CELIA - Centre lasers intenses et applications

Rapport Hcéres

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

Section des Unités de recherche

AERES report on the research unit

Centre Lasers Intenses et Applications (CELIA)

– UMR 5107

From the

Université Bordeaux 1

CNRS

CEA/DSM

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

Section des Unités de recherche

Rapport de l'AERES sur l'unité :

Centre Lasers Intenses et Applications (CELIA)

– UMR 5107

Sous tutelle des établissements et organismes

Université Bordeaux 1

CNRS

CEA/DSM

Le Président
de l'AERES

Jean-François Dhainaut

Section des unités
de recherche

Le Directeur

Pierre Glorieux

Mai 2010

Research Unit

Name of the research unit: Centre Lasers Intenses et Applications, CELIA

Requested label: UMR

N° in the case of renewal: 5107

Name of the director: Mr Philippe BALCOU

Members of the review committee

Committee chairman

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Other committee members

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1 • Introduction

• Date and execution of the visit

The evaluation committee met at CELIA on November 12-13, 2009. It met with representatives of the support establishment (Université Bordeaux 1, CNRS and CEA), the director, co-directors, PhD students, the CELIA Laboratory Council, the different group leaders and it was guided through all the newly implemented laboratories of CELIA. This laboratory visit, together with oral presentations given by the group leaders, complemented very well the comprehensive written documentation provided to the Committee in advance. This allowed the Committee to obtain, in spite of the rather tight schedule, a good overview of CELIA during this short visit.

• History and geographical localization of the research unit, and brief presentation of its field and scientific activities

CELIA is located in Talence, close to Bordeaux. It was officially started in 1999 as an academic research center to go along with the newly launched Laser MégaJoule project. Its main mission was to provide expertise in laser matter interactions. Four main objectives are highlighted:

- basic research on high intensity laser matter interactions,
- academic and scientific support for the MégaJoule program,
- transfer of optical technologies to photonic industries in Aquitaine, and
- higher education.

The scientific field of CELIA corresponds to the physics of high-power and high-intensity lasers, of ultrafast physical processes triggered or probed by optical means, of the physics of hot and dense plasmas, and more generally to laser-matter interactions in all extreme conditions, with a strong emphasis towards applications.

• Management team

The management team is composed of a director, Philippe Balcou, and two deputy directors, Henri Bachau and Vladimir Tikhonchuk.

The laboratory is structured into five research groups, each with one or two group leaders:

- The Laser group (Group on Optics and Femtosecond Lasers. GOLF)
- The XUV group (high Harmonic in the XUV, attosecond science and applications, HXUV)
- The X-ray plasma group (X-ray Sources, Plasmas, Ions, SXPI)
- The fusion plasma group (Interaction, Inertial Controlled Fusion, Astrophysics, IFCIA).
- Since 2008, the PEPSI group (Preparation of PW experiments, and Integrated Simulations).

- Staff members (on the basis of the application file submitted to the AERES)

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	11	11
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	21	21
N3: Number of other researchers (Forms 2.2 and 2.4 of the application file)	1	2
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	13	13
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)	1	1
N6: Number of Ph.D. students (Form 2.7 of the application file)	17	17
N7: Number of staff members with a HDR or a similar grade	11	11

2 • Overall appreciation on the research unit

CELIA is a very lively and dynamic research unit, active in several highly relevant areas of modern laser physics, laser – matter interaction science, non-linear optics, plasma physics, and related applications. It is a young research unit, being only about 10 years old. The average age of the researchers is also relatively low. In addition, CELIA is (mainly) located in a new and modern building, specially designed and well adapted for state-of-the-art experimental laser-based science. This combination, of a young research unit in new laboratories, contributes to a very dynamic evolution of the laboratory. The Committee is impressed by the positive evolution and the scientific achievements of CELIA.

The Committee is further impressed by the strong local support provided by the Aquitaine region. The laboratories are all of a high standard and very well equipped. However, there appears to be an imbalance between the funding provided, on the one hand, for laboratories and advanced equipment, and on the other hand for technical support (in particular laser technicians) and running costs of the experiments.

The scientific productivity with the present in-house femtosecond lasers is very good, but the directors are advised to consider appropriate upgrades in the not too distant future. The directors are further advised to pay special attention to the strong gender imbalance at the leadership level.

3 • Specific comments

The Committee recognizes that significant time and effort have been devoted in recent years to the move into the new building, and to get all the equipment into stable and optimised operation. All the research groups have managed to ramp up very quickly in the new laboratory and reached high scientific productivity in a short time. The Committee is indeed impressed.

The Committee further recognizes the fruitful connections between CELIA and industry. These connections have resulted in valuable technology transfer, to the benefit of the research programmes within CELIA as well as to its many industrial partners. The collaborative spirit of the lab, with active and fruitful links, not only to industry but

also to leading scientists and major laboratories around the world, including the active involvement of CELIA in Laserlab-Europe, is worth highlighting as one of the strengths of this research unit. The directors are encouraged to continue to promote and stimulate this spirit and these contacts.

The PhD students of CELIA constitute a very positive team of young people. Informal links amongst the students, from different research groups, enhance the cohesion of CELIA and strengthen it as a "coherent" laboratory. However, the Committee believes that these students need increased opportunities to gain teaching experience at the University, since this will be essential for their potential academic careers.

The Committee noticed that the PhD students at CELIA include several women, but that a strong gender imbalance exists at higher levels. The director, the two co-directors and all research group leaders are men. This is not an unusual situation in laboratories of similar type, but the Committee recommends that the directors of CELIA pay close attention to this imbalance, and to developing a long-term strategy on how to improve it. The importance of a better gender balance for the dynamics of any creative environment can hardly be overestimated.

Mixed "sponsorship" can strengthen any laboratory, but also present challenges. In the case of CELIA, the University of Bordeaux I, CNRS and CEA support the research with different objectives. The directors now manage a laboratory where some members are encouraged to do leading research with pulses of attosecond duration and nano-Joule energy (HXUV), while others are expected to be leading regarding experiments with multi-kilo-Joules pulse energies and nanosecond duration (PEPSI), some work with single-shot lasers and diagnostics, while in the same research unit lasers are being developed for applications at MHz repetition rate (GOLF). This is clearly a great challenge, and not simplified by the fact that the three sponsors may expect different or even conflicting priorities from the directors of CELIA. The Committee finds that the directors of CELIA have managed this task very well so far, but it sees a potential risk of tension emerging if the objectives of the different activities are stretched too far apart without appropriate funding and relevant management (sub-) structure. The funding bodies and the Directors need to take appropriate measures to mitigate these risks as the laboratory is developing in the future.

The location of the recently established PEPSI group in the ILP building, far from the main part of CELIA itself represents a challenge. For the very positive development of CELIA as a "coherent" research unit to continue, it is important that adequate measures and resources be allocated to the PEPSI group to ensure close contact is kept with other teams in CELIA.

The two main lasers for in-house high-intensity research have been developed to be robust and reliable work horses for research. Their peak performance, however risks lagging behind current state-of-the-art femtosecond lasers. For example, the kHz Aurore lasers is not carrier-envelope phase stabilized, and the 10 Hz Eclipse laser is rather limited in pulse energy, compared to commercially available lasers at existing and emerging laser facilities. This might have been a strategic choice made in order to minimize laser down-time while maximizing scientific productivity in connection to the recent move to the new building, in particular considering the limited technical staff. The scientific productivity with these lasers is very good, but the directors are advised to consider appropriate upgrades in the not too distant future. Regarding lasers, and laser upgrades, the committee noticed that during the presentation of the perspectives for CELIA, a new "ALISE 2" facility was mentioned. The Committee finds this very interesting, but wants to stress that such a facility would require financial and human resources that are clearly beyond the level of the present CELIA. Steps in this direction should be well coordinated within the ongoing study regarding a French national strategy on high-energy laser facilities.

The Committee has noted that CELIA is now involved in two user access programs, one at the European level through Laserlab-Europe and the other one at the national level with the COLA platform and a joint call-for-experiment with LOA and CEA-SPAM. One of the originalities of this access program deals with the availability of XUV and X-rays secondary sources for applications. This is a real opportunity to attract new scientific areas and new users in the scientific community connected to high-power ultrashort pulse lasers. CELIA can play an active and triggering role in this development, which would further reinforce the justification for sustainable running cost and increased technical staff.

- Production results

A1: Number of lab members among permanent researchers with or without teaching duties who are active in research (recorded in N1 and N2)	31
A2: Number of lab members among permanent researchers with or without teaching duties who are active in research (recorded in N3, N4 and N5)	1
A3: Ratio of members who are active in research among staff members [A1/(N1+N2)]	97%
A4: Number of HDR granted during the past 4 years	4
A5: Number of PhD granted during the past 4 years	21
A6: Other relevant item in the field	

4 • Appreciation team by team and/or project by project

Team : Group on Optics and Femtosecond Lasers (GOLF)

Group leaders : E. Cormier and D. Descamps

	Past	future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1	1
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	2	2
N3: Number of other researchers (Forms 2.2 and 2.4 of the application file)		
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	2	2
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	3	3
N7: Number of staff members with a HDR or a similar grade	1	1

The GOLF group has a dual responsibility: to operate and develop the laser infrastructures to the benefit of physics experiments – also as a user facility; and to push laser science and technology. The Committee notes that both these responsibilities are carried out to a very high standard with a number of world-record results being obtained.

CELIA laser facilities are based on two homemade femtosecond Ti:sapphire lasers, Aurore and Eclipse, both using a Chirped Pulse Amplification (CPA) architecture offering laser pulses up to 170mJ at 10Hz or <10mJ at 1 kHz. The GOLF group conducts a range of cutting-edge studies on the physics of intense lasers based on titanium-sapphire technology, on Ytterbium doped fibers, and on optical parametric chirped pulse amplification. All these aspects have

been innovatively blended in the "SOLSTICE" laser project. Many other issues in laser physics are also explored: optical diagnostics, laser materials, stabilized oscillators and high finesse resonant cavities, novel architectures of large mode area optical fibers.

Since 2004, the GOLF group has launched a new programme aimed at studying laser systems based on double clad Ytterbium doped fibers. The group has succeeded in designing a unique, special fiber based on the new architecture referred to as "rod-type" fiber. This fiber has been implemented in different kinds of lasers and amplifiers, and has allowed the group to break several records in terms of laser specifications. One of the fiber laser systems developed by GOLF group provides now the heart of the Solstice project. The relevance and originality of the research is high, and the quality and impact of the result are very high, in particular in the field of the "rod-type" fibers.

The GOLF group has developed a new strategy for pulse compression in order to produce pulses shorter than Yb amplification bandwidth allows. It has developed several ultrafast femtosecond amplification setups implementing different techniques of dispersion compensation. This has allowed the group to demonstrate record breaking performances such as pulses of 1 µJ ~ 70 fs @ 1 MHz repetition rate. Also a new post-compression technique to generate sub 10 fs pulses at high energies has been proposed.

Research by the GOLF group has resulted in four families of patents, and to the launch of three spin-off companies: Novalase, Femlight (later renamed Eolite), and Amplitude Systèmes. The Committee notes the important economic impact of this activity, with about 50 direct jobs created up to 2009. In recognition of those efforts, CELIA was awarded two "Innovation awards" by the French National Institute of Industrial Property.

The GOLF group also has a very good publication record, with outputs in leading international journals and numerous invited and contributed talks.

The GOLF group is in charge of operating and improving the CELIA lasers, open to internal users, and to French users in the frame of the COLA program (Centre for Optics & Laser in Aquitaine) and European users through the Laserlab-Europe programme. The quality and stability of these partnerships are high and continue for more than 5 years. Also the group's participation in JRAs of Laserlab-Europe projects demonstrates its international standing as well as its effectiveness in solving some very important problems in the development of high intensity femtosecond lasers.

Team : The XUV group (HXUV)

Group leaders : P. Martin and E. Constant

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	2	2
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	5	5
N3: Number of other researchers (Forms 2.2 and 2.4 of the application file)		
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)		
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	2
N7: Number of staff members with a HDR or a similar grade	5	5

For a relatively small group, the HXUV group carries out a broad range of internationally recognised theoretical and experimental research on the interaction of ultrafast intense laser pulses with atoms and molecules, with

particular emphasis on high harmonic generation (HHG). They have a very good publication record, e.g. their pioneering work on polarisation gating is particularly highly cited. They are well embedded in European research and training networks and have strong links with other leading groups internationally, e.g. the NRC group in Canada.

The group has excellent facilities for experiments. The lasers used (Eclipse and Aurore) are reliable work-horses. But since they lack both CEP-stabilisation and few-cycle output they are not really state-of-the-art, especially for attosecond science research.

Despite this limitation, the experimental group has developed a very innovative research programme with the opportunity for world leadership in a number of emerging areas, e.g. high-energy attosecond pulses, ultra-high repetition rate HHG, VUV spectroscopy of molecular dynamics.

The group benefits from a mix of experienced scientists and very promising younger researchers who are being supported to develop their own research themes, e.g. extreme non linear optical spectroscopy "ENLOS".

A notable strength of the group is the close connection with the GOLF group. This has allowed the HXUV group to conduct experiments with cutting-edge laser technology. In particular, the demonstration of HHG at MHz repetition rate using the patented Yb-doped fiber laser developed by the GOLF group is a world-leading result that has the potential to become an important new research theme for the group. The Committee feels it would be prudent to take steps to ensure that this very fruitful collaboration is not eroded by the increased commitments of the GOLF group to laser maintenance for external users.

An exceptional feature of the HXUV group is the strong emphasis placed on developing applications of HHG. The infrastructure for applications is among the best in the world. The recently-opened access for external users has the potential to increase the external visibility of this activity and the laboratory in general and to lead to new scientific projects and collaborations. However, the Committee notes that this will need to be carefully managed in relation to the in-house scientific programme.

The theoretical part of the group is very productive with strong external collaborations. The work on improved computational methods for dealing with many-body problems is likely to gain increasing interest with the growing community focus on XUV ionisation, e.g. using accelerator sources. This suggests an opportunity for the future. The Committee noted, however, that there does not appear to be a very close connection between the theoretical and experimental work being conducted within the HXUV group. This is mitigated in part by strong external collaborations, but it may be advantageous, for example to find some more common ground. Also, the development of an in-house capability for "full-blown" modelling of HHG is likely to be beneficial in the future for guiding and interpreting experiments.

Team : X-ray Sources, Plasmas and Ions (SXPI)

Group leaders : H. Jouin and F. Dorchies

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	5	5
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	4	4
N3: Number of other researchers (Forms 2.2 and 2.4 of the application file)		
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)		
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	5	5
N7: Number of staff members with a HDR or a similar grade	4	4

SXPI is the group working on x-ray sources, plasmas and ions. The group has an experimental part working in the development of high repetition rate x-ray sources based in laser-plasma interactions, and also in the development of the necessary instrumentation in the 1-10 keV range. It is also involved in programs on the generation and characterization of high-energy density plasmas. There is some theoretical support inside the group itself. The research level of the SPXI group is excellent and of great international relevance. The group fits very well under the scope of CELIA, and it has good links with other groups of CELIA. It is also connected with two national consortia within the Institut Lasers et Plasmas with significant contributions in High Energy Density Physics (Warm Dense Matter) and in the Fast Ignition scheme.

One of the most prominent features of the SPXI group is the very good use they make of laser facilities external to CELIA. They participate as high level users in some of the most high-profile European and extra-European laser facilities. They are very active members when going to such facilities and bring with them many developments made at CELIA on targets and detectors. The experimental part of this group is very well embedded and very active in European research. They also make remarkably good use of the laser facilities at CELIA. The experimental group has a broad experience as a user of large scale facilities as well as in the participation in international collaborations on this.

The experimental possibilities of the SXPI group in-house at CELIA are very limited due to the limited peak power available. In this sense, an upgrade of ECLIPSE to, say, 1 Joule would open many doors and they could prepare - they are ready to do it - new relevant experiments “at home”. An upgrade of ECLIPSE would be very relevant for this group, but also relevant to other groups at CELIA.

The Committee notices that this group is concentrating its research activity on plasmas from solid targets. Its previously very fruitful activity on cluster targets, well connected to the theoretical part of the SPXI group, has surprisingly been terminated, possibly because of the limited size of the group and experimental possibilities, and also due to the European collaborations in progress on solid targets. Therefore, the theory activity in this group is not completely connected to the experimental part. The theorists seem to be more connected with other groups than with the experimental part of SPXI.

The Committee notices that the SPXI group appears to be lacking a dedicated and appropriately trained person who is responsible for in-house radiation safety. This might just be acceptable with the present laser. However, any upgrade of the ECLIPSE laser should be accompanied by an increased level of radiation safety measures.

Team : Preparation of PW Experiments and Integrated Simulations (PEPSI)

Group leader : L. Hallo

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	1	1
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	1	1
N3: Number of other researchers (Forms 2.2 and 2.4 of the application file)		
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)	1	1
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	2	2
N7: Number of staff members with a HDR or a similar grade	2	2

The PEPSI team has been recently created (mid 2008) with a dual mission to:

- act as reference scientists for experiments performed on the high-energy laser facilities in CEA – CESTA: ALISE, LIL and PETAL ;
- develop new physics programs, including laboratory astrophysics, to be partly developed on the high-energy laser facilities in CESTA.

It is a transverse team with most members being members of other scientific teams in CELIA and most of the PEPSI activities are pursued in collaboration with other groups inside CELIA, or other scientific teams in other laboratories.

The group has performed detailed studies on damages in dielectrics under laser irradiation relevant for the understanding of damages in large optics and for the characterisation of target debris in laser-matter interaction studies. Though undoubtedly interesting and worth being pursued, the Committee feels that these studies do no appear to fit closely with the main objectives of the group.

The PEPSI group takes part in several collaborative studies on various topics, including an experimental role in large scale laser facilities ; generation of energetic protons and applications, alternative techniques for fast ignition – hole boring and radiation pressure acceleration – new materials for cone and behaviour laws, plasma physics related to Inertial Confinement Fusion – thermal flux and self-generated magnetic fields. In addition, as reference scientists, the group took part in a few experiments performed on the ALISE facility in 2008 and 2009.

Because the PEPSI group has only been formed very recently, most of its publications are related to the studies on damages in dielectrics and formations of nanoparticles.

In addition to the previous scientific activities, PEPSI plays a very positive role in the context of ILP to prepare the use of PETAL. It took the responsibility of the group in charge of the definition of the diagnostics to be developed or adapted for LIL –PETAL experiments.

Clearly, the PEPSI group is not strong enough yet (it only has a few members and an increasing but limited experience on high-energy laser facilities) to act efficiently as reference scientists for future experiments on LIL and PETAL. The Committee feels that the group must be reinforced with additional high-level scientists and it should evolve to try and act as PI (Principal Investigator) on higher-energy laser facilities (e.g. LULI, RAL, Jupiter), and not only on ALISE. Fortunately, this process is already engaged with new positions being offered by CEA-DSM.

It will also be important for PEPSI to define a clear strategy concerning its future scientific activities. In addition to supporting external users, it should choose a limited number of specific topics as its own research program.

The proposed location of PEPSI in the ILP building close to the LIL – LMJ facilities, but far from the main part of CELIA itself definitely has advantages and drawbacks. It is very important for PEPSI to keep very close contacts with other teams in CELIA and in the national and international community. A particular effort should be made to maintain and develop these scientific links.

During the presentation of the perspectives for CELIA, a new "ALISE 2" facility has been mentioned. Discussions on a national strategy on high-energy laser facilities have taken place very recently and conclusions should be presented near the end of 2010. On this particular point, the Committee only wants to stress that such a facility would require financial and human resources that are clearly not at the level of the present CELIA.

Team : Interaction, Inertial Controlled Fusion, and Astrophysics (IFCIA)

Group leader : V. Tikhonchuk

	Past	Future
N1: Number of researchers with teaching duties (Form 2.1 of the application file)	2	2
N2: Number of full time researchers from research organizations (Form 2.3 of the application file)	8	8
N3: Number of other researchers (Forms 2.2 and 2.4 of the application file)	1	2
N4: Number engineers, technicians and administrative staff with a tenured position (Form 2.5 of the application file)		
N5: Number engineers, technicians and administrative staff without a tenured position (Form 2.6 of the application file)		
N6: Number of Ph.D. students (Form 2.7 of the application file)	5	5
N7: Number of staff members with a HDR or a similar grade	3	3

The IFCIA group has an excellent level of scientific production that ranges from astrophysics related problems and basic plasma physics to inertial fusion research and acceleration of charged particles by ultraintense laser pulses in plasmas. This scientific production testifies to the group's broad and successful research programme.

The results of these investigations have been published in major international journals (around 150 articles in the 2004-2009 period, 30 invited presentations at international conferences and 130 talks), are highly cited and have had a major impact on the international research community in laser plasma interactions.

The Committee noted in addition the extensive publication record in numerically oriented journals that highlights the excellent work by the IFCIA group in developing mathematical models and numerical simulation tools for laser plasma dynamics studies. The world leading "open" code CHIC developed by the IFCIA group provides an invaluable tool for non-military inertial fusion research. The committee also noted that the IFCIA group has brought innovative and important contributions to the investigation of the new promising scheme of shock ignition of a fusion pellet.

Members of the IFCIA group play a pivotal role in training students and young researchers in basic and in fusion oriented plasma physics, notable in particular is the Master course in Fusion Sciences at the University of Bordeaux 1 (42 internships in 5 years, 7 PhD defences in the period 2006-2008). Although most researchers are French and French trained, the IFCIA group has been able to attract foreign researchers and visitors, most notably its team leader. The group has also been effective in raising research funds both at the local, national and international level (20 contracts in the 2004-2009 period).

The IFCIA group plays a major role in the design of fusion targets and in providing state of the art theoretical support for the French and for the European inertial fusion programmes and the Committee fully recognizes the importance of the IFCIA group's contributions to the HiPER project. The IFCIA group acknowledges that the development of world leading inertial fusion studies will continue to represent its core research strategy in future years.

The Committee was highly impressed by the exceptionally high level of the scientific contribution of the IFCIA group and expressed high appreciation for the role this group plays within CELIA, for its standing in the national and international research arena in plasma physics and inertial fusion research, and for its role in training new researchers in view of very large scale strategic developments such as LMJ.

The Committee notes that the demonstrated expertise and international recognition of the IFCIA group in key areas concerning laser plasma interactions will be an invaluable asset in extending the group's, and CELIA's, collaboration with the ELI project.

The Committee expressed some concern regarding the pending retirement of two key scientists in the IFCIA group which might weaken the group's role in the French and European inertial fusion programmes and possibly reduce the very effective collaboration between CELIA and the University of Bordeaux 1 in terms of student training and of supervision of PhD research theses.

However, the Committee recognizes that the high scientific level and international visibility of the IFCIA group should make it easy for CELIA to attract a leading plasma theoretician at international level to replace the retiring staff and carry it forward for several years. It would be advisable that the recruitment procedure be initiated early, so as to ensure an optimal transition that would maintain the IFCIA group's leading role.

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

Nom de l'équipe : GOLF

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

Nom de l'équipe : XUV

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

Nom de l'équipe : SXPI

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

Nom de l'équipe : PEPSI

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

Nom de l'équipe : IFCIA

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+

The CELIA laboratory wishes to express its gratitude for the careful work of the evaluation committee, that resulted in a deep and extensive report, that brings to light thoroughly the strong and weak points of the laboratory. The committee has also expressed a number of precise recommendations, on gender balance, radio-protection, on the need for future scientific leaders in selected fields … that are highly relevant, and will be fully taken into account to the maximum extent of possibilities.

The laboratory direction wishes to state its complete agreement with the risk of tension underlined by the committee, that arises from the large scientific realm covered at CELIA, and from the somehow different priorities, as defined by University Bordeaux 1, CNRS and CEA. It is really up to the Steering Committee of CELIA, that brings together the representatives of the three establishments, to agree on joint objectives, and decide for the adequate amount of support to the laboratory, that will allow to mitigate these risks.

The laboratory has felt greatly honored by some of the comments on the activities of the various groups, with recommandations that will certainly be very helpful.
The specific case of the new PEPSI group deserves however a special comment. The creation of this group aims to create a bridge between University research on laser/plasma interactions, and research at CEA/CESTA, thus advancing towards a global Bordeaux node on high intensity and high energy density science, especially in view of the HiPER and LaserLab-Europe programs. This requires joint research programs, of interest to all partners ; such is the case of studies on laser damage, and more generally on behaviour of components in extreme conditions, an issue of major importance for Fusion for Energy. The laboratory takes good note however of the very relevant recommandation to focus on a limited number of research themes for PEPSI, in order to achieve international recognition in the years to come.

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