management, the group leaders, the leaders of the various services and the secretariat of the 'conseil de laboratoire'.

After lunch the Committee resumed its session hearing further reports on the scientific activities of the lab and at the end the Director of the LPNHE presented to the Committee his point of view concerning the future activities of the lab and the needs in the various areas.

After all presentations the Committee held a closed session dedicated to the preparation of the evaluation report based on the Committee findings.

After the closed session, the Committee chairman then presented to the Lab management and to the general audience a preview of the first findings and evaluation judgements.

The meeting was declared closed at 18:00.

All material presented to the Committee was of excellent level and so was the organization of the day: the atmosphere was optimal in order to allow the Committee to work with maximum effectiveness.

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

The LPHNE is a site where research in Particle and Astroparticle Physics is carried out with competence, intelligence and good organisation. Research groups are involved in some of the major international projects in the field; in general the activities are well focussed and the size of the involved groups allows the assumption of important responsibilities. The technical and technological infrastructures of the LPHNE are of very good level and an effort must be done to preserve this asset; probably synergies with other existing labs on campus or in the Paris area could help in creating poles of excellence in order to avoid duplications whenever possible. The involvement of the

lab in the University is very good: the Committee is very pleased by the care devoted in welcoming and following the work of PhD student.

The competences at the LPHNE make this lab a highly esteemed collaborator worldwide.

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

Particle Physics

Approximately half of the lab physicists are involved in the major international projects in the field of particle physics. Seven groups of unequal size develop in this sector a well-balanced program between experiments exploiting data, projects in the final stage of preparation and R&D for the future.

Atlas is the clear priority of the laboratory. The LPNHE group has taken important responsibilities in the construction of the electromagnetic calorimeter and of its electronics, which are now completed. The group has also a strong contribution to the test-beam program, including the 2004 combined test-beams. Commissioning of the detector in the pit is in progress. Physics studies are ongoing on top and Higgs physics and on soft electron reconstruction. In his actual transition from construction to data analyses, the group should organize the work addressing the physics activity at the very beginning of the LHC; it would be important to improve contacts with theorists in order to discuss possibilities for early physics at the LHC. The group is also looking at the SLHC luminosity upgrade. The lab put an important effort to make available the computing resources needed to exploit the LHC data. Plans for the T2 computing centre upgrade must cope with boundary conditions imposed by new premises. The lab will have to take a decision soon about his actual small involvement on LHCb experiment which will go under threshold.

The Babar, D0 and CDF groups are well recognized in their respective collaborations and produce highly visible scientific results. The Babar group is involved in the analysis of charmless three body B decays. The D0 group is involved in the Higgs boson search, which, thanks to the accumulated integrated luminosity, will soon start to probe the Standard Model predictions. The CDF group has been involved in B_S oscillation and top physics. With the end of data taking, transitions from these groups mainly to ATLAS are going on in a smooth way. One should nevertheless take care to exploit fully the physics potential still present at the Tevatron and in Babar. Given the few permanent physicists in these groups (one in D0 and one in CDF), this requires a support from the lab for post-docs and students.

The road for the future is well defined with an R&D program on Si detectors which exploits synergies with possible interests for the detectors needed by future machines (like upgrades for the SLHC and/or a possible Super B factory) or in view of the ILC or CLIC. A group joined recently the T2K experiment opening a new future for studying neutrino properties at the Lab. This group is involved in the electronics of the TPC of the near detector

Among all these activities, the lab will have to take the best decisions to insure the optimal exploitation of its resources and maximize its visibility and the scientific return.

Astroparticle and Cosmology

Research in astroparticle and cosmology is a clear point of excellence of the LPNHE: strong groups collaborate in the most significant experiments in the field with very high visibility and important responsibilities. Plans for future collaboration exist that will allow the researchers to maintain the acquired competitiveness, albeit some more focalisation could help in concentrating on the most important targets. It would also be important to strengthen interactions with theorists working in the field in order to exploit at maximum the enormous potential of the experimental data collected.

In the astroparticle sector the work is concentrated in the study of the highest energy cosmic-rays (~ 10^{19} eV) and gamma-rays (~10^{12} eV) with Auger and HESS. The groups at LPNHE have had a major impact on both projects recognized by international prizes (2007 Descartes Prize, and EPS young physicists 2005 for HESS) and top science news (top Science news of 2007 in Physical Sciences for the Auger anisotropy results).

The LPNHE participation in the Pierre Auger project is performed by a probably not large enough renowned group with key responsibilities both technical and in physics analysis. The technical responsibilities involve the crucial construction and maintenance of the central data acquisition system. The group has also led a number of data analysis projects leading to the ground-breaking Auger anisotropy result that was featured in the cover of Science magazine (November 2007) and was chosen as the top result in the physical sciences of 2007. Key contributions of the LPNHE group have brought high visibility to LPNHE inside and outside the collaboration. The group continues to lead the physics analysis of anisotropies and the searches for neutrino-induced events. The LPNHE group is preparing for the development of the northern site of the Pierre Auger Observatory planned for Colorado, USA. The group has decreased from 5 permanent physicists to 3 and should be encouraged to grow back at least to the previous level.

The HESS experiment also enjoys the participation of a distinguished LPNHE group that has correspondingly important responsibilities: the camera construction, the central data acquisition system, calibration, and many physics analysis projects. Once again the engagement in the physics analysis is very visible, ranging from the search for neutralino annihilations in the Galactic Centre to the observation of micro quasars at the TeV energy scale. The LPNHE plays an essential role in the HESS-II program where again their main hardware involvement is in crucial items like the camera construction and the front-end electronics (including the fast analogue memory chip), developed in collaboration with CEA/DAPNIA.

The efforts in cosmology with a significant involvement of the LPNHE researchers have as primary target studies of the nature of the dark energy.

The group has contributed to observations, analysis, instrumentation, theory, and new project conceptions. They are active in SNFactory, an important collaboration potentially understaffed, and in SNLS (Supernova Legacy Survey), mainly for far supernovae, a French-Canadian collaboration where recently the LPNHE gave an important contribution developing an “active” calibration system. For the future LPNHE researchers involved in cosmology are preparing their participation to the LSST endeavour and for this they are developing a front-end ASIC, in collaboration with LAL, for the CCD readout. Their R&D effort includes the possibility of the satellite mission SNAP.

Theory

There is a small but pretty active group of theorists working mainly in B-physics and on studies of hadronic interactions at high energies.

There is a clear interest in the lab in having a lively group of theorists with whom the very active LPNHE researchers could positively interact, and this is also clearly stated in the priorities indicated by the lab. The Committee shares this view. and one could also profit from neighbouring existing groups in order to form a critical mass.

Technical services

The technical teams are well organized and operational in the frame of each physics group, and the quality and level of implication in the various projects is clearly recognized. The written and oral reports give a good description of the dedicated involvement of the technical services in each physics group, but could probably give more insight into their general strategy and objectives, showing the plans to further develop commonality and intellectual unity between groups, and the plans to develop the various underlying skills and techniques.

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

The LPNHE is a well-managed laboratory with well-equipped technical services and excellent professional staffs allowing important contributions to the various experiments; the level of staffing looks adequate but retirements could jeopardize this situation; the Committee expresses the wish that adequate hiring of new staff is performed in order to maintain this level of competences. The existing infrastructures allow the mentioned quality of service and the proposed new procurements will ensure optimal exploitation in future.

The LPNHE is very active in organizing a healthy scientific life in the lab by means of seminars, weekly meeting etc. This structure helps to be always informed of the different activities ongoing and introduces newcomers, e.g. students and visitors, to the various groups; the Committee encourages the lab management to continue on this line.

Great effort is also dedicated to the dissemination of the scientific culture by means of seminars for the general public, participation to external events and dedicated publications: this activity is of the utmost importance for the explanation of the necessity of research in basic science and should continue.

One concern comes from the foreseen move of the entire LPNHE to new premises: the new layout appears not to be the optimal to ensure to maintain the lab at the present level of functionality; improvements appear necessary in the link with the technical services of the University that are in charge of the works in order to harmonize the needs of the lab with what is planned to happen.

6 • Recommendations and advice

– Strong points :

The LPNHE is a well-managed laboratory with well-equipped technical services matching the needs and excellent professional staffs allowing important contributions to the various experiments; the level of staffing looks adequate but retirements could jeopardize this situation. Research activity is very impressive. The competences at the LPHNE make this lab a highly esteemed collaborator worldwide.

– Weak points :

Among all the activities devoted to particle physics, the lab will have to take the best decisions to insure the optimal exploitation of its resources and maximize its visibility and the scientific return Plans for future collaboration in astroparticule and cosmology fields exist that will allow the researchers to maintain the acquired competitiveness, albeit some more focalisation could help in concentrating on the most important targets.

– Recommendations :

It would be important to strengthen interactions with theorists working in the field in order to exploit at maximum the enormous potential of the experimental data collected.

Requested hiring and procurements are highly recommended; improve link with technical services of University w.r.t. the move of the lab.

INSTITUT NATIONAL DE PHYSIQUE NUCLÉAIRE ET DE PHYSIQUE DES PARTICULES

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Paris, le 18 avril 2008

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Monsieur Jean-Jacques AUBERT
Directeur de la section des
unités AERES

20 rue Vivienne
75002 Paris

Monsieur le Directeur,

J'ai bien reçu le projet de rapport du Comité d'évaluation de l'unité «Laboratoire de Physique Nucléaire et de Hautes Energies » UMR 7585, transmis par vos soins le 4 mars 2008.

Je vous prie de bien vouloir trouver en annexe les commentaires de Monsieur Pascal Debu, directeur de l'unité.

Dans l'attente de l'avis définitif de l'AERES sur cette unité, je vous prie de bien vouloir agréer, Monsieur le Directeur, l'expression de mes salutations les meilleures.

Barbara ERAZMUS
Directrice Scientifique Adjointe

Copie : Messieurs Arnold Migus et Michel SPIRO

L.P.N.H.E.

LABORATOIRE DE PHYSIQUE NUCLEAIRE ET DE HAUTES ENERGIES
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INSTITUT NATIONAL DE PHYSIQUE NUCLÉAIRE ET DE PHYSIQUE DES PARTICULES

CNRS CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

DIR/aG/072.08

Paris, le 28 mars 2008

Monsieur Jean-Jacques AUBERT
Directeur de la section des unités de recherche
AERES
S/C de Michel SPIRO
Directeur de l'IN2P3

Commentaires sur le rapport du comité d'évaluation de l'AERES

Je remercie vivement le comité d'évaluation pour la richesse des échanges lors des discussions, et les nombreux commentaires contenus dans le rapport écrit que je viens de recevoir. Ce rapport sera d'ailleurs analysé en conseil scientifique afin d'en exploiter au mieux les conclusions.

Bien que très complet dans l'ensemble, j'ai cependant un regret concernant le groupe de cosmologie. Le rapport ne contient en effet qu'une liste incomplète des contributions majeures, des prix et des distinctions reçus au laboratoire. Le groupe de cosmologie a obtenu en 2007 une médaille de bronze, un prix de la fondation Gruber et l'un de ses membres est le premier auteur de l'article d'Astronomy&Astrophysics le plus cité en 2007. Nous portons sans aucun doute la responsabilité d'un tel oubli car, bien qu'ayant été présentées, nous n'avons sans doute pas assez insisté sur les réalisations majeures de l'équipe. Cependant, dans la construction actuelle du rapport où les contributions majeures des autres groupes sont bien mises en évidence, le traitement du groupe de cosmologie semble déséquilibré.

J'espère que ces remarques pourront être prises en compte, même si je suis prêt à assumer la responsabilité de cette omission.

Pascal DEBU
Directeur du LPNHE

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