# Laboratoire d'astronomie - planétologie ( fusion du LATT laboratoire d'astrophysique Toulouse - Tarbes, du CESR centre d'étude spatiale des rayonnements et d'une partie DTP (laboratoire dynamique terrestre et planétaire)

Rapport Hcéres

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

Research Units Department

# AERES report on the unit:

## Laboratoire d'Astronomie – Planétologie

## Fusion du Centre d'Etude Spatiale des Rayonnements (CESR – UMR5187), du Laboratoire d'Astrophysique de Toulouse Tarbes (LATT – UMR5572) et partie du laboratoire Dynamique Terrestre et Planétaire (DTP – UMR 5562)

# under the supervisory authority of the following institutions and bodies:

## CNRS

## Université Paul Sabatier - Toulouse 3

Juin 2010

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

Section des Unités de recherche

# Rapport de l'AERES sur l'unité :

Laboratoire d'Astronomie – Planétologie
Fusion du Centre d'Etude Spatiale des Rayonnements (CESR – UMR5187), du Laboratoire d'Astrophysique de Toulouse Tarbes (LATT – UMR5572) et partie du laboratoire Dynamique Terrestre et Planétaire (DTP – UMR 5562)

# Sous tutelle des établissements et organismes

CNRS
Université Paul Sabatier - Toulouse 3

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

Juin 2010

# Unit

**Name of the unit :** Laboratoire d'Astronomie - Planétologie

**Requested label :** UMR

**No. in case of renewal :** UMR 5187, UMR 5572, UMR 5562

**Unit director :** Mr Jean-André SAUVAUD (CESR) – Mr Georges CEULENEER (DTP) – Mrs Sylvie ROQUES (LATT)

# Members of the expert committee

## Chairperson:

Mr Olivier LE FEVRE, Laboratoire d'Astrophysique de Marseille, Observatoire Astronomique Marseille-Provence

## Reviewers:

Mr Andre BALOGH, Imperial College, London

Mr Éric CHASSEFIERE, LATMOS, Université Pierre et Marie Curie, Paris

Mr Gerry GILMORE, Cambridge University, UK

Mr Yves GOUSSARD, École Polytechnique, Montréal, Canada

Mr Fred K.Y. LO, National Radio Astronomy Observatory, Charlottesville, USA

Mr Stephane PALTANI, ISDC Data Centre for Astrophysics, Genève, Switzerland

Mr Dominique POULIQUEN, Laboratoire d'Astrophysique de Marseille, France

Mr Dave ROTHERY, The Open University, Milton Keynes, UK

## Reviewer(s) nominated by the staff evaluation committees :

Mrs Nicole VILMER, CoNRS

Mr Hervé DOLE, CNAP

Mrs Ariane LANÇON, CNU

# Representatives present during the visit

## Scientific delegate representing AERES:

Mrs Edith FALGARONE

## Representatives of the institutions and bodies that supervise the unit:

Mr Alain MILON, vice-président du Conseil scientifique, Université Paul Sabatier

Mr Bernard DUPRE, directeur de l'OSU OMP, Université Paul Sabatier

Mr Jean-Marie HAMEURY, directeur scientifique adjoint à l'INSU

Mr Alain CASTETS, chargé de mission à l'INSU

Mrs Armelle BARELLI, déléguée régionale du CNRS

Mr Dominique BAKRY, correspondant du conseil scientifique de l'Université Paul Sabatier

Invited : Mr Yves LAGABRIELLE, président de la section 18 du CoNRS

# Report

## 1 • Introduction

- Date and conduct of the visit : 2 to 4 december 2009

The visit started on the morning of the first day with general presentations by the present directors of CESR, DTP and LATT in front of the committee and open to the whole staff, with a complete overview of her/his research unit and the main achievements over the past 4 years. It was followed by a presentation of the scientific project for the new research unit by the project organizer.

In the afternoon of the first day, presentations of the main science achievements were given by the group leaders from each research unit within each of the main research areas. For each research area, science prospects for the next years were presented by a spokesperson. The day ended with a closed session of the committee.

The committee split into 3 groups in the morning of the second day, for a visit of installations and to meet the staff scientists of 3 areas of research interests: (1) planetary geophysics and space plasmas, (2) the evolving Universe, and (3) signal image, solar and stellar physics and matter cycle. In the afternoon, the committee met the funding authorities, PhD students and postdocs, as well as the technical and administrative staff. Day 2 ended with a closed session of the committee.

Finally, the committee met the three persons in charge of elaborating the project for the new research unit in the morning of day 3. The visit ended with discussions by the committee to establish its conclusions and recommendations.

The general organization of the 3 days and the documents submitted ahead of the meeting demonstrated the high level of preparation of the components towards building a new research unit . The committee was able to interact with most of the staff, and received all the necessary inputs to conduct the evaluation.

- History and geographical location of the unit and brief description of its field of study and activities :

The evaluation was done in the context of the merging of the CESR, LATT, a large part of the DTP and a team of the Laboratoire Mécanismes et Transferts en Géophysique (LMTG), which will create the largest astrophysics laboratory in France. The committee has been presented with the achievements of each of the laboratories joining the new institute over the past 4 years, and has evaluated the project presented in support of the creation of the new laboratory. The 4 units are located in the Université Paul Sabatier Campus. LATT, DTP and LMTG are hosted in the "Belin" campus of the Observatoire Midi-Pyrénées, and CESR is at the "Roche" location, about 300m away. The main research areas of the new laboratory are: (1) Solar system, planetary geophysics and space plasmas, (2) Solar and stellar physics, (3) Cold Universe and matter cycle, (4) The evolving Universe: extragalactic and high-energy astrophysics, (5) Signal and image.

- Management Team :

LATT : Mrs Sylvie ROQUES.

CESR : Mr Jean-André SAUVAUD.

DTP : Mr Georges CEULENEER.

Project new laboratory : Mrs Sylvie ROQUES, Mr Jean-André SAUVAUD, Mr Michael TOPLIS.

- Staff (according to the dossier submitted to AERES) :

| | In the report | In the project |
|---|---|---|
| N1: Number of professors (see Form 2.1 of the unit's dossier) | CESR : 24<br>DTP : 6<br>LATT : 23<br>LMTG : 1 | 54 |
| N2: Number of EPST, *Établissement public à caractère scientifique et technologique* (Public scientific and technological institution) or EPIC, *Établissement public à caractère industriel et commercial* (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier) | CESR : 26<br>DTP : 6<br>LATT : 14<br>LMTG : 2 | 47 |
| N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier) | CESR : 4<br>DTP : 1<br>LATT : 2<br>LMTG : 3 | 10 |
| N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier) | CESR : 47<br>LATT : 23 | 73 |
| N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier) | CESR : 33<br>LATT : 6 | 39 |
| N6: Number of doctoral students (see Form 2.7 of the unit's dossier) | CESR : 23<br>DTP : 3<br>LATT : 14<br>LMTG : 1 | 41 |
| N7: Number of persons accredited to supervise research and similar | CESR : 38<br>DTP : 7<br>LATT : 23<br>LMTG : 2 | 71 |

## 2 • Assessment of the unit

- Overall opinion :

The constituent laboratories and teams each have been involved in many science projects, resulting in a high productivity in terms of refereed papers (more than 1800 in refereed journals 2005-2009). The science teams are well recognized at the national and international levels. The instrumentation program is strong, but the connection between instrumentation involvement and science return in a leadership position could be significantly improved. Overall, the constituent laboratories have made significant contributions to French Astrophysics and planetology, and represent an important pool of expertise and driving force for future projects.

The on-going merger will produce the largest astrophysics and planetology laboratory in France. The scientific project has been elaborated through discussions in several Scientific Themes grouping the relevant teams from each of the laboratories. While significant advances have been made to define this project, work needs to continue to come to a focused plan that is beyond a collection of the existing activities. It is important to identify a list of scientific priorities that would increase the scientific impact of the new laboratory.

The organization for the new laboratory has not been fully developed, pending the appointment of a new director. The appointment of a new director, who can provide a strong scientific vision, takes advantage of the existing strength of the merging components, and foster increased interaction and collaboration, will be crucial for leveraging the past investments.

- Strengths and opportunities :
  - High publication rate in each of the constituent laboratories. Most of the teams are among the European leaders in their fields.
  - Strong space and ground-based instrumentation expertise has been developed, with major contributions to leading space projects (Herschel/HIFI, Planck/HFI, Rosetta, Cluster, Stereo…) or VLT instrumentation (MUSE), and on-going participation to a number of design studies.
  - Sustained level of financing from national agencies (incl. CNES).
  - Strong collaboration network.
  - Excellent participation to higher education at all levels of the LMD.
  - The new laboratory will have the largest permanent staff in France, one of the largest in Europe. Combined with the high level know-how, the new laboratory will be well placed to participate in future large science projects.

- Weaknesses and threats :
  - The ratio of science return in a leadership position over the resources invested in instrumentation projects should be improved. Leadership in international projects could be increased significantly, in line with resources that will be available in this new laboratory.
  - The current science project can only be considered to be a first draft, that consists of little more than of a simple concatenation of projects from the founding laboratories. To come to a strong and positive plan with priorities will require significantly more focused interactions driven by the main scientific leaders. The global organization of the new laboratory is still to be defined.
  - Technical facilities and some office space need serious upgrading.

- Recommendations for the unit director :
  - Appointment of a new director, who can provide a strong scientific vision, takes advantage of the existing strength of the merging components, and fosters increased interaction and collaboration, will be crucial for leveraging the past investment to maximize the scientific impact of the new laboratory.
  - Focus resources on projects where there is a good opportunity for the laboratory to be leading a scientific activity (PI, co-PI, or strong co-I).
  - Science teams: Develop the science plan from the existing discussions for each of the science themes, with priorities. Identify working teams, with the leaders in each team, able to help define an ambitious science vision for the future. The involvement of the new laboratory in instrumentation projects should result from this plan, and should be fully supported by scientific teams associated to each instrument development.
  - Current management: Develop a strawman organization plan, including the identification of science teams and their leaders, the organization of the technical staff, and the policy for resource allocation, as a foundation for the new director to build upon. Develop in parallel, with the team leaders, a recruitment plan for researchers and technical staff, emphasizing a science-driven future planning.
  - Current management: Further develop the plan for the upgrade of facilities.
  - The above recommendations should be completed in a timely manner or otherwise risk to take a lot of time and energy from the staff, diverting them from focusing on the main science projects.

- Data on work produced for the report :

(see http://www.aeres-evaluation.fr/IMG/pdf/Criteres_Identification_Ensgts-Chercheurs.pdf)

| | |
|---|---|
| A1: Number of *produisants* (professors and researchers whose names appear in a minimum number of "publications" over a 4-year period) listed in N1 and N2 | CESR : 41<br>DTP : 12<br>LATT : 37 |
| A2: Number of *produisants* among the other staff listed in N3, N4 and N5 | CESR : 12<br>DTP : -<br>LATT : 12 |
| A3: Proportion of *produisants* in the unit [A1/(N1+N2)] | CESR : 0.95<br>DTP : 1<br>LATT : 1 |
| Number of theses for accreditation to supervise research defended | CESR : 7<br>DTP : 3<br>LATT : 2 |
| Number of theses defended | CESR : 30<br>DTP : 10<br>LATT : 26 |
| Any other data relevant for the field (please specify) | |

## 3 • Detailed assessments

- Assessment of work produced and scientific quality :

  - Relevance and originality of the research conducted, quality and impact of the results :

The main research areas cover some of the most active fields of international research today. Some of them are truly unique, while the bulk of activities are well connected to national or European research programs.

  - Quantity and quality of publications, papers, theses and other work :

The number of papers published in refereed journals is high, 1033 for CESR, more than 100 (estimated) from the part of DTP concerned by the merger, and about 700 for LATT. Many publications are with a first author outside of the research units, though; the level of citation is good.

  - Quality and solidity of contractual relations over time :

The number of contracts and grants with national and international agencies is at a good level. CNES is providing continued strong support to space activities. The contracts around ground based instrumentation could be improved in the future. The level of support from the ANR can be significantly improved.

- Assessment of the influence, appeal and integration of the research unit in its environment :

  - Number and reputation of the prizes and distinctions awarded to the unit members, including invitations to international events :

This is at a good level. Senior scientists are regularly invited at international conferences.

- Ability to recruit top-level researchers, post-doctoral and other students, especially foreigners :

CESR has maintained the scientific staff about constant over the past 4 years. LATT has seen an increase of the University staff, not sufficient to compensate the decrease in CNAP and CNRS staff, with less recruitments than the number of staff retiring. The capability to attract PhD student has remained excellent.

- Ability to obtain external financing, to respond to or launch calls for tenders and to participate in the activities of competitiveness clusters :

The level of financing coming from external sources is good. CNES is a strong contributor to the global budget. The committee notes a relative weakness of ANR financing and encourages the teams to apply for these high value grants.

- Participation in international or national programmes, existence of important collaborations with foreign laboratories :

The teams are participating in a highly satisfactory number of programs in large international collaborations, including consortia of institutes for instrumentation.

- Valuation of research and socio-economic or cultural relations :

There is little to report on. There are regular partnerships with high schools to present Astrophysics to students.

- Assessment of the strategy, governance and life of the unit :

  - Relevance of the unit's organisation, quality of its governance and internal and external communication :

The 3 components: CESR, DTP, LATT are well organized in their own right. In each of them the organization is clear. Communication could have been improved, especially while discussions on the merger were initiated.

The merger of these components is bound to succeed as the management and the staff has understood the motivation of the CNRS and University. The many discussions over the past months in preparation of the new project have made progress possible and it is clear that scientifically the merger is on the way.

The committee expresses a strong concern on the status of some of the technical facilities. Some seen during the visit are clearly outdated or not equipped at an adequate level. The committee recommends further developing a plan to modernize and relocate at a common location the technical facilities, including the associated budget, as a pre-requisite to seek funding. This plan should be motivated by the priorities in the overall science program.

  - Relevance of initiatives aimed at scientific coordination and the emergence and taking of risks :

Scientific activity has been boosted by the prospect of the merger into a new laboratory. While the 3 components had some level of scientific collaborations prior to this initiative, it is clear that the merger has triggered a number of scientific discussions around future projects. More long-term initiatives exist in the form of regular seminar activities, journal-club, and the invitation of visiting scientists. The committee encourages further developing these initiatives to be more visible at the national and international level.

  - Involvement of the unit’s members in teaching activities and in organising research in the region :

The members of the 3 components are strongly involved in higher education activities: the research-oriented Master ASEP (Astrophysique, Sciences de l’Espace, Planétologie, LATT responsible, 25 students/year), the research oriented Master STPS (Sciences de la Terre et des Planètes Solides, LMTG responsible, 10 students/year), the technology-oriented Master ATS (Astrophysique et Techniques Spatiales, CESR responsible, 20 students/year) and

Master TSI (Techniques Spatiales et Instrumentation, CESR responsible, 20 students/year), the Space Master (Master Européen en Sciences de l'Espace et Technologie, CESR co-responsible, 5 students/year), Licence professionnelle ITEC (Instrumentation et Tests en Environnement Complexe, CESR responsible, 20 students/year), Licence professionnelle MQM (Métrologie et Qualité de la Mesure, CESR responsible, 20 students/year), Diplôme Universitaire de Technologie Mesures Physiques (CESR co-responsible, ~230 students/year). There is a significant volume of lectures in the local engineering schools. The laboratories are members of the doctoral school "Sciences de l'Univers de l'Environnement et de l'Espace" and the doctoral school MITT (Mathématiques, Informatique, Télécommunications de Toulouse).

- Project assessment :

  - Existence, relevance and feasibility of a medium- or long-term scientific project :

The build-up of a scientific project for the new institute is well underway, the result of numerous interactions prompted by the upcoming merger. The project presented seems to be at this stage more the result of a concatenation of projects rather than a real identification of the most promising research areas, with the hierarchy of priorities remaining to be done. This will involve a vision for the future which would be best defined from a collegial work coordinated by the scientific leaders of the new institute. The committee recommends to the current and future management to identify and encourage leadership to define this vision. It recommends organizing the discussion around the future project based on existing reviews, the identification of strengths and weaknesses, the availability of resources. The connection to major programs of international agencies like ESA Cosmic Vision or ESO ALMA and EELT should be strongly encouraged. This should lead the laboratory to an even higher level of participation in national and international projects, aimed at a strong science return.

The main concern lies in the current lack of planning for the new laboratory organization. This has somehow been postponed in anticipation of a new director being recruited and leaving to her/him the task to lead the reorganization. While this may sound legitimate, the impact on the staff has been significant, as there is a general feeling of uncertainty about the future, with many staff members worried. As the merger has been imposed by the tutelles, there is only moderate excitement about creating the new laboratory, and the lack of planned organization means that the uncertainty will last. The committee considers that this issue should be treated carefully but urgently, with the development of a baseline organization around the different scientific themes, and for the technical staff, done in collaboration with the staff. This should include plans for upgrading technical facilities and offices, and finding a solution to host together the researchers and the technical platforms of the new planetary geophysics and space plasmas group. This strawman organization will form the basis upon which the new director will be able to successfully build the new institute structure in a timely fashion with the support of the staff.

The science project will be made possible if the level of funding and the numbers of permanent staff are sustained over the next years. The committee expresses a strong concern about the replacement of key expertise when staff members retire, especially for highly skilled engineers and technicians. The committee recommends that the management develop a multi-annual recruitment plan for research and technical staff, listing the critical skills that are at risk and developing new skills. This will help motivate manpower allocation from CNRS and the University, and will support young scientists as they apply to the national or University concourses. The committee notes the increase over the years of temporary staff, both at the scientific (postdocs) and technical levels (CDD), linked in particular to the funding from ANR contracts. While the committee finds that the current ratio of temporary over permanent staff is reasonable, it recommends implementing specific management of this important resource.

The search for a new director is particularly important in the context of building a new laboratory of such a large size. The committee considers that the procedure followed up to now risks finding only a few candidates, and therefore encourages a wide advertising of this position. The legitimacy and support from the staff crucial for success of the new director will be linked to the perceived openness and fairness of the procedure.

  - Existence and relevance of a resource allocation policy :

The allocation of resources varies greatly between the existing components, particularly for the technical staff. For the new laboratory to work properly, a clear and uniform policy for resource allocation will need to be defined.

- Originality and risk-taking :

The science activities are defined in the context of national and international priorities. The originality lies in the different methods combined to produce research results. Risk taking is apparent in the involvement in space missions: with a small number of missions developed by space agencies, some missions currently under study will not continue. The CESR has taken the approach, as many other leading space laboratories, to invest into several projects in parallel, knowing that only a few will succeed in the selection process. The committee considers that this is perfectly legitimate, but recommends maintaining a careful staff management to explain the global strategy, and reassure staff members when down selection occurs, as for the Simbol-X cancelation.

## 4 • Team-by-team and/or project-by-project analysis

Because of the merging of several different units into a single one, we have made the choice to produce this analysis for each of the main research themes which have driven the work of the combined staff in preparation of the research project of the quadrennial plan. As the new laboratory is being created, the organization and the leaders of science teams are not identified. We have indicated the name of the person who presented the project to the committee, as well as the names of the people who presented the results In most cases.the lines N4 and N5 of the Tables are not documented because the vast majority of the engineers and technicians do not belong to a team (or a theme) but to the research unit as a whole.

### Name of the team : Theme "Cold Universe / Matter cycle"

### Name of team leader : presented by Mrs Ch. JOBLIN, results presented by Mr A. WALTERS

- Team staff or staff allocated to the project (according to the dossier submitted to AERES) :

| | In the report | In the project |
|---|---|---|
| N1: Number of professors (see Form 2.1 of the unit's dossier) | 6 | 6 |
| N2: Number of EPST, *Établissement public à caractère scientifique et technologique* (Public scientific and technological institution) or EPIC, *Établissement public à caractère industriel et commercial* (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier) | 8 | 8 |
| N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier) | 3 | 3 |
| N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier) | | |
| N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier) | | |
| N6: Number of doctoral students (see Form 2.7 of the unit's dossier) | 8 | 8 |
| N7: Number of persons accredited to supervise research and similar | 9 | 9 |

- Analysis :

The current activities in the Cold Universe areas of research at the CESR have developed around the following projects: Planck, Herschel, PILOT, Laboratory Astrophysics (PIRENEA) and the CASSIS software. The group has a number of visible responsibilities in major international missions: co-PI on Herschel/HIFI with the concept and the realization of the high resolution spectral correlator, co-I on Planck/HFI with the realization of the readout electronics and electric architecture of the instrument. It is also part of the Instrument Control Center of HIFI, PI of the sub-mm balloon-borne experiment PILOT, and has the responsibility of several work packages on the Planck mission. This heavy involvement at the technical mission levels leads to a general impression that the main emphasis and accomplishments have been more on the technical capabilities and instrumentation than the underlying science.

The PIRENEA experiment has been built to study the formation and destruction of polycyclic aromatic hydrocarbon (PAH) molecules, how they evolve under interaction with UV radiation, electrons and gas under interstellar conditions, their relationship with very small dust grains and their charge state. This is all very important for understanding the origin of the unidentified band emission in mid-IR spectra of galaxies. The PIRENEA instrumentation is among a few facilities in the world capable to measure mass spectrometry of photodissociation products of very small grains under conditions approaching those in interstellar space. The interplay of the laboratory work and IR (and mm/submm) observations is at the forefront in this field, a clear scientific strength at CESR. Attention should be given to maintaining and increasing its scientific impact.

The planned project of Matter Cycle will involve largely the existing efforts within CESR, plus the exoplanet research effort currently within LATT. There appears to be no dramatic shift in direction or new activities planned following the merger within the new laboratory, except that the instrumental efforts previously devoted towards Planck and Herschel would presumably shift towards the next IR mission of SPICA. Hoewever, the team should also focus on the scientific exploitation of the IRAM-Plateau de Bure Interferometer (PdBI) and its extension to 6 x 15m telescopes, as well as of ALMA, which is fully funded and will become scientifically operational by 2013 (Early science late 2011,) and is fully accessible to the French astronomy community. Some clearer emphasis and plan on the use of ALMA in the future scientific activities of the Matter Cycle theme would be important. In this context, a plan to expand the expertise and experience in the use of ground-based radio interferometry within the group would be beneficial.

Overall, a sharper focus on scientific issues that the group may be particularly able to address would raise the scientific visibility and impact of this very strong group internationally.

- Conclusion :

  - Evaluation :

This group has built solid technical expertise leading to the participation of world-leading space missions. Technical contributions on mission payloads (Herschel, Planck) are clearly world-class. While developing the instrumentation, the scientific output as leaders of science papers has been modest, although the team participated in a number of papers, for a high total number. It is expected that the scientific rewards for this heavy technical involvement should naturally follow.

  - Strong points:

Strong group well identified at the international level from its technical contributions to space missions. Forefront activities in laboratory studies of PAH molecules.

  - Weak points:

Science exploitation of existing facilities needs to be improved in the mid-term to diversify and minimize risk related to the participation in future missions.

  - Recommandations :

The team should capitalize on its instrumentation leadership to obtain the leadership of forefront science programs. It should organize and prepare itself for the scientific exploitation of Herschel and Planck, possibly reinforcing the team with new staff with a more focused astrophysical motivation.

Prepare for the use of ALMA in addition to IRAM-PdBI, as a mid-term goal before SPICA.

Name of the team : Theme “Planetary Geophysics and Space Plasmas”

Name of team leader : presented by Mr Ph. LOUARN, results presented by Mr Ph. LOUARN, Mr P. PINET and Mr J. INGRIN

- Team staff or staff allocated to the project (according to the dossier submitted to AERES) :

| | In the report | In the project |
|---|---|---|
| N1: Number of professors (see Form 2.1 of the unit's dossier) | 11 (CESR)<br>4 (DTP)<br>1 (LMTG) | 15 |
| N2: Number of EPST, *Établissement public à caractère scientifique et technologique* (Public scientific and technological institution) or EPIC, *Établissement public à caractère industriel et commercial* (Public industrial and commercial institution) researchers (see Form 2.3 of the unit’s dossier) | 10 (CESR)<br>9 (DTP)<br>3 (LMTG) | 20 |
| N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit’s dossier) | 3 (CESR)<br>4 (DTP)<br>3 (LMTG) | 10 |
| N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit’s dossier) | 14 (CESR) | 14 |
| N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit’s dossier) | 13 (CESR) | 13 |
| N6: Number of doctoral students (see Form 2.7 of the unit’s dossier) | 14 (CESR)<br>10 (DTP)<br>1 (LMTG) | 25 |
| N7: Number of persons accredited to supervise research and similar | 15 (CESR)<br>7 (DTP)<br>2 (LMTG) | 24 |

- Analysis :

The research activities on the solar system have been regrouped in the theme entitled "Géophysique Planétaire et Plasmas Spatiaux" (GPPS). This theme, regrouping more than one third of the scientists of the new laboratory, results from the fusion of two teams of the CESR (space plasma, planetology), the planetary science component of the DTP, and a small group of Earth scientists from LMTG. The group from CESR, strongly involved in the provision of space hardware, is specialized, on one side in the study of ionized and magnetized environments of planets from in situ plasma ion and electron measurements, on the other side in the characterization of the composition of planetary surfaces by high energy spectroscopy. The scientists of DTP study planetary and small body surfaces, including the Moon, from space imaging data and laboratory measurements of scattered light properties, and deep Earth through seismology. The small group from LMTG has a strong experimental component dedicated to the study of the behaviour of geomaterials at high pressures and water inside Earth mantle.

The scientific production rate of the researchers involved in the theme during the last four years is of 2.5 refereed papers per year and per researcher, and is nearly equally distributed between the different components. The number of PhD thesis, either defended or ongoing, approaches one per researcher. The CESR group is deeply involved in space missions, through the provision of instruments, with a well-established leading role at world level in ion and electron spectrometry of ionized environments (Cluster, Demeter, Stereo, Mars and Moon orbiters, Cassini, Rosetta, BepiColombo, Maven, Juno) and a potentially major emerging role in the characterization of planetary surfaces (past and ongoing Mars missions, ChemCam on NASA’s Mars Surface Laboratory). In the field of ionized environments, this group has developed a number of complex numerical simulation codes (Transcar, IMMŠ), widely used by the French community for the interpretation of Earth and planetary space environment data. The involvement of both CESR and DTP groups in the scientific interpretation of space observations makes this theme visible at international level.

The high-level expertise of the LMTG component in laboratory experimental studies, with a number of specific experiments devoted to the study of mineralogical processes, and the implementation of a Venus environment simulation chamber, all devoted to understanding the formation and evolutions of planetary surfaces and interiors, is a key motivation in the new laboratory, including potential synergies with the seismology team of DTP. In the frame of the "Observatoire Midi-Pyrénées", DTP has the responsibility of several "Service d'Observation" in the field of seismology and geodesy, and CESR is in charge of the CDPP in the field of plasma physics.

The solar system department from CESR is a world-class group, known both for the quality of the instrumentation flown on numerous space missions and, increasingly, for the very high quality of its scientific output in the field of space plasma physics. The general increase in scientific output can be attributed to both the success of the space missions to which the Department has contributed (a return on investments made over the past two decades) and also the recruitment of an excellent young group of scientists who have already acquired a high international reputation. The department was for several decades at the forefront of space plasma instrumentation. However, in some cases in the past, the main scientific discoveries arising from the missions to which CESR contributed vital instruments were not fully exploited locally and led to an impression of the department as a mainly hardware-oriented group, even if much in demand for their excellence in this domain. However, the change from a relative lack of scientific recognition to a much wider recognition of the CESR contribution to science as well as to instrumentation has clearly been achieved over the past decade, primarily due to the department's participation in ESA's Cluster and NASA's Cassini missions. The group is currently building instrumentation for NASA's Magnetospheric Multiscale (MMS) mission and for ESA's BepiColombo to Mercury. These contributions, covering the next decade, should be equally fruitful in maintaining the scientific output. It is noted that there are internationally respected senior figures in the field in this department and the present excellence and the future prospects of the department are largely due to their efforts.

The new department should be encouraged to remain open to instrumental participation in other missions. The department's experimental expertise is much in demand and this should be regarded as a real asset rather than a distraction. Occasional minor 'opportunity' participation can be used to develop technical capabilities that are then more fully exploited in projects in which the department takes a lead role. Correspondingly, the department's ability to remain at the forefront of space plasma instrumentation should be encouraged and supported with the development of a new, younger generation of technical/engineering staff. This should involve acquiring new skills, rather than simply replacing the skills adapted to the previous generation of instrumentation techniques.

The Centre de Données de Physique des Plasmas (CDPP) is identified as an excellent facility. It is genuinely a research tool for scientists, rather than a data depository. Initiated by the need to establish a data centre for the then forthcoming Cluster mission, the concept and the informatics have been developed and widened to include a range of products from many space mission and even ground facilities. It is noted that the motivation and direction for the CDPP have always been scientific and this has enabled the centre not to degenerate to simply a sophisticated Information Technology (IT) empire. It is a very useful and much used national facility, closely linked with equally well-run facilities internationally.

The planned project is scientifically focused on the understanding of the formation and evolution of planets, with six topics covering the numerous science fields addressed by the different groups joining the theme, from planetary cores to the heliosphere. Several transverse themes, like planetary water cycle, inner-outer magnetism, surface/plasma interactions are planned to be addressed. As an example, a focus is put on Mars, where the interplay of atmospheric escape and surface processes could have determined the climatic evolution of the planet.

The grouping of planetary/solar physicists, geochemists and geophysicists within a single team is a major strength, making this group unique in France, and probably in Europe. The interdisciplinary scientific potential of the team is huge, and the thought must be pursued and should materialize at mid-term in a few, more detailed, research axes in preparation of the interpretation of future data (e.g. ChemCam for Mars). The committee has noted the strong willing of the different components of the GPPS group to be "together" as soon as possible. A grouping of laboratory experiments (LMTG, DTP) within a single platform, with adequate technical support, close to researchers, is seen by the committee as a major element for the success of the fusion. For space experiments, a major challenge will be to maintain the technical staff at the minimum level required to honour commitments on future missions (Solar Orbiter, EJSM, Exomars…), which requires that several "IR" are urgently recruited. The future development of planetary seismology, with the planned participation to lunar and martian networks, will similarly need to be supported.

The enforced break-up of DTP clearly hit that group hard ("Notre petite UMR est touchée de plein fouet par cette redefinition des contours" UMR 5562 Bilan) but the group members seem to have accepted the situation. We understand that each DTP team was allowed to choose whether to join the new astrophysics laboratory or the "pôle" Sciences de la Terre et Environment (STE). It is entirely appropriate for Equipe Surfaces Planetaires to join the new laboratory. The Equipe Geodesie Spatiale has experience in mapping the gravity field/geoid of Mars and various small bodies which would have been an asset for the new laboratory, but, as they joined STE, collaborations should be encouraged. The Equipe Sismologie Déformations Continentales has elected to join the new laboratory, although their experience has been very largely (entirely?) confined to studies of the deep Earth and providing a valuable regional seismic monitoring service. The small likelihood of this team being able to contribute to future seismic studies on the Moon or Mars (Campagne d'évaluation 2011-2014, page 27) seems an insufficient reason for this group to join the new astrophysics laboratory rather than STE, and therefore their project needs to be matured. Equipe Pétrologie et Modélisation specialises in magma chamber processes and melt extraction. It is appropriate that the petrology part of this team has chosen to join STE, but we hope that the interface between STE and astrophysics will be sufficiently permeable to encourage collaboration with former members of LMTG in such areas as small body melting, core formation and melt migration.

- Conclusion :

  - Evaluation :

The Solar system team from CESR is a strong group, and has produced a large number of papers, linked to their strong role in instrumentation around electron and ion detectors. Their skills at instrument making are world-class, this is a strength to anticipate participation in new projects. The interpretation of these data has become very good, supported by the hiring of young scientists, and benefits from an increased activity in numerical simulations and theory. With the PI or co-PI-ship of a few well-focused world-class missions this team remains a European leader, one of the top few world-class groups. The team from DTP has a good level of publication, a good national and international standing with state of the art seismology surveys. The joining of the LMTG group will bring a great expertise for laboratory experiments, important to interpret ChemCam data. The proposed merger with space scientists working together with geologist will therefore be quite unique in Europe. This team is expected to successfully continue to develop its expertise in planetary science to remain world class.

  - Strong points :

The merging of the 3 different groups will build a very strong team at the international level, linking space physics and planetary geophysics. There will be real opportunities to bring together different techniques for enhanced scientific exploitation. This will give the new laboratory an improved potential to participate in major planetary missions.

  - Weak points :

The main risk would be to only concatenate the different teams without a real add-on value. The new team will need to further develop/refine its projects to optimize the contribution to space projects.

  - Recommendations :

    - The teams within this theme are encouraged to increase their level of scientific leadership, beyond their recognized technical expertise.
    - Strong technical support should be given to the technical platform resulting from the grouping of the laboratory experiments from DTP and LMTG. Physically moving the technical hardware would be an important element for the visibility and efficiency of this technical platform.
    - Maintaining at a high level the number of technical staff expert in space hardware at CESR is considered as a necessary condition to the success of the new laboratory.
    - Where sensible, focus on projects where leadership of the team is ensured.

Name of the team : Theme “Solar and Stellar Physics”

Name of team leader : presented by Mr RIEUTORD, results presented by Mr F. PALETOU

- Team staff or staff allocated to the project (according to the dossier submitted to AERES) :

| | In the report | In the project |
|---|---|---|
| N1: Number of professors (see Form 2.1 of the unit's dossier) | 8 | 8 |
| N2: Number of EPST, *Établissement public à caractère scientifique et technologique* (Public scientific and technological institution) or EPIC, *Établissement public à caractère industriel et commercial* (Public industrial and commercial institution) researchers (see Form 2.3 of the unit’s dossier) | 8 | 8 |
| N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit’s dossier) | 6 | 6 |
| N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit’s dossier) | | |
| N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit’s dossier) | | |
| N6: Number of doctoral students (see Form 2.7 of the unit’s dossier) | 9 | 7 |
| N7: Number of persons accredited to supervise research and similar | 4 | 4 |

- Analysis :

There have been three groups working on solar/stellar physics, both observational and numerical modelling, in LATT, which are to be combined in a single new larger group. The new larger group is a natural development of present activities and strengths, will strengthen the team, and is to be recommended. Previous and current activities include ground-based solar imaging, dedicated to observational studies of kinematic flows and their analysis, stellar physics focused on stellar magnetic activity and magnetic cycles in sun-like stars, and a complementary activity related to astrophysical fluid dynamics numerical simulation and analysis. The three activities are comparable in number of people and level of effort, and form a natural and well-balanced new group. Their past success, their balance of interest and expertise, and their focus, make the new grouping a natural extension which is likely to lead to continuing success and productivity. The level of scientific production in refereed science papers is excellent with 325 papers for 18 scientists over the period.

Observationally, the focus on solar high-resolution imaging at Pic du Midi is an effective use of a local resource. This work has the potential to continue to deliver valuable science at small cost from a local resource. The observational focus on stellar magnetism is based on the excellent specialist instruments (NARVAL and ESPADONS) now operational at Telescope Bernard Lyot (TBL) and Canada France Hawaii Telescope (CFHT) respectively. The group is one of very few internationally active in the subject, and now provides the international leadership held for so long by the H-K project at Mt Wilson. The natural timescales of stellar magnetic activity are, as in our Sun, decades, so stable and focused effort at minimal operational cost is essential. The teams have done well in the past, and their focus on a future dedicated project-based use of resources at TBL is an intelligent and cost-effective way forward.

The integration of a strong theory group, together with the natural complementarity of solar and stellar studies, is a very substantial strength of the research team, making it viable and robust. Extension to more astrophysically topical magnetic activity in younger stars, where magnetic spin-down is arguably the dominant evolutionary process, indicates a scientifically robust future for a productive and well-balanced team. They merit continuing support, and a long-term commitment of dedicated access to what should become the local project-specific observational capabilities of the observatory.

The team maintains the highly-regarded BASS2000 solar database, a valuable national database, and the only archive in France of solar data from the THEMIS instrument and other ground-based instruments (e.g. CALAS, the coronograph at Pic du Midi, the Nançay Radioheliograph), with link to the VO. It has also developed a prototype for the data of stellar spectro-polarimetry from ESPADONS and NARVAL. It is entirely sensible to locate databases in close physical integration with the scientific users of such data, to ensure the archives remain focused on research needs, and deliver what the science users want. The future local Toulouse databases should continue to be developed in the VO context. The current expansion of the activity in the "Bigorre astronomical data center" beyond the solar data needs to be further developed, to identify the rationale, and the needed resources.

- Conclusion :

  - Evaluation :

The past achievements identified the different groups as important players at the international level. The fundamental studies of stellar magnetism have made this group dominant internationally. The group on stellar and solar fluid dynamics and the group on high-resolution wide field imaging of the Sun are internationally renowned. The new team will form a coherent group, addressing broad stellar and solar physics topics, from observational and theoretical perspectives, one of the few groups in the world with such a broad expertise.

  - Strong points :

Balanced combination of observational and theoretical approaches. There is a real opportunity for an important contribution to emerging new topics linked to the interaction between stars, accretion discs and planets, in the framework of understanding stars and planet formation.

  - Weak points :

The team should avoid spreading over too many small scale projects, which would minimize the global impact. The insertion of new data in the BASS2000 database needs to be better defined in the VO.

  - Recommendations :

    - Identify a list of science priorities. Define the organization of the team, coordinated by a team leader, around these priorities.
    - The extension of the BASS2000 databases beyond solar data needs to be better defined in its goals and resources. Developments should continue to be done in the context of the VO tools and protocols.

Name of the team : Theme “Evolving Universe”

Name of team leader : presented by Mrs Roser PELLO, results presented by Mrs G. SOUCAIL and Mrs E. JOURDAIN

- Team staff or staff allocated to the project (according to the dossier submitted to AERES) :

| | In the report | In the project |
|---|---|---|
| N1: Number of professors (see Form 2.1 of the unit's dossier) | | 20 |
| N2: Number of EPST, *Établissement public à caractère scientifique et technologique* (Public scientific and technological institution) or EPIC, *Établissement public à caractère industriel et commercial* (Public industrial and commercial institution) researchers (see Form 2.3 of the unit's dossier) | | 8 |
| N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit's dossier) | | 8 |
| N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit's dossier) | | |
| N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit's dossier) | | |
| N6: Number of doctoral students (see Form 2.7 of the unit's dossier) | | 15 |
| N7: Number of persons accredited to supervise research and similar | | 21 |

- Analysis :

The CESR is a world-wide leader in space-based instrumentation dedicated, in particular, to the study of astrophysical X-ray and gamma-ray sources. LATT has been participating in the search for very distant galaxies, in major faint galaxy surveys and is leading 3D spectroscopic investigations at high redshifts. A team at LATT is working on the measurement of cosmological parameters. All these activities have been presented under one theme, an attempt towards a future organization in the new laboratory.

The field of galaxy formation and evolution is very active. Remarkable progress has been made in the understanding of galaxy evolution: using the VVDS (VIMOS VLT Deep Survey) and the zCOSMOS surveys, researchers at LATT have measured the evolution of the mass-metallicity relation to redshifts z~1.5. The group is leading the MASSIV survey using the velocity fields of galaxies at $1<z<2$ from 3D spectroscopy to quantify the main processes driving galaxy assembly. Another component of LATT is actively pursuing the search for the first galaxies approaching the reionisation era. These activities imply heavy observational and data processing loads, and are carried-out in the framework of large international collaborations. The group at LATT is involved in the preparation of large programs based on the guaranteed time associated to instrument developments: MUSE (VLT) and EMIR (Grantecan), which ensure a continuity of activities. The proposed connection between activities around galaxy evolution and the physics of compact objects with the emergence of black holes in the early phases of galaxy formation is to be encouraged, but a well thought-out plan has to be developed to avoid unnecessary dispersion. There is a perceived lack of involvement in the longer term perspective of the future generation of large facilities which will bring new insight in this subject, either in space or on the ground.

In the field of high energy astrophysics, a number of remarkable achievements have been produced, in particular the 511keV map of the Galaxy with SPI/Integral tracing the annihilation sites of positrons, likely to be due to supernovae and possibly linked to dark matter. In the past, the emphasis has been put on hard X-ray and gamma-ray telescopes, with, for instance, very important contributions to Granat/Sigma and INTEGRAL/SPI. With some 15-20 permanent researchers, the high-energy astrophysics group at CESR also has the potential to be a significant player in the scientific exploitation of these missions. There are several scientists with a world-wide visibility, both on the science side and on the technical side. It therefore seems very important that this high level of technical expertise be used in areas where significant scientific potential and leadership are present.

The CESR is now confronted with a difficult period for high-energy astrophysics in space, with only few launch opportunities for new missions. Simbol-X was the only European mission over the 2010-2019 period that could involve a large fraction of the European high-energy astrophysics community. There was a significant involvement of the CESR in this project, but it has unfortunately been canceled by CNES, leaving a lot of disappointment and a significant waste of resources. On the technical side CESR is now mostly involved the French-Chinese mission SVOM, but this mission is mostly an opportunity mission, with a rather limited involvement of the CESR in its main science goal, the study of gamma-ray bursts. There's more interest in the project at LATT, but this science theme seems overall largely underrepresented at CESR/LATT compared to the scale of the technical developments at CESR.

Because of the need to preserve both the technical and scientific capabilities of the CESR, it is important that scientists at the CESR keep pushing for new projects to be developed with the different space agencies, putting the science case at the forefront as a key element of mission selection. In this respect CESR's detector project for the International X-ray Observer, HTRS (High Timing Resolution Spectrometer), is exemplary. The scientific return to the new laboratory must be at the level of the technical involvement. This requires a project organization with a proper balance between technological developments and science analysis, fostering a real long term synergy.

Another consequence of the strong focus of the CESR in the development of new space missions is that only few scientists are present in the on-going science exploitation of some very successful missions, in particular XMM. There is therefore a need to use different facilities to diversify data sources necessary to conduct science projects. For instance, should the HTRS instrument for any reason be taken out of the IXO mission, there's a risk for the CESR to be almost completely absent from the next major high-energy astrophysics mission. Some activities are being developed towards very high energies, with participation to the Fermi mission and possibly to the Cherenkov Telescope Array (CTA). Here again, it seems difficult to achieve the required critical mass to make the new laboratory a significant player at the institute level rather than at the individual level. In the case of CTA, this can prove crucial, as the community is presently organizing itself very aggressively in order to share the responsibilities in the development.

A number of activities are on-going in the field of Cosmology and fundamental physics, towards the measurement of cosmological parameters, the understanding of dark energy and dark matter. These activities are supported by a University grant ASPHON, for high level seminars, a postdoc and a PhD student. This group is taking interesting approaches to cosmology, but is restricted in its activities by the small number of researchers concerned, which in the end implies only a modest contribution to the field at the national level. There is a general lack of participation to the large programs of the discipline aiming at dark energy and dark matter, this is a strong concern for the future of this activity.

The diversity under this Theme is certainly a richness to build upon, while at the same time making sure that the research is focused on a reasonable number of leading programs. The proposed merging between the high energy group at CESR, the cosmology, and the evolution of galaxies groups at LATT in a single group called 'Univers en évolution' is certainly tantalizing; however, in view of the very diverse subjects, there is a risk that the envisaged collaboration would lack coherence and focus. While it could be argued that the worst case scenario would be a status quo, the fact that the current groups have quite different sizes poses the question of the long-term survival of the smallest groups and on the way priorities of the new group will be decided.

- Conclusion :

  - Evaluation :

This theme concatenates a number of different topics, making it a very rich environment. Results are at a good national and European level. The publication level and impact is excellent, boosted by the participation as co-investigators of large programs. The project proposed needs to be more focused. Members are leaders of a few programs, and are more frequently solid partners in international collaborations.

  - Strong points :

Leadership is present in a few areas, which are driving forces for the future: the search for the first galaxies, chemical and dynamical evolution of galaxies, compact sources.

  - Weak points :

The richness in research topics results in spreading efforts on too many small research topics without enough critical mass to make an important impact. The participation in next generation large programs and facilities in a leading position is currently weak. The organization of a future team around this large theme is yet to be defined.

  - Recommendations :

    - The newly formed team should better identify priorities on which to concentrate efforts, in particular those for which there is the opportunity to be a leader.
    - The different groups in this theme should identify a team organization and leaders to coordinate the various activities.
    - It is recommended to motivate the next generation of technical programs on well formulated scientific questions, and work to develop the expertise necessary towards proposing or participating in future programs.

Name of the team : Theme “Tools for Astrophysics”

Name of team leader : presented by Mr H. CARFANTAN

- Team staff or staff allocated to the project (according to the dossier submitted to AERES) :

| | In the report | In the project |
|---|---|---|
| N1: Number of professors (see Form 2.1 of the unit's dossier) | 7 | 5 |
| N2: Number of EPST, *Établissement public à caractère scientifique et technologique* (Public scientific and technological institution) or EPIC, *Établissement public à caractère industriel et commercial* (Public industrial and commercial institution) researchers (see Form 2.3 of the unit’s dossier) | 2 | 2 |
| N3: Number of other professors and researchers (see Form 2.2 and 2.4 of the unit’s dossier) | 1 | 1 |
| N4: Number of engineers, technicians and tenured administrative staff members (see Form 2.5 of the unit’s dossier) | 16 (of which 15 GIGT) | 1 |
| N5: Number of engineers, technicians and non-tenured administrative staff members (see Form 2.6 of the unit’s dossier) | 2 | 0 |
| N6: Number of doctoral students (see Form 2.7 of the unit’s dossier) | 12 | 6 |
| N7: Number of persons accredited to supervise research and similar | 5 | 5 |

- Analysis :

The theme “Tools for Astrophysics" includes image and signal processing as well as the GIGT supporting the development of ground based instrumentation.

The image and signal processing team is a team of 8 permanent staff which has existed in its present form since 2003. Its goals are to significantly contribute to astronomy projects carried out in LATT or more generally in OMP, and carry out quality research in generic signal and image processing (SIP) with national and international recognition. While its focus on generic SIP makes it one of two such teams in France (the other one being with the laboratoire Fizeau, Nice), it shares the goal to support astrophysical data analysis with several other teams in France. The strategy of the team is clear: (1) select research subjects linked to astronomy projects carried out at LATT, with potential applications in other areas; (2) carry out methodological research on those subjects and then specialize the results so as to apply them to astronomy/astrophysics projects, but also to other areas through collaborations; (3) get recognition from and develop ties with the national and international SIP community; (4) get early involvement in astronomy projects from the beginning and attempt to be associated with the design of instruments or experiments, so that the collected data may be processed more effectively.

It appears that the team has been fairly successful on the first three points: the main research areas (e.g., source separation, spectral and time frequency analysis of irregularly sampled data, image reconstruction and restoration, self calibration) are relevant to several problems in astronomy and astrophysics, but are also topics of general interest in SIP. Fundamental work on these problems has been performed, as indicated by the satisfactory level (quantity and quality) of publications in international SIP journals. The results are been being used within LATT and OMP (e.g., PISCO, MUSE) and in other scientific domains through international collaborations. The team is well integrated in the french SIP community, notably through active involvement in GDR ISIS. However, the team has encountered difficulties in getting involved in the mainstream astrophysics projects at the early stages. Even though this situation may be slowly evolving, it illustrates the difficulties of multidisciplinary activities and raises the issue of the sustainability of a SIP research activity in an astrophysics laboratory. Nonetheless, it is noteworthy that team has been able to compensate for retirements and keep a fairly constant staff level through internal recruiting ("mutations").

The Theme 5 proposed for the new laboratory is essentially identical to the SIP group of LATT. The planned activities are mostly a continuation of the present ones, with an extension of the interactions to other themes of the new laboratory. Ongoing collaborations with CESR teams may ease out this transition. However, Theme 5 may also be faced with serious difficulties such as (i) visibility and recognition in the new structure, (ii) appropriate focus of research activities and (iii) critical mass and support from sponsoring organizations. The team is encouraged to carry out vigorously the internal dissemination activities outlined in the research plan and to place the emphasis and resources on research activities with maximum impact on the projects of the new laboratory. Concerning the third item, multidisciplinary activities are considered beneficial; they should be supported by the CNRS and UPS at a level that guarantees their sustainability and development. At some point in the near future, the question of whether this group should transition from a research group to a support group should be debated.

GIGT is a group of 15 technical people at LATT with expertise to participate in the development of instrumentation for large ground based instruments, with some participation in space instruments with CESR. It is participating in MUSE, a large 3D spectrograph for the VLT, and develops R&D projects like FRESNEL. The activities are run as a "service d'observation". This group has some clear successes (e.g. MUSE), but the global production seems to be below the average contribution of a group of this size elsewhere, despite the strong involvement of the staff. This group will need to focus on more visible contributions to major programs at the national or international level such as the EELT.

- Conclusion :

  - Evaluation :

The image and signal team has developed a noteworthy expertise in signal and image processing, with applications in Astrophysics. It is now at a critical stage where they should be more strongly involved in the main astrophysics projects of the new laboratory. The GIGT has made important contributions to instrumentation development and has built valuable technical expertise.

  - Strong points :

Valuable expertise and trained staff to solve complex signal and image processes. Valuable expertise to participate in instrumentation development.

  - Weak points :

Despite its attempts to get more involved, the image and signal group is not enough focused on astronomical projects in the main priorities of the laboratory, hence will have the difficulty to appear prominently in the global strategy of the new astrophysics laboratory. The GIGT should be more focused on large national or international projects.

  - Recommendation :

Focus the activities on the main astrophysics projects of the new laboratory.

| 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 : Univers froid / Cycle de la Matière

| 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 | A |

Nom de l'équipe : Géophysique Planétaire et Plasmas Spatiaux

| 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 | A+ |

Nom de l'équipe : Physique Solaire et Stellaire

| 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 | A+ |

Nom de l'équipe : Univers en Evolution

| 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 | A |

Nom de l'équipe : Outils pour l'Astrophysique

| 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 | A |

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Toulouse, le 15 mars 2010

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au

Président du comité d'experts de l'AERES

**Objet : Observations de portée générale** sur le rapport d'évaluation
de l'unité **« Laboratoire d'Astronomie-Planétologie »**
portée par**: Mme Sylvie ROQUES, MM Jean-André SAUVAUD et Michael TOPLIS**

L'ensemble des personnels du nouveau laboratoire et les trois porteurs de projet désirent remercier le comité de visite pour la qualité et le caractère constructif des échanges qui ont eu lieu au mois de décembre. Nous sommes très sensibles aux commentaires du rapport d'évaluation, soulignant les nombreux points forts de l'ensemble des cinq thématiques, préfigurant la qualité de la recherche qui sera menée dans le plus grand laboratoire national d'astronomie-planétologie.

En termes généraux, les porteurs de projet souhaitent rappeler que le projet scientifique présenté est bien plus qu'une simple juxtaposition des thématiques développées dans les laboratoires actuels. Le challenge était bien de trouver le meilleur chemin possible entre conserver les actions fortes développées au sein de chaque laboratoire existant et permettre l'émergence de nouvelles thématiques porteuses et originales. Le défi pour les années à venir est certainement d'approfondir ces liens "transdisciplinaires", mais il est à remarquer que dès à présent les deux plus grands thèmes du futur laboratoire ("Univers en évolution" et "Géophysique planétaire et plasmas spatiaux") font intervenir des chercheurs d'au moins deux laboratoires d'origine différents (LATT et CESR pour le premier, CESR, DTP et LMTG pour le second). Plus qu'une simple concaténation de compétences, le nouveau laboratoire, bénéficiant d'un important élan collectif, sera bel et bien un grand lieu de brassage d'idées nouvelles et un terrain scientifique propice aux échanges aux interfaces des disciplines.

En ce qui concerne les thématiques/équipes, il nous paraît important d'insister sur les points suivants :

- Géophysique Spatiale et Plasmas Spatiaux : les chercheurs concernés constatent avec plaisir l'évaluation positive des actions passées et les encouragements à développer le potentiel de ce groupe. Par contre, nous souhaitons exprimer notre surprise concernant le caractère décourageant des commentaires du comité sur l'intégration de la composante sismologie.

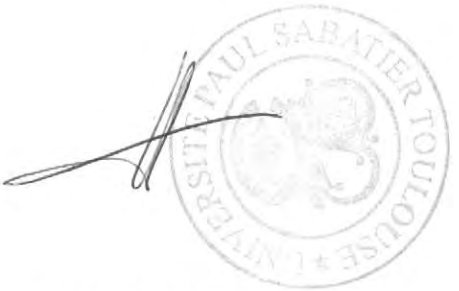
.../...

Tout d'abord, nous n'adhérons pas au pessimisme exprimé concernant nos chances de contribuer à des missions spatiales dans ce domaine, car sur le plan national, hors Paris, c'est sûrement à Toulouse qu'existe le plus grand potentiel pour contribuer aux futures études de sismologie planétaire. De plus, cette composante apporte une contribution inestimable aux études du "fonctionnement planétaire" à travers une expérience des réseaux sismologiques et des traitements de données associés. Le commentaire du comité pourrait laisser croire qu'il considère que seule une participation à des missions spatiales justifierait l'adhésion au nouveau laboratoire, point de vue que nous contestons très vivement, non seulement pour la composante sismologique, mais plus largement pour une bonne partie des "Sciences de la Terre" qui a fait le choix de rejoindre le nouveau laboratoire et apporte une plus-value indéniable à l'environnement scientifique dans son ensemble.

- Physique Solaire et Stellaire (PSS) : nous nous félicitons que l'activité des trois équipes fondatrices de la nouvelle thématique soit clairement reconnue. Il est cependant regrettable que le thème transversal de l'astérosismologie soit quasiment passé sous silence (pourtant 130 publications sur les 325 de PSS – dont 2 dans Nature et une dans Science, plus de 1000 citations). Les chercheurs impliqués ont par ailleurs des participations importantes à des grands projets internationaux en astérosismologie, comme COROT (passé et prolongation), KEPLER, etc. en tant que PI ou co-PI de programmes, ou présidents de groupes de travail, et participent à l'élaboration de projets à plus long terme. Ils bénéficient d'une reconnaissance internationale très importante.

- Base de données CDAB (ex-BASS2000) : les nouvelles données de spectropolarimétrie stellaire (issues de Narval) sont non seulement intégrées à la base mais aussi compatibles avec l'Observatoire virtuel (la base TBLegacy est déjà opérationnelle (http://tblegacy.bagn.obs-mip.fr/narval.html et largement consultée). En ce qui concerne les données solaires, si la définition des protocoles reste à valider au niveau international, le service est associé au projet FP-7 "Helio" en train de contribuer au développement de standards VO pour les données "héliophysiques".

- Signal Image en sciences de l'univers : il est important de rappeler que lors de la construction du projet de fusion, il a été naturel de dissocier l'équipe de recherche « Signal Image en Sciences de l'Univers » du GIGT (ex-axe Outils pour l'astrophysique), groupe technique destiné à poursuivre son activité de support dans le cadre élargi de l'ensemble des « ITA projets » du nouveau laboratoire. Cette équipe signal-image mène une activité profondément pluridisciplinaire, dépassant pour les applications le cadre restreint de l'astronomie (applications aux sciences de l'univers en général), tout en s'impliquant à la fois sur les aspects méthodologiques du traitement du signal ainsi que dans les phases amont des projets (VLT/MUSE et FRESNEL par exemple). Elle est une équipe de recherche à part entière et serait à moyen terme stérilisée si son objectif tendait vers une activité de seul support.

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