CPHT - Centre de physique théorique

Rapport Hcéres

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

Department for the evaluation of research units

AERES report on unit:

Centre de Physique Théorique

CPhT

Under the supervision of the following institutions and research bodies:

École Polytechnique

Centre National de la Recherche Scientifique - CNRS

December 2013

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

Department for the evaluation of research units

On behalf of AERES, pursuant to the Decree of 3 november 2006[1],

– Mr. Didier HOUSSIN, president
– Mr. Pierre GLAUDES, head of the evaluation of research units department

On behalf of the expert committee,

– Ms. Claire LHUILLIER, chair of the committee

[1] The AERES President "signs [...], the evaluation reports, [...] countersigned for each department by the director concerned" (Article 9, paragraph 3 of the Decree n ° 2006-1334 of 3 November 2006, as amended).

Evaluation report

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

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

Unit name:	Centre de Physique Théorique
Unit acronym:	CPhT
Label requested:	UMR
Present no.:	UMR7644
Name of Director (2013-2014):	Mr Bernard PIRE
Name of Project Leader (2015-2019):	Mr Bernard PIRE

Expert committee members

Chair:	Ms Claire LHUILLIER, Université Paris 6
Experts:	Mr Tony BELL, University of Oxford,UK
	Mr Roberto FERNANDEZ, University of Utrecht, Netherlands
	Mr Xavier LITAUDON, CEA Cadarache
	Mr Jean ORLOFF, University of Clermont-Ferrand (representative of the CNU))
	Mr Boris PIOLINE, CNRS and CERN (representative of the CoNRS)
	Mr Gavin SALAM, CERN, on leave from CNRS, Switzerland

Scientific delegate representing the AERES:

Mr Marc KNECHT

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

Mr Pierre LEGRAIN (director of the Doctoral School ED447)

Mr Patrick LE QUERE, École Polytechnique

Mr Barend VAN TIGGELEN, INP/CNRS

1 • Introduction

History and geographical location of the unit

Centre de Physique Théorique is a laboratory of École Polytechnique Palaiseau (91128 Palaiseau cedex) and an UMR of CNRS (UMR 7644).

Management team

Director: Mr Bernard PIRE

Assisted by a Secretariat: headed by Ms Florence AUGER

And a computer assistance team: headed by Mr Jean-Luc BELLON

Unit workforce

Unit workforce	Number as at 30/06/2013	Number as at 01/01/2015
N1: Permanent professors and similar positions	3	3
N2: Permanent researchers from Institutions and similar positions	26	27
N3: Other permanent staff (without research duties)	5.5	5.5
N4: Other professors (Emeritus Professor, on-contract Professor, etc.)		
N5: Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.)	24	
N6: Other contractual staff (without research duties)		
TOTAL N1 to N6	**58.5**	**35.5**

Unit workforce	Number as at 30/06/2013	Number as at 01/01/2015
Doctoral students	10	
Theses defended	13	
Postdoctoral students having spent at least 12 months in the unit*		
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	18	18

2 • Assessment of the unit

Strengths and opportunities related to the context

a) The unit is recognized internationally as a center of excellence for research in theoretical physics.

b) The unit contributes in a crucial way to projects of national and international importance including the LHC, and GSI-Fair, the construction of the LMJ and Apollon lasers, the ESA Virtual Space Weather Modeling Center and the construction of ITER.

c) The computer support team is a common resource to all teams unanimously praised for its availability and efficiency.

Different opportunities are present:

a) The location on Polytechnique campus offers many opportunities to develop interactions with other research groups such as LULI, LPP, Centre de mathématiques Laurent Schwarz.

b) Association with the College de France is enabling the development of a high profile world-class research group in Condensed Matter and could enhance the position of CPhT as a whole.

c) The development of the University of Paris-Saclay will attract investment, research students and high quality scientists. It is an opportunity to establish closer links with the university, which may open new hiring possibilities outside CNRS and École Polytechnique on the long run.

Weaknesses and threats related to the context

a) The plasmas groups are or will become subcritical after the retirement of two of the most prominent members.

b) The enlarged context in which CPhT is beginning to operate (Collège de France, University of Paris-Saclay), the evident difficulties in making new appointments, impose considerable stress on the internal life of the unit and place increased demands on the Director and the Council.

c) Transport and especially RER B needs improving to irrigate the Saclay campus and connect it in a smooth way to the national and international communities that are their natural partners. It may be critical for the attractiveness of the Paris Saclay operation and the various organizations (X; CEA, etc.) as a whole.

Recommendations

a) CPhT should actively identify suitable candidates in all hiring channels (CNRS, École Polytechnique, etc) and find an effective way to make strategic input to appointment decisions.

b) The partnership with College de France is highly desirable and a proper administrative framework should be sought which would ensure that this association benefits to the laboratory as a whole.

3 • Detailed assessments

Assessment of scientific quality and outputs

There has been substantial scientific output across the laboratory, with over 600 publications during the period 2008-2013. World class research has been carried out in each of the six teams, and all the work is of international significance. Publications are systematically in the respective fields' high-ranking journals, including a large number in Physical Review Letters and some Nature-group publications, notably in those fields where these are the main vehicles for prestigious work. Another important facet of the unit's output is in the form of computer programs, which represent many person-years of dedicated, innovative and skilled work and are of substantial value to the wider community.

Assessment of the unit's academic reputation and appeal

The laboratory's high academic standing is reflected in its considerable success in attracting funding, including two ERC grants (one synergy and one consolidator) as well as a large number of other international and national grants. That funding has enabled the laboratory to attract a correspondingly large number of postdoctoral researchers, and these are of high quality, some of them having gone on to obtain permanent positions. A further recognition of the laboratory's excellence lies in the election of one of its members to a Professorship at the Collège de France and the prospects of a future closer relationship between the CPhT and the Collège de France. The laboratory has also played a leading role in the organization of high profile international conferences and workshops.

Assessment of the unit's interaction with the social, economic and cultural environment

The interaction with the social, economic and cultural environment takes place along three axes.

Outreach: Many members of the lab participate to the dissemination of Science through books (3), conferences, articles in Encyclopedia Universalis and participations in TV and radio talks. (Bar des Sciences).

One can also list the recent initiation by a member of CPhT of a joint cursus with Saint Gobain in the École Polytechnique graduate school.

One patent (landmine detection) in collaboration with the lab of Applied Mathematics has been taken during the contract.

The unit expertise is key to the success of two major projects located in France: the LMJ and ITER.

Assessment of the unit's organisation and life

The unit is organized in six teams covering four main directions of research: fundamental interactions (with one team focusing on standard model particle physics and another one on BSM physics in the context of string theory), mathematical physics, condensed matter theory and finally, plasma physics (with one team on laser-plasma interactions, and another one on magnetized plasma).

Despite this wide thematic span, the various teams entertain good relationships, and the cohesion of the unit rests on a common theoretical approach to physics, on scientific interactions (in particular through teaching duties) and on the reliance on common services. The efficiency of secretariat and computer support is unanimously praised.

The unit has an intense scientific life, stimulated by numerous seminars within each team and at the laboratory level, and irrigated by the presence of numerous students and postdoctoral researchers. The Scientific Council has regular open meetings (up to six times a year) to discuss allocation of common resources and general planning. It is important, for the cohesion of the unit, that this forum be used to share information and discuss strategic matters for the unit.

The committee was surprised to hear, during the meeting with the unit's council, some discordant voices concerning the project leader for the following contract. This should be clarified within the unit and with the supervising institutions.

At the practical level, the infrastructure has improved significantly with the relocation of a part of the laboratory in a new building with more technical space and additional lecture rooms, following an accidental fire in the temporary but historic Paul Levy building. The situation on the Polytechnique campus is a key asset, and the panel encourages the members of the unit to develop scientific relationships with the other laboratories on the campus.

Assessment of the unit's involvement in training through research

From 2008 to 2013 researchers of the unit have directly supervised 22 PhD theses, and have hosted a large number of post-doctoral students (about 20).

Many members of the unit are directly involved in teaching at the M2 level and in pre-doctoral schools within ED 447 and ED 107, as well as abroad.

One member of the unit is professor at Collège de France. Three members are full professors at École Polytechnique and five part-time professors.

Joint M2 programs have been organized at the national and international levels.

Assessment of the strategy and the five-year plan

The opportunities and challenges for the future are different for each team. We focus here on the strategy and perspectives for the laboratory as a whole, leaving specific comments on the individual teams' strategies to the sections below.

The présentation générale in the rapport d'activité invited the committee to comment on three particular items of strategic importance to the CPhT, which are reproduced here:

** our strategy to continue to develop our research programs along its current 6 axes, with a particular emphasis on the plasma groups that did not benefit of recent recruitment;*

** the commitment of College de France as a third component of the École polytechnique-CNRS partnership to fund and support the CPhT;*

** our will to reinforce our implication in academic teaching at École polytechnique and the future Université Paris-Saclay.*

The committee's opinion on these points is as follows:

Recruitment to the plasma groups is absolutely vital. Appointments are needed to provide future leadership and to maintain and develop fruitful interaction with other research groups within the École Polytechnique and in the Paris region, as well as nationally and internationally.

Since in the five year period, recruitments are also necessary in other teams, all possible recruitment channels should be explored, including within different sections and Institutes of CNRS and École Polytechnique. Positive action is needed from CPhT and from all its supporting organizations.

The committee enthusiastically welcomes the interest from the Collège de France to develop a partnership with CPhT and supports the on-going negotiations. The involvement of the College will promote the further development of a world-leading research group in Condensed Matter and has the potential to strengthen the position of the CPhT as a whole, even if this aspect remains to be fully articulated.

The arrangement with École Polytechnique for academic teaching functions well. This is important and should continue. Regarding the desire expressed by CPhT' to become involved in academic teaching also at the Paris Saclay University, the committee is supportive and encourages individual members as well as the director to actively pursue opportunities in this direction.

As a last recommendation: CPhT and its supervising institutions should now take the time to discuss a strategy and identify a candidate for director for the second part of the 2015-2019 contract (retirement of the present director).

4 • Team-by-team analysis

Team 1 : Particle Physics

Name of team leader: Mr Claude ROIESNEL

Workforce

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
N1: Permanent professors and similar positions		
N2: Permanent EPST or EPIC researchers and similar positions	4	5
N3: Other permanent staff (without research duties)		
N4: Other professors (PREM, ECC, etc.)		
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)		
N6: Other contractual staff (without research duties)		
TOTAL N1 to N6	**4**	**5**

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
Doctoral students		
Theses defended		
Postdoctoral students having spent at least 12 months in the unit	2	
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	2	2

• Detailed assessments

The group has five permanent members (one of whom arrived in Oct. 2013), and has hosted six postdocs, one student, as well as numerous visitors.

Assessment of scientific quality and outputs

The group's scientific results (66 publications + 4 under consideration) have covered the following four main areas:

1. *Exclusive processes in lepton-hadron and hadron-hadron collisions.* There is a strong activity on this subject, with about 30 articles over the evaluation period, covering important aspects both on the theoretical front (for example the NLO calculation of Deeply Virtual Compton Scattering) and phenomenologically (with applications at the LHC, GSI-FAIR, etc.)

2. *Saturation physics.* The work has mostly concentrated on the development of a fundamental understanding of saturation, with notable results on (1) understanding saturation beyond the leading order and (2) probing the dynamics of saturation through simplified models of saturation. Both aspects bring important insights to the field.

3. *2-particle irreducible methods,* in particular the development of the method for QED, and applications to non-perturbative problems and out-of-equilibrium problems. The work in question brings thorough analyses to these problems.

4. *Non-perturbative QCD (especially AdS/QCD).* Though this subject involves just a handful of articles, the group's work was instrumental in understanding how to apply AdS/QCD methods to deep inelastic scattering.

The work has international impact and is often written in collaboration with researchers across Europe and the US.

The results have been published in the field's first-tier journals, notably JHEP, Physical Review D., Phys. Lett. B, Nucl. Phys. A/B. There have been two publications in Physical Review Letters, and one Physics Report (the prime journal for review articles in the field).

Assessment of the team's academic reputation and appeal

Members of the team take part in a wide range of international conferences (with about 60 proceedings), and also in key collective studies that help determine the future of the field, such as those carried out by the LHeC study group.

The group has been actively involved in the management of two national networks (Labex P2IO, and the direction of GDR nucléon) and is part of an ANR grant for 2012-2015. It has also been successful in obtaining funding for its international collaborations, and for postdocs.

The quality of the postdocs attracted to this group of the CPhT is high. At least two of them have gone on to obtain permanent positions, and it is a significant success for the team to have attracted a new and promising permanent member.

Assessment of the team's interaction with the social, economic and cultural environment

One member of the group is regularly involved in outreach, having contributed a total of six articles to the Encyclopaedia Universalis and to "La science au present".

Assessment of the team's organisation and life

The team is small and so does not need excessive organization. Based on discussions with its members, the team appears cohesive and functions well. The main group activity is the IPN-X seminar, run jointly with the IPN on the Orsay campus. This makes it possible to obtain a critical mass for seminars and also encourages interaction with the Paris-Saclay community. it is an important and very beneficial activity for the team.

Assessment of the team's involvement in training through research

Two young members of the team have taught at the Bielefeld-Paris-Helsinki international graduate school. One of them also teaches in the high-energy physics METH Zurich-Polytechnique Masters course.

The team's involvement in the supervision of Ph.D. students has been somewhat limited. Given the strengths of the team members, this is perhaps regrettable, and it would be beneficial for the team as a whole, and for its individual members, if they regularly took on Ph.D. students.

Assessment of the strategy and the five-year plan

The team's expertise to date is mostly on the rich phenomenology of strong interactions in standard-model physics. In light of the lack of new physics discoveries so far at the LHC it plans to continue in this direction. Given the group's strengths, and given that one can expect two decades of strong-interaction results from the LHC (not to mention other experiments), regardless of whether new physics is discovered, this strategy should assure the group a rich physics program.

The recruitment of a new member is a very positive development for the coming years, compensating for one departure. Given the two retirements in the decade to come, the team should aim at recruiting more young researchers in the years to come.

Conclusion

Strengths and opportunities:

The team is systematically publishing in top-level journals, and carrying out valuable calculations, some of which have a high chance of becoming cornerstones of their respective subfields in the years to come. The team also has well-developed links with experimental groups around the world, which is of mutual benefit to the CPhT and to the experiments. Finally the team has a track record of attracting and training good postdocs (and corresponding funding for them), some of whom have gone on to obtain faculty positions.

- ***Weaknesses and threats:***

The team faces a generational change in the years to come, with the continuation of a wave of retirements of its senior members. The team has recently attracted one top-level junior hire, reinforcing the younger part of its team, but will need to continue to hire further young researcher(s) in the years to come. One weakness of the past few years is the team's limited involvement in the training of Ph.D. students, and the team could be more proactive in seeking out prospective Ph.D. students, even if the context does not always make this easy.

- ***Recommandations***

From discussions with the team members, it is clear that they are considering the different strategic choices to be made with regards to future hirings. The committee encourages them to continue their reflections in this direction and, additionally, encourages the "tutelles" to support them in this respect. Among the important tasks for the younger researchers in the team is becoming more actively involved in the training of Ph D students.

Team 2 : String Theory

Name of team leader: Mr Panagiotis PETROPOULOS

Workforce

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
N1: Permanent professors and similar positions		
N2: Permanent EPST or EPIC researchers and similar positions	4	4
N3: Other permanent staff (without research duties)		
N4: Other professors (PREM, ECC, etc.)		
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	6	
N6: Other contractual staff (without research duties)		
TOTAL N1 to N6	**10**	**4**

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
Doctoral students		
Theses defended	3	
Postdoctoral students having spent at least 12 months in the unit	23	
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	2	2

• Detailed assessments

The team currently consists of four permanent CNRS researchers, two post-docs and two Ph D students.

Assessment of scientific quality and outputs

The team covers a broad spectrum of topics in the area of string theory and high energy theory, along four main research axes:

1. Formal aspects of string and supergravity theories: low energy effective action of flux compactification in the framework of gauged supergravity, constructions of new classes of non-supersymmetric black hole solutions, black brane dynamics in higher dimension, structure of UV divergences in supergravity, gravitational instantons and Ricci flows.

2. Holographic correspondence: effective holographic models for QCD, allowing to compute thermodynamical and dynamical properties of the quark gluon plasma at strong coupling; condensed matter applications, in particular to superfluid helium and rotating ultracold atomic Bose condensates.

3. String phenomenology: construction of grand unified models in the framework of F-theory, studies of various mechanisms for supersymmetry breaking and computations of corresponding Yukawa couplings and gauge threshold corrections, Randall-Sundrum type models of electroweak symmetry breaking, flavor physics, MSSM with higher-dimension operators, U(1)' gauge fields as dark matter candidates.

4. Cosmology: multi-field inflation, resolution of cosmological singularities in solvable string theory models, cosmological signatures of supersymmetry breaking.

On each of these topics, the team has produced numerous high quality contributions, which were published in the top scientific journals of the field (150 publications from 2008 to 2013 in JHEP Nuclear Physics B, Physical Review D, JCAP, etc). Especially noteworthy are a 6-article series on improved holographic QCD models (540 citations in total, according to INSPIRE), two papers on the `blackfold' approach for black holes in higher dimension (200 citations), the study [1] on new physics signatures in the cosmic microwave background (100 citations), papers on F-theory grand unified models (110 citations), and papers on experimental signatures of U(1)' bosons at FERMI telescope (120 citations).

The team members are also regularly invited in international conferences (as testified by publication of 27 proceedings).

Assessment of the team's academic reputation and appeal

The excellence of the team has been recognized by prestigious european grants (Chaire d'excellence européenne 2004-2008, ERC grant 2009-2013, based in part at CPHT) and numerous national or bi-national grants (ANR, PICS, PEPS, CEFIPRA, P2I, Marie Curie fellowships). These contracts have allowed hiring top level postdoctoral fellows (23 over 2008-2013, some of them shared with IPHT or LPTENS), out of a pool of about 100 applicants each year. The top quality of the postdoc is underscored by the fact that three of them have gone on to permanent academic positions.

The team members are involved in numerous international collaborations (USA, Canada, Brazil, India, United Kingdom, Germany, Greece, Italy, Belgium, Japan, Denmark...) as well as national collaborations, within the string theory community in Paris area and outside Paris (Tours, Lyon, Clermont-Ferrand).

Assessment of the team's interaction with the social, economic and cultural environment

The team plays an active role within the French high-energy theory community, in organizing numerous workshops and scientific meetings, and in the Paris area by its involvement in the joint string theory seminar held on a bi-weekly basis at Institut Henri Poincaré. Two general public articles were published in the journal of the Société Francaise de Physique and several outreach actions were conducted.

Assessment of the team's organisation and life

Thanks to the high number of PhD students and postdocs, the team has enjoyed a vibrant scientific animation. A bi-weekly double feature string theory seminar organized locally plays an important role in training PhD students and postdocs, and in establishing group dynamics. The team members appear to get on well together and have fruitful collaborations with PhD students and postdocs.

Assessment of the team's involvement in training through research

From 2008 to 2013, the team has supervised 6 PhD theses, and has hosted 5 foreign PhD students and 9 Master students. Two PhD theses are underway. During their first year, PhD students benefit of a one-trimester training organized jointly with Amsterdam and Bruxelles universities.

Two team members are part time professors at École Polytechnique, and one former member, and now frequent visitor, is full time professor. The latter has recently established an M2 program in Particle Physics (PHE), joint between École Polytechnique (within ED 447) and ETH Zurich. Team members teach part of the particle physics and quantum field theory courses in this M2 program, and also give tutorials at the M2 program in Theoretical Physics at École Normale Supérieure (ED 107). A team member is the École Polytechnique delegate at the scientific council of this same program.

Assessment of the strategy and the five-year plan

In this ever-changing field, it is difficult to establish a long-term research program, as unexpected new avenues may open at any time and make pre-established choices obsolete. The team expects to continue current research in BSM physics and cosmology, with particular emphasis on constraints coming from LHC and PLANCK experiments. It will also continue the study of higher-dimensional black holes and black branes, using the blackfold and algebraic methods developed at CPHT. It also intends to develop applications of holographic methods to condensed matter, particularly on superfluid Helium and rotating ultracold atomic condensates. These are challenging and topical directions of research, which will undoubtedly produce valuable results in the future.

Conclusion

- **Strengths and opportunities:**

The string theory team at CPHT is at the forefront of research at the international level. Its scientific output has been remarkable, with over 150 papers published in top scientific journals over the last five years. One of its assets has been its capacity to attract top level postdoctoral fellows, which was made possible by numerous research contracts from European Community (Chaire d'excellence européenne 2004-2008, ERC 2009-2013, Marie Curie fellowships) as well as national ones (ANR, PICS, PEPS, CEFIPRA, P2I), along with a clever policy leveraging national and local funding into Marie Curie Fellowships. The recent hiring of a CNRS Chargé de Recherches in 2010 has considerably reinforced the formal wing of the team, without, however, fully compensating the departure of a research director in 2009.

- **Weaknesses and threats:**

While being an asset, the wide thematic span of the team threatens to isolate some of its members, especially on the phenomenological wing. This risk was so far averted thanks to the intense postdoctoral hiring, but may become more severe as the current contracts come to an end.

- **Recommendations:**

The committee encourages the team in its search of new sources of funding so as to keep the high level of postdoctoral hiring. The committee recommends the hiring of a new permanent researcher to reinforce the team and compensate the 2009 departure.

Team 3 : Mathematical Physics

Name of team leader: Mr Christoph KOPPER

Workforce

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
N1: Permanent professors and similar positions	1	1
N2: Permanent EPST or EPIC researchers and similar positions	6	5
N3: Other permanent staff (without research duties)		
N4: Other professors (PREM, ECC, etc.)		
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	2	2
N6: Other contractual staff (without research duties)		
TOTAL N1 to N6	**9**	**8**

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
Doctoral students	1	
Theses defended	1	
Postdoctoral students having spent at least 12 months in the unit		
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	5	4

• Detailed assessments

The team has had, during the contract, six permanent members and two emeritus researchers, active during the evaluation period. During this period the team has had three PhD students and four postdoctoral fellows.

Assessment of scientific quality and outputs

The team can be divided in two subgroups working, respectively, in *field theory* and *dynamical systems* and *statistical physics*. Both subgroups have comparable strengths and levels of productivity or international visibility. Altogether, the team develops a rather diversified spectrum of mathematical tools, including methods from field theory, statistical mechanics, probability theory and partial differential equations (stochastic and non-stochastic).

Quantum field theory has been, historically, a beacon subject at the CPhT, developed by the leading international experts in rigorous renormalizability schemes. It is reassuring to see that, despite the retirement of all of the founder figures, the team has been able to renew itself while keeping the scientific level in consistency with its tradition. The team has produced important advances in perturbative renormalization and constructive field theory.

The topics in dynamical systems and statistical systems developed by the team form a diversified set that evolves with time. This set includes research relating dynamical systems with non-Markovian stochastic processes, issues on diffusion and non-equilibrium statistical mechanic and, more recently, concentration inequalities, quasi-stationarity and Gibbsianness. Further work refers to integrable systems, stochastic equations and random fields and a recent incursion in population dynamics.

The summed scientific production of the group is excellent (107 papers, 1 book and 5 book chapters). Most of the articles are in leading journals in mathematics, mathematical physics and physics.

Assessment of the team's academic reputation and appeal

The team remains an international reference both for rigorous quantum field theory and for topics in the frontier between dynamical systems, stochastic processes and mathematical statistical mechanics.

Its members are regularly invited at international conferences, workshops and schools.

The team is very active in international collaborations with a number of countries in three continents. In particular, members have long standing collaborative projects with Chile and Brazil. The mathematical physics team of the École Polytechnique is very well known in the international arena.

Assessment of the team's interaction with the social, economic and cultural environment

Members of the team are active in teaching at different levels at the École Polytechnique. One of them is full-time professor and teaching vice-director of the Physics Department. Another teaches part-time at the Department of Applied Mathematics. Other members teach Master courses and courses to assist foreign students.

Assessment of the team's organisation and life

The team keeps a very friendly and open atmosphere that leads to an effective sharing of information. Mathematical research is often built out of individual efforts, in which each researcher pushes his/her own program and sets up his/her own network of collaborators. In this sense, this team is surprisingly exceptional, as shown by a non-negligible number of publications involving pairs of members.

Assessment of the team's involvement in training through research

In the evaluation period the team has had 3 PhD students and 4 postdocs. While it could be argued that larger numbers would be preferable, these numbers indicate a clear vocation to train and transmit expertise to younger generations.

Assessment of the strategy and the five-year plan

The team has clear ideas for future research. Perhaps the most ambitious goal of the subgroup on field theory is to show absence of anomalies for the standard model at all orders, followed by the analysis of the renormalization flow beyond the perturbative regime. Other objectives include the study of models of random tensors (generalizing random matrices models) and the application of stochastic calculus to fractional Brownian motion. The subgroup on dynamical systems plans to further the studies on (absence of) limits of Gibbs measures and on applications to biological systems.

Conclusion

The team is living up to its reputation of leading group in mathematical physics. It presents a nice and not very common thematic balance, in which part of the team follows a systematic program started decades ago and still extremely relevant, while another part explores a dynamic panoply of topics of foundational or applied interest.

- **Strengths and opportunities:**

Its strength lays both in its size (unusual for a group in mathematical physics), its international reputation and its thematic diversity. These attributes guarantee that the team can continue to function as a generator of important scientific ideas, in particular through collaborations arising of its international appeal.

- **Weaknesses and threats:**

The main weakness lies in the very limited number of young researchers that have been trained by the team. This could compromise future influx of new blood and the continuation of important research lines. A possible threat stems from the fact that the team is entirely funded by the CPhT, and it lacks grant money coming from other sources. This type of grants is not easy to get for groups in fundamental research, but the team seems well positioned to obtain them.

- **Recommendations:**

- The team should have a more aggressive policy of recruitment of PhD students and post-doctoral researchers. The team deserves to create a school of thought.

- The team should apply for important research grants both at the national and international levels. Such grants give financial autonomy, which in turns leads to increased weight in academic decisions.

- The team may consider strengthening its relation with the mathematic departments at the École Polytechnique (or other institutions of the future Paris-Saclay pole). Such a relation can bring further thematic richness and an enlarged audience and pool of interested students.

Team 4 : Condensed Matter

Name of team leader: Mr Antoine GEORGES

Workforce

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
N1: Permanent professors and similar positions	2	2
N2: Permanent EPST or EPIC researchers and similar positions	3	2
N3: Other permanent staff (without research duties)	1	1
N4: Other professors (PREM, ECC, etc.)		
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)		
N6: Other contractual staff (without research duties)		
TOTAL N1 to N6	**6**	**5**

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
Doctoral students	5	
Theses defended	3	
Postdoctoral students having spent at least 12 months in the unit	9	
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	3	2

• Detailed assessments

The team has cinq permanent members.

Assessment of scientific quality and outputs

The team's scientific results have covered a large spectrum of the condensed matter theory of strongly correlated quantum systems from the explanation of simple generic mechanisms via archetypal models to ab initio understanding of various real materials. Numerous methodological improvements have been brought to the original DMFT approach (for Dynamical Mean Field theory) for strongly correlated quantum systems and the team is now able to answer a large range of questions concerning all these systems whatever the origin of the strong correlations. Moreover the team has now realized the bridge between this generic approach and the chemists' ab initio approach of the materials from their atomic constitution: opening the door to predictive description of properties of real materials. This extremely ambitious program has been and is supported by the development of codes which for some of them are now in open access in the TRIQS library (co-developed with a researcher in IPhT Saclay).

• During the contract the potentiality of the DMFT approach has been illustrated by the definitive explanation of the spatial properties of the Cuprate High Tc Superconductors (pseudo gap, nodal and anti-nodal point of the Fermi surface)

• During this contract, a new breakthrough has been achieved with the generic understanding of the effect of strong intra-atomic spin-orbit coupling on the electronic properties of transition metals and of their oxides. This advance comes with the first illustration of such a mechanism in the physical properties of a real material ($BaAs_2Fe_2$)

• The combined new approaches open the possibility to tackle a very large number of material problems as Fe superconductors, the magnetic and structural properties of Fe at high and ultra high (geological) pressure have been studied and many difficulties solved

• The team is very active in studies at the interface between Condensed Matter Physics and Quantum Optics (Ultra-Cold Atomic Gases, Cavity QED, Quantum Information, topological insulators and nanosystems)

Outputs: 146 publications in excellent reviews and two books or chapter of books.

Assessment of the team's academic reputation and appeal

The team is an international leader in the field of strongly correlated quantum physics. This can be measured by:

• the impressive (more than 30) number of national and international collaborations with top scientists;

• the cooptation of one member of the team as a Professor in Collège de France: which is an index of his international notoriety;

• the frequent and regular invitations of group members in international conferences and schools;

• the attractiveness to national and foreign doctoral (5) and post-doctoral students (9).

Assessment of the team's interaction with the social, economic and cultural environment

Another researcher of the team has built a joint" parcours" on material physics between École Polytechnique and Saint Gobain, and a double cursus between École Polytechnique and the FU in Berlin.

Assessment of the team's organisation and life

The organization of the team allows the development of young talents and is extremely rich for doctoral and post-doctoral students.

Assessment of the team's involvement in training through research

The team has a strong involvement in teaching at various levels and in various institutions: lectures at College de France and École Polytechnique.

Team members have also a strong involvement in training PhD students and post-docs. Three theses have been completed during the contract, and three are presently in preparation. There are presently six post-doctoral fellows in the team (nine or more on the whole span of the contract).

Assessment of the strategy and the five-year plan

The projects for the future five years are both extremely ambitious (*predict and control the synthesis of new materials)* and very well prepared.

They have been validated by the attribution of two ERCs:

- ERC Consolidator grant (2014-2019) "Predictive Electronic Structure Calculations for Materials with Strong Electronic Correlations: Long-range Coulomb Interactions and Quantum Dynamical Screening";

- an ERC SYNERGY project (2013-2019) "Frontiers in Quantum Materials Control", with: Max Planck Hamburg, Geneva and Oxford.

Conclusion

This team does outstanding work at an international level. Its impetus is extraordinarily strong.

- **Strengths and opportunities:**

Its strength lays in the internationally recognized quality and diversity of the researchers, and an appropriate size and distribution of ages.

The strongest present opportunity is a tighter association with College de France. The recent election in College de France of a specialist of the "Chemistry of Materials and Energy" enlarges the opportunity to achieve very innovative work.

- **Weaknesses and threats:**

Not to be seen presently.

- **Recommendations:**

The team does not seem in need of external recommendations.

Team 5 : Laser-Plasma Interaction

Name of team leader: Mr Stefan HULLER

Workforce

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
N1: Permanent professors and similar positions		
N2: Permanent EPST or EPIC researchers and similar positions	4.6	3.6
N3: Other permanent staff (without research duties)		
N4: Other professors (PREM, ECC, etc.)		
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	0.6	0.6
N6: Other contractual staff (without research duties)		
TOTAL N1 to N6	**5.2**	**4.2**

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
Doctoral students	1	
Theses defended	3	
Postdoctoral students having spent at least 12 months in the unit	3	
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	4.6	3.6

• Detailed assessments

Assessment of scientific quality and outputs

The team has been very productive over the past five years with 101 publications in refereed journals. The intellectual quality of the papers is high, as represented by publication in high impact journals: 15 in Physical Review Letters and 3 in the Nature family of journals including papers published so far in 2013. Research into ultra-short laser pulses at moderate intensities has been particularly productive with about 60 refereed publications including 6 in PRL and 3 in Nature journals. The laser-plasma unit's papers are well-cited for the subject although none of the papers in this five year period has yet attracted the exceptionally high citation rates achieved by earlier papers from the team (some published in 2007 just a year before the present period).

The team's research is varied and extensive, ranging from the filamentation of very short laser pulses at relatively low intensity, through parametric instabilities and filamentation at laser intensities relevant to inertial confinement fusion, to ion and electron acceleration at very high laser intensities. The research uses a variety of techniques ranging from the predominantly analytic to high performance computing with advanced codes, and from basic theory to experimental support. Across the whole range of topics and techniques the research is of the highest intellectual quality. The team is globally respected for the scientific integrity of its research.

Assessment of the team's academic reputation and appeal

The team has a high reputation, and some members of the team are deservedly described as world-leaders in their field. The evidence for this judgment comes from the unit's achievements over many years and (anecdotally) from remarks made at gatherings of plasma physicists.

Evidence for the wide impact of the team's research can be seen in the large number of collaborations: 11 national and 15 international collaborations.

One of the members of this team is particularly prominent on the national scene. He is the Director of "l'Institut Lasers et Plasmas", and plays an important role in forming policy on the development and uses of high power lasers across France.

The team is highly regarded, but it could give increased priority to systematically promoting the international impact of its research. The team should ensure that all its high quality research reaches publication. Members of the team could be less reluctant to compete for first authorship on collaborative papers. A larger number of invited conference presentations might be sought in order to reflect the excellence of the team's research.

Assessment of the team's interaction with the social, economic and cultural environment

The team plays a key role in the major investments being made by France in high power lasers such as the Laser Megajoule (LMJ), PETAL and Apollon. Members of the team actively collaborate with experimentalists on existing lasers at LULI, LOA and CEA in the Paris region. The twin purposes of the largest of the new lasers (LMJ) are to underpin French nuclear deterrence and to investigate Inertial Fusion as a route to clean commercial energy production. The other lasers deliver less total energy but greater instantaneous power. These are being developed to investigate the generation of energetic ion beams for cancer treatments, compact electron acceleration to high energies, and novel means of igniting high gain capsules for thermonuclear energy generation. Moreover, the needs of plasma physics helps driving the development of a world-leading laser industry in France. The team is making an important input to all these projects. Of particular importance at present is the understanding of parametric instabilities and filamentation during laser propagation in fusion hohlraums. The team's expertise in this subject may be paramount in understanding one reason why the US National Ignition Facility (NIF) is underperforming. The resolution of issues on the NIF is important for the related LMJ facility in which France is investing billions of euros. The team's research into ultra-short laser pulse has potential for micro- and nano-scale engineering and production of THz electromagnetic pulses.

Assessment of the team's organisation and life

The laser-plasma team at CPhT is small but well integrated with nearby experimental units (LULI, LOA) at École Polytechnique. The close association with LULI and LOA embeds CPhT in a broad community that attracts large numbers of visitors for experiments and seminars. The team's greatest overlap of interest is with the laser-plasma experimental laboratories. Magnetized and laser-produced plasmas are quite different and use different computational techniques although both require access to high performance computers and associated support staff. In the coming five year period, the laser-plasma team may develop a common program with the quantum groups in CPhT as laser intensities increase and QED effects become important (even dominant). The laser-plasma team's location in CPhT facilitates collaboration with a range of experimental groups without being subsumed into any one of them.

There is a large overlap of research interests among members of the laser-plasma team resulting in many jointly authored papers. Research into ultra-short pulses at moderate laser intensities is relatively distinct from that of the rest of the unit, but there is still a strong commonality of interest and the team forms a coherent whole.

Assessment of the team's involvement in training through research

The number of research students is relatively small with three completed theses in the five-year period. The quality of these students is very high. These three have been the first author on 3, 2 and 2 refereed papers respectively and co-authors of numerous other papers.

Four members of the team are involved in master level teaching at École Polytechnique.

Assessment of the strategy and the five-year plan

Future scientific prospects for the team are excellent, especially because of the completion of new high-power lasers in France and the carrying out of the first experiments.

The team's expertise could be crucial for the success of the LMJ, especially if laser-plasma interactions turn out to be a major reason for the difficulties achieving ignition on the equivalent US NIF facility. This will be an important opportunity for the team to both engage in exciting new physics and make a major contribution to a project of great national importance.

The completion of the Apollon laser will bring access to a very different type of physics in which quantum electrodynamics becomes important in laser-plasma experiments for the first time. Facilities capable of accessing this new regime are being built elsewhere in the world so this should be a highly competitive field with the opportunity to develop the theory of completely novel experiments. This should be an opportunity for cross-team collaboration within CPhT.

However, the team faces a major difficulty. Two of the leading and most prominent scientists in the team will retire during the next five-year period, and a presently active emeritus may become less active. The remaining group of three scientists (one presently shared with another unit) will be insufficient to respond to the exciting opportunities presented to the unit. Moreover, the severely depleted team will appear less attractive to new recruits and could be in terminal decline at the end of the five-year period if no appointment is made.

Conclusion

- **Strengths and opportunities:**

- The team has an international reputation for world-leading science of high integrity.

- The proximity of current world-leading laser facilities and the completion of new laser facilities in France offer unparalleled opportunities for excellent science of national and international importance.

- **Weaknesses and threats:**

- Retirement of leading scientists will leave the team severely depleted if no action is taken.

- **Recommendations:**

- Take steps to increase the international visibility of the unit's excellent research.

- New appointments are absolutely essential for the future of laser-plasma physics at CPhT, for the success of nationally significant projects such as the LMJ, and for the provision of theoretical support to laser-plasma experiments in the Paris region. Ideally two appointments should be made. One of the appointments should be at a leadership level. The organisations overseeing CPhT must find a way of making these appointments.

Team 6 : Magnetized Plasmas

Name of team leader: Mr Hinrich LUTJENS

Workforce

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
N1: Permanent professors and similar positions		
N2: Permanent EPST or EPIC researchers and similar positions	3.4	3.4
N3: Other permanent staff (without research duties)		
N4: Other professors (PREM, ECC, etc.)		
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	0.4	0.4
N6: Other contractual staff (without research duties)		
TOTAL N1 to N6	**3.8**	**3.8**

Team workforce	Number as at 30/06/2013	Number as at 01/01/2015
Doctoral students		
Theses defended	2	
Postdoctoral students having spent at least 12 months in the unit	1	
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	2.4	2.4

• Detailed assessments

Assessment of scientific quality and outputs

The team's scientific production is summarized in 36 publications and 43 contributions in conferences. These numbers should be compared to the small size of the team. The team effort was mainly focused on code development, leading to a reduced number of publications. Nevertheless, the work has international impact and is often written in collaboration with researchers in France and in Europe. The results have been published in the field's first-tier journals, notably in plasma Phys. Contr. Fusion, Nuclear, Fusion, Physics of Plasmas, J Computer Physics, Astrophysical Journal etc and one publication in Physical Review Letters. ~45% of the publications are related to tokamak plasma physics, ~45% to astrophysical plasmas and 10% to Hall effect thrusters. 50% of the publications have national or international collaborators as a first author, which gives an idea of the strength of the collaborations

In addition to the publications, the main production consists in the development of world class computer codes for the modeling of MHD instabilities in tokamaks, the modelling of solar activity and its impact on Earth, the modeling of Hall effect thrusters. It should be stressed that a major effort has been made to develop a unique tool (the new fluid/kinetic hybrid code XTOR-K) to understand MHD instabilities in the presence of fast particles (non-thermal). This is a major issue for the international project ITER, the tokamak under construction in France (Cadarache) where a large fraction of fast particles will be produced by the fusion reactions (fast alpha fusion born particles). The modeling and understanding of the so-called burning plasma is a prime physics issue for the success of the magnetic fusion confinement research. Similarly, in astrophysical plasmas the development of XTRAPOL, METEOSOL, MESHMHD *for the* modelling of the solar eruption process and its relation with earth atmosphere are key assets for the team. The codes are recently included in the framework of the ESA Virtual Space Weather Modeling Center.

Assessment of the team's academic reputation and appeal

The team is well integrated in different research networks with long standing national and international collaborations. In particular, the collaboration with CEA/DSM, IRFM through the "Federation de Recherche Fusion Par Confinement Magnetique" is a key asset for the team in order to have access to experimental data required to validate the modeling and theoretical predictions (mainly obtained in Tore Supra and JET). A large number of publications are related to this activity. Similar collaborations in space plasma physics are essential to validate simulation predictions (with ESA, NASA, DGA). This reputation is recognized also by the fact that the team has led a number of projects funded by the French National Agency ANR (three projects). The team leader has also coordinated the MHD activity within the "Federation de Recherches Fusion Par Confinement Magnetique". Finally, up to 10 invited talks have been given in international conferences. Very recently, within EUROFUSION H2020, the team has proposed an Enabling Research Project for the implementation of the fusion RoadMap ("*Nonlinear 3D simulations of plasma core instabilities beyond MHD in tokamak plasmas*"), which consists in coordinating the activity with three major laboratories in EU (CEA-IRFM, CRPP–EPFL, ENEA–CNR). The team has been recently chosen to be one major model provider for the space weather program of the European Space Agency (ESA). The team has also been involved in the GDR "*Propulsion par plasma dans l'espace*" involving CNES, and industrial partners such as Safran-Snecma.

Assessment of the team's interaction with the social, economic and cultural environment

The team interaction with the social, economic and cultural environment is measured through the active collaboration with CEA/DSM/IRFM via the "Federation de Recherches Fusion Par Confinement Magnétique" and its implication for the ITER project, contracts with CNES, ESA, and industry Safran-Snecma, the participation to TV or radio broadcasts, and participation to the GDR "Propulsion par plasma dans l'espace". The research activities have close links with the international project ITER, the world largest tokamak currently built in France. When the project has been officially launched, the French President (Mr J. CHIRAC) announced that "ITER in FRANCE must be a success". The CPhT team contributes to this future success, which has social and economic impacts.

Assessment of the team's organisation and life

The team may suffer from being too isolated within the CPhT even though two researchers share their time between the magnetized plasma and the Laser-Plasma teams. The main link of the group "Magnetized Plasmas" with CPhT is through the computer support team. This support should be further reinforced to leave more time to the physicists for solving open research issues and exploit the newly developed codes.

Assessment of the team's involvement in training through research

During the evaluation period, the team has been involved directly in the training of 3 PhD students and 7 post-doc students. In addition, the team is involved in a set of teaching activities at the FCM Master Fusion, and at École Polytechnique. Compared to the small size of the team, this is a significant contribution.

Assessment of the strategy and the five-year plan

After a long period of code development, the five years' plan of the team should consist in benchmarking and validating the newly developed codes against experimental data (for tokamak and astrophysical plasmas). This activity should strengthen the prediction of the MHD stability for the future generation of tokamak such as ITER. This positioning is highlighted by the fact that the team has recently submitted an Enabling Research Project for the implementation of the fusion RoadMap with EuroFusion H2020 program. In addition, in the fusion roadmap the mastering and, ultimately, controlling of the MHD instabilities are clearly flagged as a major issue. In astrophysical plasmas, the CPhT codes will be part of the Virtual Space Weather Model Center; an effort will be made to develop comprehensive modeling to integrate sun and earth interactions, and to better understand the heating of the solar corona. On the one hand, these strategies could only be developed if the team is reinforced, as the size is too small for such an ambitious program. On the other hand, one may gain in efficiency and team spirit by reducing the numbers of projects led in parallel (e.g. reducing the activity on the Hall effect Thruster that is ready to be transferred to the industry). In addition, one may think of synergetic programs or common (code) developments between the astrophysical plasmas and tokamak plasmas.

Conclusion

- **Strengths and opportunities:**

- The international and excellent reputation of the team. In astrophysical plasmas, the team has been chosen to be one major model provider for the ESA space weather program and the medium/long term strategy is well defined. The ITER project (the tokamak under construction in France), with an increasing demand in terms of modeling and preparation of experiments with fully validated codes, will indeed be strongly supported by the exploitation of these unique and world class computer codes. Similarly, other European projects such as JET in England, the WEST project in Cadarache (the modification of Tore Supra), ASDEX-U, the start of W7-X experiments in Germany and the start of the JT60-SA experiments are key opportunities for the team to develop international collaborations. The strong collaboration with CEA (IRFM) and the link with "Federation de Recherches Fusion Par Confinement Magnetique" are a key asset.

- **Weaknesses and threats:**

- The small size of the team and the weak interaction with other plasma laboratories at École Polytechnique are clearly a major weakness. A relatively large number of research projects (the three main subjects are tokamak plasmas, astrophysical plasmas and Hall Thrusters) for a team of three permanent researchers: the activity relies on a very limited number of researchers. The citation rates of the publications could be further increased, for instance by continuing the effort related to the international visibility of the team's excellent research. The major effort was on code development leaving a very limited time for the exploitation. The threats are in the computer support, on the availability of the manpower to support the code development, on the departure of one member of the team that could destabilize the whole strategy, on a too large numbers of projects. Difficulties to attract young researchers who may fear to be too isolated within the team, and within the CPhT, since the projects are led by individual researchers. The threats are also the reduction of the number of projects funded by the ANR and the present lack of visibility for Euratom funding within H2020.

- **Recommendations:**

- It is mandatory to significantly reinforce the size of the team (no recruitment since 1995) in relation with the ambitious five years strategy, the foreseen retirement of senior researchers, and, the growing demand from the ITER project (in FRANCE). It is of prime importance to increase the high-level computer support for an increased efficiency of the use of computing facilities (e.g. develop massively parallel codes) and for the physicists to spend more time on code validation/exploitation. We recommend reducing the number of projects led by individuals (e.g. reduce the activity on Hall Thruster?). We recommend reinforcing the computer support provided by CPhT to strengthen the world-class code exploitation. We recommend reinforcing the collaboration with the Laboratoire de Physique des Plasmas/LPP at École Polytechnique. We recommend maintaining strong international collaborations to further validate the codes already developed and to enhance the accessibility/value of the codes with the help of a user-friendly interface, in view of a systematic exploitation and extrapolation (e.g. toward ITER).

5 • Conduct of the visit

Visit dates:

Start:	Thursday 5th December, 9.00 am
End:	Friday 6th December, 4.30 pm

Visit site(s):	Centre de Physique Théorique -
Institution:	École Polytechnique
Address :	Bat. 6, RDC F91128 PALAISEAU CEDEX FRANCE
	Tell. : 33 (0) 1-69-33 42 01
	Fax: 33 (0) 1-69-33 49 49

Specific premises visited: seminar rooms and offices

Conduct or programme of visit

Thursday 5 December, morning session

9h00–9h20	Closed session of the committee
9h20–9h45	general presentation of the lab. by the Director
9h44–10h00	questions from committee
10h00–10h20	Particle physics
10h20–10h40	String Theory
10h40–11h00	Mathematical physics
11h00–11h20	Coffee break
11h20–11h 40	Condensed Matter
11h40–12h00	Laser-Plasma interactions
12h00–12h20	Magnetized plasmas
12h20–12h50	More questions from committee
13h00	Lunch

Thursday 5 Dccember, afternoon session

Meetings with the 6 teams

14h15–15h45	String theory, Condensed matter, Magnetized plasmas
15h45–16h00	Coffee break
16h00–17h30	Particle physics, Math physics, Laser plasma interactions

Friday 6 December, morning session

9h00–9h20	Closed session of the committee
9h20–9h40	Committee meeting with the administrative staff (ITA)
9h40–10h00	Committee meeting with the computing assistance team
10h00–10h15	Committee meeting with the doctoral students
10h15–10h30	Committee meeting with the post-docs
10h30–10h45	coffee break
10h45–11h10	Committee meeting with the Director of the Doctoral School ED447
11h10–11h30	Committee meeting with the Laboratory Council
11h30–12h00	Committee meeting with the CNRS, École polytechnique and College de France administrations
12h00–12h30	Committee meeting with the laboratory director
12h30–16h30	Private Lunch for the committee, followed by the closed committee session

6 ● Supervising bodies' general comments

Patrick Le Quéré
Directeur adjoint de l'Enseignement et de la Recherche

Madame Nathalie Dospital
Déléguée Administrative
Section des unités
AERES
20 rue Vivienne
75002 PARIS

Objet : Evaluation AERES du CPhT (UMR 7644)
Référence : DAER /LL/14 – n° 84
PJ : Réponse au rapport d'évaluation du CPhT - S2PUR150007898-004937

Palaiseau, le 4 avril 2014.

Chère Madame,

Le CPhT (UMR 7644) n'a pas de remarque particulière à formuler sur le rapport AERES.

En tant que co-tutelle du CPhT, nous n'avons pas de commentaire particulier à ajouter, autre que vous faire savoir que nous avons été très sensibles à la qualité du rapport, et vous prions de remercier en notre nom l'ensemble des membres du comité et son président pour le temps qu'ils ont consacré à cette évaluation.

En vous souhaitant bonne réception de la présente, je vous prie de croire, Chère Madame, à l'assurance de mes meilleures salutations.

Patrick Le Quéré
Directeur adjoint de l'Enseignement et de la Recherche

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