AIM - Astrophysique, interprétation, modélisation Paris-Saclay

Rapport Hcéres

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

Department for the evaluation of research units

AERES report on unit:

Astrophysique Instrumentation Modélisation

AIM

Under the supervision of the following institutions and research bodies:

Commissariat à l'Energie Atomique et aux énergies alternatives

Centre National de la Recherche Scientifique

Université Paris 7 – Denis Diderot

February 2013

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

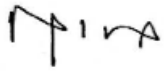
Research Units Department

President of AERES

Didier Houssin

Research Units Department

Department Head



Pierre Glaudes

The president of AERES "signs[...], the evaluation reports, [...]countersigned for each evaluation department by the relevant head of department (Article 9, paragraph 3, of french decree n°2006-1334 dated 3 november 2006, revised).

Grading

Once the visits for the 2012-2013 evaluation campaign had been completed, the chairpersons of the expert committees, who met per disciplinary group, proceeded to attribute a score to the research units in their group (and, when necessary, for these units' in-house teams).
This score (A+, A, B, C) concerned each of the six criteria defined by the AERES.
NN (not-scored) attached to a criteria indicate that this one was not applicable to the particular case of this research unit or this team.

Criterion 1 - C1 : Scientific outputs and quality ;
Criterion 2 - C2 : Academic reputation and appeal ;
Criterion 3 - C3 : Interactions with the social, economic and cultural environment ;
Criterion 4 - C4 : Organisation and life of the institution (or of the team) ;
Criterion 5 - C5 : Involvement in training through research ;
Criterion 6 - C6 : Strategy and five-year plan.

With respect to this score, the research unit concerned by this report (and, when necessary, its in-house teams) received the following grades:

- Grading table of the unit: Astrophysique, Interprétation - Modélisation, Paris-Saclay - AIM

C1	C2	C3	C4	C5	C6
A+	A+	A+	A+	A+	A

- Grading table of the team: E1 COSMOLOGIE ET EVOLUTIONS DES GALAXIES (LCEG)

C1	C2	C3	C4	C5	C6
A+	A+	A+	A+	A+	A+

- Grading table of the team: E2 FORMATION DES ETOILES ET MILIEU INTERSTELLAIRE (LFEMI)

C1	C2	C3	C4	C5	C6
A+	A+	A+	A+	A+	A

- Grading table of the team: E3 DYNAMIQUE DES ETOILES ET DE LEUR ENVIRONNEMENT (LDEE)

C1	C2	C3	C4	C5	C6
A+	A+	A+	A	A+	A

- Grading table of the team: E4 ANNEAUX DISQUES ET PLANETES (LDAP)

C1	C2	C3	C4	C5	C6
A+	A+	A+	A	A+	A

- Grading table of the team: E5 PHENOMENES COSMIQUES HAUTE ENERGIE (LEPCHE)

C1	C2	C3	C4	C5	C6
A+	A+	A+	A	A+	A

- Grading table of the team: E6 COSMO STAT (LCS)

C1	C2	C3	C4	C5	C6
A+	A	A+	A	A+	A+

- Grading table of the team: E7 MODELISATION DES PLASMAS ASTROPHYSIQUES (LMPA)

C1	C2	C3	C4	C5	C6
A+	A+	A+	A+	A+	A

- Grading table of the team: E8 SPECTRO-IMAGEURS SPATIAUX (LSIS)

C1	C2	C3	C4	C5	C6
A+	A	A+	A+	A+	A+

Evaluation report

Unit name:	Astrophysique Instrumentation Modélisation
Unit acronym:	AIM
Label requested:	UMR
Present no.:	UMR 7158
Name of Director (2012-2013):	Mr Pierre-Olivier LAGAGE
Name of Project Leader (2014-2018):	Not yet defined

Expert committee members

Chair:	Mr François MIGNARD – Observatoire de Côte d'Azur/Lagrange, CNRS, Nice
Experts:	Ms Carine BRIAND, Observatoire de Paris/LESIA (représentante du CoNRS)
	Ms Véronique BUHAT, LAM, Marseille (représentante du CNU)
	Ms Patrizia CARAVEO, INAF/Instituto Astrofisica Spaziale, Milano
	Mr Christian GUILLAUME, CNRS/OAMP/Observatoire de Haute Provence
	Mr Gerhard HENSLER, University Vienna
	Mr Jelle KAASTRA, Space Research Organization Netherlands
	Mr Henri-Claude NATAF, ISTerre, Grenoble
	Mr Giovanni ZAMORANI, INAF/Observatory Bologna

Scientific delegate representing the AERES:

Mr Michel Blanc (Unable to attend)

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

CEA	Mr Philippe CHOMAZ (Directeur de l'"Institut de recherche sur les Lois Fondamentales de l'Univers", Irfu)
Paris-Diderot	Mr Richard LAGANIER (Vice-Président du Conseil Scientifique)
CNRS	Mr Denis MOURARD (Directeur Adjoint Scientifique INSU/AA)

1 • Introduction

History and geographical location of the unit

The "Astrophysique, Instrumentation, Modélisation" reseach unit (AIM) is a joint unit between the CEA, the University Paris-Diderot and the CNRS. It was created on the 1st January 2005 from two existing research structures : the SAp (or "Service d'Astrophysique", the former Astrophysical Department between the CEA and CNRS, already an UMR) and the Gamma-Gravitation group (a research team between the CEA and the University Paris-Diderot). An important evolution took place in 2008 with the integration in AIM of the technical staff (engineers and technicians) from the SAp who were not originally included when the AIM was formed in 2005. This integration was strongly recommended by the previous AERES visiting committee.

On the 30th June 2012, AIM comprises 110 permanent staff and 88 persons under temporary positions. AIM is essentially located on a single site at the CEA (outside the main center, thus allowing much more open access). Very recently, four offices have been made available on the Paris-Diderot Tolbiac campus and used by AIM research-lecturers.

Let us note at this stage few distinctive features compared to an average French unit in Astronomy and Astrophysics:

- The very large number of post-docs (46 in June 2012) compared to the number of researchers. This reflects their efficiency in getting grants to support their activities;
- Most of the permanent staff (91/110) are CEA employees, the remainder having CNRS and University positions.There is no astronomer (CNAP, because AIM is currently not eligible to host staff on these positions);
- Strong technical support from CEA which allows to maintain a performant "Research and Development (R&D)" on cryogenic and X-ray detectors. As a consequence this permits a relatively low level of CDDs (temporary contracts) for a space laboratory in France.

AIM is further divided into 8 thematic teams (usually referred to as "laboratories" according to CEA nomenclature), each with 4 to 12 permanent staff:

LCEG – Laboratory of Cosmology and evolution of galaxies;

LFEMI – Laboratory on Star formation and interstellar medium;

LDDE – Laboratory on the Dynamics of stars and their environments;

LADP – Laboratory on Ring, disks and planets;

LEPCHE – Laboratory for the Study of high-energy cosmic phenomena;

LCS – Laboratory CosmoStat (cosmology and statistics, formed in 2010);

LMPA – Laboratory of Modelling of astrophysical plasmas;

LSIS – Laboratory of Space imaging spectrometers.

Areas of research activities

AIM is carrying basic research in astrophysics covering the data acquisition with ground-based and space instruments, the signal processing, interpretations of observations together with the instrumentation design and construction coupled with research and development on detectors, and last but not least, the computational modelling. Regarding astrophysical sources they cover the whole scale from planetary systems, stars, the Milky Way to the nearby and remote galaxies and clusters of galaxies. Observations come either from space observatories like Integral, XMM-Newton, Fermi, Herschel, SOHO-GOLF, Cassini, or from ground-based facilities like IRAM, CFHT, HESS and encompass a large fraction of the electromagnetic spectrum. National and international computing facilities are extensively used for numerical simulations. This constitutes a trademark of AIM: in 2011, 55% of the total computing time for Astrophysics allocated by GENCI has been given to projects with an AIM PI. General and powerful data analysis tools are produced at AIM and available to the community in the form of documented software packages.

Management team

P.-O Lagage, I. Grenier, P.-A. Duc, M. Talvard

AERES nomenclature

ST3

Unit workforce: 197

Unit workforce	Number as at 30/06/2012	Number as at 01/01/2014	2014-2018 Number of project producers
N1: Permanent professors and similar positions	8	8	7
N2: Permanent researchers from Institutions and similar positions	48	51	45
N3: Other permanent staff (without research duties)	54	54	7
N4: Other professors (Emeritus Professor, on-contract Professor, etc.)			
N5: Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.)	47	37	32
N6: Other contractual staff (without research duties)	8	7	
TOTAL N1 to N6	**165**	**157**	**91**

Percentage of producers	*99 %*

Unit workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	32	
Theses defended	45	
Postdoctoral students having spent at least 12 months in the unit*	104	
Number of Research Supervisor Qualifications (HDR) taken	13	
Qualified research supervisors (with an HDR) or similar positions	34	

2 • Assessment of the unit

Strengths and opportunities

- International leadership in several of the research areas covered by the Unit (*e.g.* earliest stages of star formation, galaxy evolution, formation of planetary satellites, solar gravity modes);
- Good anticipation of the end of Herschel with a strong implication to the follow-up activities, and development of heavy numerical simulations and increasing implication in Euclid;
- High visibility through top-level publications (in particular from Herschel observations), large number of citations;
- Multiple international collaborations and membership in consortia;
- World-class instrumentation laboratory with technical infrastructure allowing the realisation of space hardwares (*e.g.* the imager to JWST/MIRI) or instrumentation for ground-based telescopes (*e.g.* ArTéMiS for APEX);
- Highly prospective R&D on sub-mm and X-ray detectors;
- Well balanced demographic structure offering a great potential for the long-term participation in space programs, both for the preparation, science exploitation or instrument design and construction;
- Very successful in raising funds on project-based proposals at the national or European level;
- Pro-active policy to attract PhD and post-docs (see also 'threats');
- The creation of the LABEX UnivEarthS and the IDEX Paris-Sorbonne-Cité is an opportunity to develop new collaborations between AIM and the University in this new context and to push for permanent positions to be opened at University not only for the teams “LADP” and “LEPCHE” but also for the other teams of AIM;
- High level of recognition and visibility sanctioned by numerous awards;
- Large involvement in public outreach activities.

Weaknesses and threats

- With 45% of the total staff being on (generally short-term) temporary positions, AIM has become dependent on this workforce to analyse the large amount of data produced by space missions. The risk of a loss of key expertise is obvious and inescapable as long as the proportion of temporary position remains that high. This number has grown 'freely' without a centralised policy at the Unit level to keep it under control and should be at least stabilised if not slightly decreased. In terms of human management, this large proportion of people with uncertain future and in competition for the same limited number of permanent positions (much less than the number of people already competing for) might generate tensions between the two distinct populations;
- Individual teams have strong personalities and each one produces top class results. Through the successful applications for grants they have a large financial autonomy for their projects. There is a challenge for the AIM management level to maintain a full consistency in the strategic orientations of the unit and to keep an 'AIM spirit' throughout. So far, this spirit operates thanks to the director who has followed the evolution of the institute for 12 years. A new and less experienced director should be aware of this risk;
- Herschel and its scientific exploitation has been the backbone of AIM success over the last few years. We arrive at the end of the cycle and the post-Herschel era may be a challenge for the cohesion of the team and their new positioning. However this seems to have been well anticipated by the management;

- There is a somewhat uneven distribution between the number of full-time researchers and researcher-lecturers from one team to another. This may lead to strong discrepancy in the scientific production and access to the students, and stengthen the team culture at the expense of the Unit taken as a whole;
- Imbalance in the hiring of the permanent researchers between teams. The lack of hiring may endanger the projects of the teams (in particular team "LDEE").

Recommendations

- With the steady increase in number of people working at the main AIM site at CEA, the office space has started becoming a problem, in particular for the Master trainees, PhD students and post-docs. While not yet critical compared to other institutes in Paris area, this issue must be anticipated and discussed with CEA;
- Given the activities undertaken at AIM around space missions, signal processing packages or R&D, the institute has a genuine contribution in community service tasks in astronomy and astrophysics. Discussions should be initiated with INSU (Institut National des Sciences de l'Univers, an Agency of the CNRS) to see how AIM could be linked to an OSU (Observatoire des Sciences de l'Univers). This will be a strategic evolution, and the choice of the reference University must be carefully pondered;
- The implication for the Unit of the hosting the Euclid ground-segment scientist must be better assessed. This is a key-position for the project and a huge and long-term commitment for AIM which will impact on the unit organisation and needs;
- In order to keep its leading role in detector development, the Unit needs to secure funds for pursuing top level long-term R&D;
- Policy at the Unit level to prepare and orient post-docs and PhD students to non-academic positions. Given their number, just a minority of non-permanent staff will find a job in research in astrophysics and they must be fully aware of this situation.

3 • Detailed assessments

Assessment of scientific quality and outputs

AIM has continued its remarkable development over the reporting period starting on January 2008.

In most of the research areas undertaken at AIM, results are outstanding in variety, quantity, quality and visibility. Most research topics are innovative and, to a wide range, performed at the cutting edge of international competition. The major orientation stressed in the 2007 Unit Project on the scientific exploitation of Herschel has been more than successful over the reporting period, with 35% of the Herschel publication with an AIM co-author. This concerns both star formation regions and star-forming galaxies where fundamental results have been obtained. Globally for the whole AIM the quantitative output is outstanding with a total of 1650 articles in refereed journals (2007-2012) including 50 in Nature and Science and above 1200 technical reports related to space instrumentation. The level of citations is on a par with 45,000 citations and 95 publications with more than 100 citations.

The integration of the 'technical team' from SAp, as recommended by the previous Visiting Committee, has been achieved and proves very successful for AIM and the involved persons.

On the instrumentation side, as Co-PI of MIRI (Mid InfraRed Instrument) they have delivered the imager to be on-board of the JWST (James Webb Spatial Telescope) and the ArTéMiS instrument will soon leave for in-site qualification on the APEX telescope on the ALMA (Atacama Large Millimeter Array) site.

More details are given team by team in the dedicated sections of this report.

Assessment of the unit's academic reputation and appeal

AIM is clearly at the top-level of the French units in astronomy and astrophysics and well recognised on all of its research areas. It is recognised nationally and internationally with remarkable success in competitive applications for grants, attractiveness for foreign post-docs, numerous awards granted to AIM scientists, international patents in instrumentation and visibility in high-level outreach actions.

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

AIM is fundamentally an institute carrying out basic research and has only a small number of University lecturers in its staff, a background that explains the relatively low level of direct interaction with the social environment (with the exception of outreach, see below), although the lecturing effort of CEA and CNRS scientists is quite significant.

However one must highlight a long history of high-level implication in public outreach, which goes much beyond the standard for an average scientist and contributes also to the visibility of AIM to a wider public. Some of the actions like the exhibition at the Palais de la Découverte "A Journey to the Centre of the Galaxy" or the 3-D movie on the multi-scale Universe have been acclaimed, and the largest sundial built on the Castillon dam is spectacular and highly original. These actions involve important partnership between AIM and the science and technology museums in France. Members of the Unit have also published an amazing number of books for a wide audience.

During the reporting period, five international patents have been registered, from which one must highlight the development of mini-cameras Calliste with CdTe detectors, and the experimental device to create a hydraulic jump in a fountain or a swimming pool mimicking puzzling instabilities linked to the formation of supernovae.

Assessment of the unit's organisation and life

The quality of life at work seems optimum at AIM with a good organisation of the information flow between the different managerial levels. Seminars are organised by each team and at the institute level as well, and are a source of informal meetings. The multiple collaborations of several members from different teams lead to broad interactions between the teams and is an important source of the scientific life throughout AIM. Trainees, PhD and post-docs have also the opportunity to present regularly their work and learn to make public presentations;

PhD students are satisfied with the quality of the supervision and their connection with the international research conducted at AIM, but some suffer from the dual location of their activities (Saclay and Paris);

The panel noticed during its visit an expression of great enthusiasm, motivation as well as a general happiness and pride for the achievements of the institute. The “Conseil de Laboratoire” with elected and appointed delegates meets regularly with the management team, although the most strategic discussions are held among the team leaders.

The web site of the Unit needs to be improved in some ways: between the access through University Paris-Diderot (two accesses indeed) or the CEA/SAp, it is not always clear how to really access to the AIM site and be sure that one ends up at the right place: for example, the UMR 7158 is given as UMR E-9005 when arriving through the CEA web page. While being quite informative on the science side, there is very little about the organisation of the Unit and the first level structure into 'labs' (teams).

Given the large and regularly increasing number of temporary positions staying for at least one year at the institute, office space pressure is important and could become a problem.

Assessment of the unit's involvement in training through research

AIM has a unusually large number of PhDs and post-doc for a French institute. Therefore the involvement in training through research is really significant, although it is not very clear to the PhD students that this is a training through research and that not all of them will find a long-term position in the academic world. While the large majority of the PhD students comes from French institutions, this is just the opposite for the post-docs hired from many countries (mainly: UK, Italy, Germany, Switzerland, Russia). Almost all the PhD students (90%) are from the ED 127 (Ecole doctorale d'astrophysique d'Ile de France). Then one has 7% from the ED 422 (Sciences et Technologies de l'information, des télécomunications et des Systèmes, Paris Sud) and one student from the ED 386 (Sciences Mathématiques, Paris Centre).

Assessment of the five-year plan and strategy

Given the change of director (name still unknown) at the end of the current contract there has been limited discussions on the general project for AIM for the next five years. However combining the documentation provided by the current management, and using the detailed projects presented by the individual teams, one can easily see where AIM plans to go.

There will be no change in the overall organisation of AIM; the committee founds the current structure quite satisfactory and efficient. There is no need for change at the moment and the system remains flexible enough to allow for adjustments during the next term.

Basically, the successful strategy of the last contract period will be continued: AIM will be present along the whole chain of data acquisition (meaning hardware development and R&D), analysis, modelling in astrophysics covering the various scales from the Solar System to Cosmological distances with a multi-wavelength approach. Another keyword which goes through all the teams is international collaboration at every levels.

AIM will capitalise on its current strengths:

- Broad range of expertise on astrophysical objects, wavelengths, modelling, top-level signal processing and numerical simulations. A perfect combination to submit applications for funding or access to observing facilities;
- Presence on selected space missions (*e.g.* Euclid, JWST, Solar Orbiter) or in study phase for submission to ESA/NASA calls (*e.g.* JUICE);
- Strong involvement on ground-based telescopes with different times scales (short time for APEX-ARTEMIS and longer for E-ELT-METIS);
- Very strong R&D and instrument team with in-house facilities to perform research on detectors of the future and build instruments, test equipments or characterise detectors;
- Experienced teams to carry out data analysis and science interpretation or conduct massive numerical simulations on national or international computing centres;
- Efficiency with administrative support of CEA-Irfu to apply for funding at the National and European levels.

There is a major uncertainty on this landscape: the fate of the satellite SVOM (Space-based multi-band astronomical Variable Objects Monitor), still unclear in the early months of 2013 and the final decision will impact on the available technical forces for other projects. Beyond SVOM (whatever happens to the project), AIM should also position itself, with great assets, in the early thinking and lobbying for the next generation X-ray mission.

4 • Team-by-team analysis

Team 1 : Cosmologie et évolution des galaxies (LCEG)

Name of team leader: Mr ELBAZ

Workforce

Team workforce	**Number as at 30/06/2012**	**Number as at 01/01/2014**	2014-2018 **Number of project producers**
N1: Permanent professors and similar positions			
N2: Permanent EPST or EPIC researchers and similar positions	9	10	9
N3: Other permanent staff (without research duties)			
N4: Other professors (PREM, ECC, etc.)			
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	15	14	11
N6: Other contractual staff (without research duties)			
TOTAL N1 to N6	**24**	**24**	**20**

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	5	
Theses defended	10	
Postdoctoral students having spent at least 12 months in the unit	30	
Number of Research Supervisor Qualifications (HDR) taken	2	
Qualified research supervisors (with an HDR) or similar positions	6	6

• Detailed assessments

Assessment of scientific quality and outputs

The “Laboratoire” Cosmologie et Evolution des Galaxies (LCEG) has developed extremely successfully over the past period. Its research comprises three main fields, (i) galaxies from high redshifts to the local universe, (ii) structure and evolution of galaxy clusters, and (iii) numerical simulations on galaxy evolution. Galaxy studies are particularly focused on its star-formation history, on the processes affecting it as, i.e. gas assembly from the environment and internal black holes, and existence and survival of tidally produced dwarf galaxies in galaxy merger tails. These topics are addressed both observationally and also with numerical models by a small subgroup of the LCEG. In addition, the cosmological structure formation on larger scales is explored by X-ray observations.

In all these fields, this team performs its research at the international cutting-edge and has achieved significant breakthroughs. As examples, members of this group have given new insights on the relation between star-formation rate and stellar mass of galaxies at high redshift (z~1 and z~2), which led to a paradigm change in the sense that the role of merger-driven starbursts in the early cosmic history had been significantly overestimated in the past. The group has derived scaling laws of galaxy clusters that help understanding their evolution as probes of cosmology, and has spotted clues from simulations about the growth of central galactic spheroids from gas instabilities in galactic disks.

The staff of the LCEG have been exceptionally successful in the acquisition of third-party funding. The number of personal grants on the international level through the ERC and also by project funding from national agencies, like e.g. ANR, bears witness of the leading role and the well accepted scientific quality of the involved scientists of this unit. Since the last evaluation report this funding success has led to a significant increase of the unit by a large number of young postdoc researchers which almost increased four-fold in number, from 4 to 15, while the number of staff positions (9) and doctoral students (5) remained constant.

Not only the criterion of external funding, but also their publication record with close to 500 papers since 2007, many of which are accepted for publication by the highest-impact journals, and an enormous citation rate document the successful output activity and research quality of this unit.

Assessment of the unit's academic reputation and appeal

LCEG scientists play an international leading role in various fields and are multiply invited to conference talks. Their participations in numerous observational consortia not only guarantee access to the most up-to-date data acquisition but also demonstrate the international attractiveness of the group members and their reputation.

The enormous expansion of the unit through postdoc researchers has raised the mean scientific competence of the unit and also significantly increased its appeal. On a longer term one can expect that this reputation should lead to an increasing preference by national and international PhD students what is surprisingly not yet visible at the present state.

Moreover, LCEG staff members are honoured by several awards and appointed members to numerous major astronomical committees on the national and international scenes and to national scientific boards.

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

The LCEG unit consists of a large number of doctoral students and young postdocs. Such a large internal group can and must contribute to the scientific and social appeal of the AIM as a whole. The LCEG members really perform actively and significantly contribute to the sociality and the enthusiastic mood of the Unit by their contribution to AIM visitors and participation in seminars and joint seminars with other AIM teams. In addition, the various collaborations with members of other “laboratories”, as e.g. LFEMI, LMPA, LCS among others, also bridges social and cultural separations among the teams.

Concerning the social and cultural environment of the AIM, LCEG members have published 14 popular science books, performed multiple popular science shows, and contributed to major science exhibitions and public educational programs.

Assessment of the unit's organisation and life

All group members are highly motivated, transferring the senior researchers' success and excitement to their younger team members. The enormous expansion of the unit by post-doc researchers has raised the mean scientific competence of the unit and uniformised the quality between the subgroups. They meet regularly for seminars (Friday lunch) and one has the impression of a lively interaction and cohesion within the team and good interaction with the Unit.

While the observation-related fraction of the team dominates and is broadly exposed to research fields, the smaller numerical group has to concentrate its efforts to particular scientific questions. On the other hand, such a cooperation between observers and modellers is an ideal and desirable feature, but is a hardly realised synergy in most international units. Since there exist strong interactions with other teams, LCEG bridges the scientific and social life between the AIM teams.

Assessment of the unit's involvement in training through research

The extremely large number of young post-docs are advised by the experienced and successful senior staff scientists but also forward their experiences and skills to the doctoral students of the unit. Although there are various subgroups within the unit aiming at different object studies, their supercritical sizes, their linked research questions, and their common basis of data reduction and instrument development, lead to an overwhelmingly large synergy within the unit. In addition, such personally large unit as LCEG contributes automatically in large to the training, education, and advice to the other AIM teams through joint seminars and working group discussions with other units as e.g. LFEMI, LCS, and LMPA.

Outside the AIM, the unit members contribute to the teaching in Master and post-graduate classes and by special lectures to international Physics schools.

Assessment of the five-year plan and strategy

Considering the present state of activities and international reputation of the unit members, the future of this unit and its scientists looks bright.

The staff scientists are involved in numerous international observational projects. They harbour in-house data archives and have access to huge recently and internationally acquired data sets. Based on their recent results with well-acquainted breakthroughs, the continuation of their successful research streams are envisaged and sound reasonable. Since the remarkably successful acquisition of grants by staff scientists over the past period has increased the number of researchers at post-doc level to an unusual ratio of staff to temporal third-party funded scientists of 10:15, a research continuation on such high level of man-power seems doubtful. Although all staff scientists are extremely encouraged and intensely involved to fund raising, one must be aware of the shrinking number of possibilities (because repetitions in some funding programs are impossible) and the increasing oversubscription to grant programs. As a consequence, a reduction of post-doc researchers might be expected in the future.

The same uncertain and probably irreproducible situation will hold for the access to guaranteed observational time. Due its expertise, leadership and reputation, the team is well positioned for the growths of instrument and survey consortia and the expected resulting rise in competition due the increasing complexity of astronomical instrumentations and surveys. Nevertheless, a reasonable reduction of guaranteed data access is expected. This must not necessarily lead to a shrinkage of personnel, but opens chances for a strategy change of data access. The involvement in the Planck mission, the AIM deep implication in the Euclid mission, and the lead in the XXL survey will save an essential international participation.

One of the objectives for the upcoming period, understanding the star-formation process in galaxies on cosmological scales, i.e. its trigger and quenching mechanisms, and its inclusion into numerical simulations, must be performed by an intimate coupling with the LFEMI and the LMPA teams. The first one approaches this problem from panchromatic observations, the latter from the advancement of the applied numerical code RAMSES. In both units, however, it remains uncertain to what extent this support can be continued on the aimed intensity (see their specific team analyses). On the computational side, particular intensity must be spent to the treatment of the multi-phase behaviour of the interstellar medium and a realistic description of the star-formation self-regulation by sub-scale physical processes instead of continuing with the present-day commonly applied recipes which obviously underestimate the energy deposit and spatial and temporal star-formation scale.

Conclusion

- Strengths and opportunities:

The LCEG unit has developed extremely successful, acquiring a large amount of personal and project funding, increasing the number of post-docs significantly, comprising different research groups of supercritical sizes, being involved into numerous successful observational campaigns and programs, having access to a wealth of most up-to-date data, publishing breath-taking results that lead to a high international reputation, and reaching a state of successful synergies within the unit.

Only with a similar number of scientists this high-level international success, involvement into projects, and reputation can be maintained.

A further strength of the unit is its constellation and cooperation of the personnel majority in observations with a smaller group of numerical modellers. Since these latter apply numerical codes which are developed and maintained by scientists in the LMPA team, the permanent contact with these colleagues (in the inter-unit platform on computational astrophysics called COAST) and regular meetings and seminars as practiced, contain a specific strength of the LCEG.

- Weaknesses and threats:

The strength in fund raising of the LCEG staff scientists has (paradoxically) led to a significant weakness in the structure of the team personnel, namely, the reversal of the permanent-to-temporal scientists' ratio. An almost improbable continuation of grant acquisition on such a successful level, partly because of non-repeatedly accessible programs, involves the risk of a backslide from the presently leading position.

- Recommendations:

The LCEG unit is encouraged to proceed with its extraordinarily successful approach in their research fields. Even when the competition for grants and guaranteed access to observations becomes harder, reputation and involvement of staff scientists promise the maintenance of the present research capacity, but a further steep increase does not seem realistic.

In order to guarantee the continuation of the successful research and not to take a loss of quality, CEA and AIM administrations should consider and evaluate the LCEG situation seriously and continuously over the next period and help moderately (and perhaps temporarily) where the maintenance of the gained scientific quality gets clearly into danger without the fault of the staff scientists.

Team 2 : Formation des Etoiles et Milieu Interstellaire (LFEMI)

Name of team leader: Mr SAUVAGE

Workforce

Team workforce	**Number as at 30/06/2012**	**Number as at 01/01/2014**	2014-2018 **Number of project producers**
N1: Permanent professors and similar positions			
N2: Permanent EPST or EPIC researchers and similar positions	8	8	8
N3: Other permanent staff (without research duties)			
N4: Other professors (PREM, ECC, etc.)			
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	8	4	4
N6: Other contractual staff (without research duties)			
TOTAL N1 to N6	**16**	**12**	**12**

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	6	
Theses defended	6	
Postdoctoral students having spent at least 12 months in the unit	13	
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	3	4

• Detailed assessments

Assessment of scientific quality and outputs

The team of the Laboratoire de Formation des Etoiles et du Milieu Interstellaire (LFEMI) studies star formation and interstellar medium from the sub-parsec scale to nearby galaxies on the whole. It is a novel and essential approach to understand the physics of star formation and dust production. The expertise of the team is basically in the far-IR and submm spectral range and they are deeply involved in various large programs (especially on Herschel) involving international consortia.

A strength of the group is the link of their observations with tools modeling the spectra of the cold interstellar components, dust and molecules, the warm and the radiation-ionised gas phase in order to explore their physical states. Their permanent success with observational proposals lead to continuity of data exploitation and advancement in the understanding of the star-formation conditions in galaxies from small to large scales.

One other main characteristics of the team is to be strongly involved in instrumentation with the definition, the calibration and the operation of instruments. The expertise of the group leader has led him to be appointed as ground-segment scientist of the EUCLID mission.

The production of the team is outstanding with more than 300 refereed papers in the best astronomical reviews and 40 as first author and more than 6000 citations. This very high production is partly, but not only, due to the first publications of the Herschel mission (participations to 74 papers in the Herschel special issue).

Assessment of the unit's academic reputation and appeal

Members of the LFEMI team are internationally well-known. Due to their expertise of the Herschel detectors they led 3 key programs on the guaranteed time on the Herschel satellite and participated in numerous guaranteed and open-time projects the most important ones being KINGFISH, HERITAGE and HI-GAL.

Several results obtained by the team have a major impact in the study of pre-stellar cores and the ubiquity of narrow filaments of cold interstellar medium.

For the last 5 years, 3 new permanent researchers have joined the team which has increased from 5 to 8 its permanent staff. 19 post-docs and PhD students have also worked in the LFEMI during this period. These numbers are exceptionally high, even for the AIM. The large attractivity of the team can be attributed to the high visibility of the team members, especially through their activity in the Herschel consortia. Over the period, the team has led 2 ASTRONET (European funding agency for the development of astronomy) proposals, 3 ANR (National Research Agency) projects, and was awarded by 1 ERC (European Research Council) advanced grant.

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

The LFEMI comprises a significantly large number of doctoral students and young post-docs who contributes nicely to the social life in AIM. The international scientific collaborations of the team members also attract visitors to the institute. The LFEMI team members contribute to the public outreach activities in radio shows, public outreach conferences, and through popular articles.

Assessment of the unit's organisation and life

The scientific strategy of the team is very clear with a high expertise in the study of star formation and the interstellar medium in the far-IR and sub-mm and at various scales. Their expertise goes from the instrument conception to the full exploitation of the data and their interpretation. During the last years they have increased their expertise in modeling with two recruitments, strengthening their position in this area.

Regular meetings are organised in the team, in particular around Herschel programs.

A weekly talk gathers LFEMI and LCEG members who share interests in observing facilities (Herschel) and astrophysical topics (process of star formation). Modeling the filamentary structure and turbulence within molecular clouds and the processes of star formation is engaged in collaboration with colleagues from the LMPA.

Assessment of the unit's involvement in training through research

Due to their status (CEA and CNRS) the permanent staff has no teaching duties. 6 PhD defences took place in the team during the last 5 years, and 6 PhD students are presently in the team. The younger post-docs also benefit from the experience of the senior scientists.

Assessment of the five-year plan and strategy

The five-year strategy of the team is well defined. The different expertises of the team will be preserved and emphasised with the participation to the definition of future far-IR and sub-mm facilities (ARTEMIS, NIKA), and with the on-going exploitation of Herschel data coupled to new observations with available instruments (IRAM, ALMA, NOEMA, SOFIA). The development of numerical simulations, and multi-phase models of galaxies in parallel to observations, appears very promising. On a longer term, the participation to SPICA/SAFARI, the next-generation infrared astronomy mission, is highly coherent.

The team head is the PI of the ground-based segment of EUCLID, a satellite whose main objectives are cosmological. Whereas such an involvement appears crucial for the AIM as a Unit, it may be difficult to reconcile with the main objectives of the LFEMI team. On the other hand, using the EUCLID involvement to create new interactions with other teams, might sound promising.

Conclusion

- Strengths and opportunities:

The high and well-recognised expertise of the team in studies of star formation and interstellar medium in far-IR and sub-mm is an obvious strength. The team strategy is very clear with an optimal exploitation of the Herschel data, to fully optimise their huge implication on this project. ALMA is also identified as a major facility for the team.

Their involvement in ArTéMiS (Architectures pour Télescopes à grand champ de vue dans le domaine sub-Millimétrique au Sol), the successor of Herschel for interstellar studies, is highly coherent. Continuously successful observational proposals guarantee the acquisition of data.

- Weaknesses and threats:

Today two major topics are addressed by the team (star formation at the sub-parsec scale, and analysis of the interstellar medium of whole galaxies) split into two sub-teams. Until now, they have shared their expertise on Herschel. The post-Herschel era may be a challenge for the cohesion of the team.

The high rate of non-permanent staff in the team and leading major themes is a potential issue with the risk of loss of expertise of the permanent staff.

The time-consuming involvement by the team leader as PI of the ground-based segment of EUCLID may hamper progress in the original research fields of parts of the team and cause a dispersion inside the team who is neither specialised in the major aims of EUCLID nor in the visible-NIR domain.

- Recommendations:

Co-development of instrumentation and data analysis and interpretation is a strength of this team which must continue in this way. Their multi-scale approach of physical processes at work in galaxies is promising of essential contribution for the community in the field, and should be continued and fully investigated. It is a real opportunity to link the two major themes addressed by the team. Spectral modeling and numerical simulations are very complementary to the observations, are forward-looking and exciting, so that this synergy has to be further developed in the next few years corresponding to the post-Herschel era.

The team should clarify its implication on EUCLID and its impact on future projects.

Team 3 : Dynamique des Etoiles et de leur Environnement (LDEE)

Name of team leader: Mr BRUN

Workforce

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014	2014-2018 Number of project producers
N1: Permanent professors and similar positions			
N2: Permanent EPST or EPIC researchers and similar positions	4	4	4
N3: Other permanent staff (without research duties)			
N4: Other professors (PREM, ECC, etc.)			
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	3	3	1
N6: Other contractual staff (without research duties)			
TOTAL N1 to N6	**7**	**7**	**5**

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	5	
Theses defended	2	
Postdoctoral students having spent at least 12 months in the unit	8	
Number of Research Supervisor Qualifications (HDR) taken	1	
Qualified research supervisors (with an HDR) or similar positions	2	3

• Detailed assessments

Assessment of scientific quality and outputs

The permanent staff of the "Laboratory" DEE consists of four researchers on CEA contract. The main research topics of the group are the study of : (i) the origin and proprieties of stellar magnetism; (ii) the astero-seismology; (iii) the evolution of the angular momentum and rotation of the stars; and (iv) the stellar environment (radiation and tide effect).

Members of the team have developed leading-edge numerical simulations of solar dynamo and stellar convection, and used them to address several exciting issues of stellar dynamics. Through 3D global convective models of solar dynamo, they have shown that magnetic wreath can indeed exist in turbulent convective zone, justifying further study on the conditions of destabilisation of the magnetic flux tubes that lead to sunspots. The implication of the team in several key space missions (SOHO, CoRoT, Kepler and also Herschel) has given access to crucial data which have led to important discoveries, such as the evidence for magnetic cycles in a star and constraints on accretion mechanisms. The discovery of the gravity-modes of the Sun, a long-standing question in solar physics, is particularly noteworthy. The collaboration with the LDAP team, yielding a new scenario for the formation of satellites from planetary rings, is also a strong point of this team.

The large scientific production (more than 200 refereed articles) in the most important international journals attests the high scientific quality of the team and the extended international network of collaborators.

Assessment of the unit's academic reputation and appeal

LDEE is actively involved in the preparation of the next generation of X-instrumentation for solar physics in the frame of the Solar Orbiter mission (ESA). They participate to the elaboration of the scientific definition of the instrument.

The team has been distinguished by 2 prizes ("La recherche" 2011 and "L'Oreal-UNESCO jeunes chercheurs" 2012). It leads one ERC grant, and participates in 2 ANR grants and 2 European Framework Programs.

They are team members or co-investigators of key present and future space missions.

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

In spite of the small size of the team, it contributes actively to the efforts of the Unit in terms of Public Outreach (interviews in the media, participation to public exhibits, popularisation articles, etc).

Assessment of the unit's organisation and life

The members of the team participate in the meetings organised at the Unit level as well as to the debates in the frame of the COAST transverse (High Performances Computing in Astrophysics) program of AIM. They provide their expertise in numerical method in solar physics to this project (see also LMPA group).

Assessment of the unit's involvement in training through research

The team has a strong implication in the formation of Master students (regular lectures in Master2) and PhD (training and organisation of summer schools). Numerous post-doc have been hired thanks to its success in winning competitive national (ANR) and international (ERC) contests. During the last years, LDEE hired six post-docs and six PhD students.

Assessment of the five-year plan and strategy

The project for the five coming years is the logic continuation of the experience gained in the last years. In line with the strategy of AIM, the strategy of LDEE is well balanced between contributions to key space missions, investment in high performance modeling tools and investigation of new physical mechanisms. LDEE research will follow two main lines: (i) dynamics of stars and (ii) the physics of stellar environment. The team plans to carry on the numerical simulations of stellar interiors and even extend them to include radiation. Such an extension aims at participating to Solar Orbiter / STIX (launch foreseen on 2017) data analysis through adapted 3D-modeling. From the observational point of view, the team will pursue its participation in the analysis of Kepler and CoRoT data.

In collaboration with the LADP team, LDEE will have access to the JUICE (JUpiter ICy moons Explorer) data and aim at the detection of the acoustic modes of Jupiter.

Conclusion

- Strengths and opportunities:

The LDEE team has a strong experience in numerical simulation and data analysis of astero-seismology data. The team covers a wide spectrum of techniques and data relevant for understanding the dynamics of stars and their environment. LDEE benefits from a high visibility and has been very successful in obtaining ERC and ANR grants to extend their group, compensating thus the lack of hiring of tenure researchers in the last five years. Their project is partly based on the development of Solar Orbiter/STIX instrument.

- Weaknesses and threats:

LDEE is a small team in a large Laboratory. Its expertise in its various research topics rests upon a single researcher. The projects of the team are achievable if the high level of post-doc hiring is maintained, which is quite hazardous. The development of new research lines may be difficult with only four tenure researchers. Following the evolution of the numerical methods and hardware is also a challenge.

- Recommendations:

The project of LDEE for the five coming years is ambitious and timely. It will be difficult to achieve if the team is not reinforced, as the level of temporary positions already reaches its maximum.

The team will have to find the proper balance between long-term investments (in numerical methods and space missions in particular) and shorter-term rewarding projects. It should comfort its successful collaboration with the LADP team within AIM, and develop collaborations with other nearby teams (Sphynx and LIMSI for example).

Like in the other teams, efforts must be devoted to improve the access of the students to non-academic positions.

Team 4 : Anneaux, Disques et Planètes (LADP)

Name of team leader: Ms FERRARI

Workforce

Team workforce	**Number as at 30/06/2012**	**Number as at 01/01/2014**	2014-2018 **Number of project producers**
N1: Permanent professors and similar positions	4	3	3
N2: Permanent EPST or EPIC researchers and similar positions	1	1	1
N3: Other permanent staff (without research duties)			
N4: Other professors (PREM, ECC, etc.)			
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	3	2	2
N6: Other contractual staff (without research duties)			
TOTAL N1 to N6	**8**	**6**	**6**

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	4	
Theses defended	3	
Postdoctoral students having spent at least 12 months in the unit	4	
Number of Research Supervisor Qualifications (HDR) taken	3	
Qualified research supervisors (with an HDR) or similar positions	4	4

• Detailed assessments

Assessment of scientific quality and outputs

The LADP team occupies a unique position both in AIM and on the national scene. Its access to CASSINI data (with the participation of the team leader and one member of the team to the CIRS - Composite InfraRed Spectrometer- and ISS -International Space Station- teams) has led to exciting discoveries on rings and satellites. Particularly noteworthy is the proposition of a new scenario for the construction of planet satellites from their surrounding rings. This scenario is accompanied by a 10-fold re-evaluation of the dissipation due to tides. These new ideas have strong implications for the formation and evolution of satellites and planets. Other discoveries of the team provide substantial playgrounds for the scientific community (dunes on Titan, ring thickness and mass, gravity wakes). The high visibility of the team is attested by its 83 publications with international collaborators, 15 invited talks, 1 book chapter. With 4 publications in Nature, 2 in Science and the rest in top-level disciplinary journals, the team is difficult to beat.

Assessment of the unit's academic reputation and appeal

The successful implication of LADP in CASSINI facilitates its involvement in new planetary science missions and infrastructures: ELT-METIS, JWST-MIRI and JUICE.

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

The cultural outreach of LADP is remarkable, with numerous public talks and radio-TV shows, popularisation articles, and contribution to the “Voyages planétaires” public exhibition in Nantes 2011. The socio-cultural value of the team is particularly visible as team leader assumes the Presidency of CLEA (Comité de Liaison Enseignants et Astronomes), a key national actor for the training of high-school teachers in Astronomy.

Assessment of the unit's organisation and life

After 12 years of leadership, past team leader has stepped down but is still very present in the team as Emeritus Professor. The current team leader and her younger colleagues form a very lively and dynamic group. Aside CASSINI science (funded by CEA and CNES), funding is secured by 4 successful ANR proposals led by the team (NG-MIDE, Exodunes) or elsewhere (DustyDisks, Apostic), and by UnivEarthS LabEx work packages. Several highlights of the AIM website are due to LADP and this team will certainly actively contribute if AIM launches a more complete website. Most members of the team have teaching positions at the University Paris Denis-Diderot. This does not seem to weaken the interactions within the team and with other teams of AIM, as illustrated by the remarkable collaboration with one member of LDEE. Recent access to dedicated offices at University Paris Denis-Diderot has greatly helped.

Assessment of the unit's involvement in training through research

With research topics among students’ favourites and an active presence in University Paris-Diderot (3 of the 4 permanent staff teach there), the team has supervised 5 PhD theses and 20 Masters research internships. It contributes to teaching at the Licence and Master levels, providing immediate dissemination of new discoveries.

Assessment of the five-year plan and strategy

In line with the strategy of AIM, the strategy of the LADP team is well balanced between deepening engaged research topics and meeting new challenges, and between instrumental perspectives (with a clear positioning in JUICE) and theoretical/methodological developments. The novel scenario proposed by the team for the construction of satellites will be a powerful driver, while the extension of the ring activity towards proto-planetary disks and exo-rings provides a promising achievable challenge. The members of the team have proven their ability to extract from unique space observations exciting new ideas that feed more discoveries.

Conclusion

● Strengths and opportunities:

LADP is a dynamic and successful team. It played a key-role in the discovery of a new mechanism for the formation of natural satellites from rings. Its collaboration with LDEE on a physical model for tidal interaction is a very strong point. The team has a clear and original focus. Its project is well balanced between observation and methodological developments, with a strong implication in the Jupiter JUICE mission. LADP will have the opportunity to play a central role in the planned new Department Earth and Universe of the IdEx Sorbonne Paris Cité. Starting collaborations with the planetary group of IPGP represent a real opportunity.

● Weaknesses and threats:

LADP will have to find the best way to provide the expected service to the community (e.g., results of the VLT/VISIR program) while pursuing its own research topics. Assuming the leadership of a team that has been led for 12 years by the charismatic past team leader is not an easy task. Efforts from all members of the team will help find a new equilibrium. PhDs and post-docs should be offered the best information on all the job opportunities they should consider, including non-academic ones. LADP is a small team in a big Laboratory. The permanent staff is almost uniquely University staff, and changes in the strategies of the funding, or regional politico-scientific context could destabilise this team.

● Recommendations:

The core of the team is rather small with 4 permanent positions in research among which 3 are University professors or assistant professors with teaching duties. The rest of the team includes 4 post-docs and 4 PhD students and one emeritus professor, and lacks technical support. Given the science objectives covering protoplanetary physics, disk debris, rings dynamics and satellite formation, and data from several space missions and ground-based instruments, the team must seriously consider a wider basis for recruitement and evolve towards a better balance between permanent and temporary positions. A technical support at the Unit level is also highly desirable to help handle the data.

Team 5 : Phénomènes Cosmiques à Haute Energie (LEPCHE)

Name of team leader: Mr RODRIGUEZ

Workforce

Team workforce	**Number as at 30/06/2012**	**Number as at 01/01/2014**	2014-2018 **Number of project producers**
N1: Permanent professors and similar positions	3	4	3
N2: Permanent EPST or EPIC researchers and similar positions	8	9	8
N3: Other permanent staff (without research duties)			
N4: Other professors (PREM, ECC, etc.)			
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	7	6	6
N6: Other contractual staff (without research duties)			
TOTAL N1 to N6	**18**	**19**	**17**

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	3	
Theses defended	6	
Postdoctoral students having spent at least 12 months in the unit	18	
Number of Research Supervisor Qualifications (HDR) taken	4	
Qualified research supervisors (with an HDR) or similar positions	8	9

• Detailed assessments

Assessment of scientific quality and outputs

Historically, high energy astrophysics is one of the main fields of research of the AIM unit. The “Laboratoire d’Etudes des Phénomènes Cosmiques de Haute Energie” (LEPCHE) is producing an excellent research, also owing to its important and qualified participation to international collaborations. LEPCHE has been a major contributor to XMM (X-Ray Multi-mirror Mission), INTEGRAL (International Gamma-Ray Astrophysics Laboratory) and Fermi (Gamma-ray space telescope) observatories and is now actively engaged in the scientific exploitation of these very successful missions. The overall scientific production is outstanding both in quality and in quantity. The wealth of the subjects covered is impressive. Although the staff complained for the lack of theoretician support to help interpreting the variety of data being analyzed, the scientific quality of LEPCHE production could hardly be better.

The staff scientists of LEPCHE have been successful in the acquisition of third-party funding, both from national agencies, like ANR and European ones. This success demonstrates the leading role and the well-recognised scientific quality of the scientists of this unit.

Assessment of the unit's academic reputation and appeal

LEPCHE research is carried out in international context. The presence of post-docs coming (all but 2) from abroad witnesses the international appeal of LEPCHE. The international recognition of the quality of the LEPCHE research is testified, among other things, by the large number of invited talks at national and international conferences.

From the academic point of view, the fact that 3 LEPCHE staff are professor at the University Paris-Diderot provides a strong link to the university system. In spite of this ideal situation, the small number of PhD students was mentioned as a long term potential problem.

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

LEPCHE is devoting significant effort towards public outreach activities organising and/or contributing to public exhibitions, to scientific documentaries and maintaining a dedicated web site.

Assessment of the unit's organisation and life

The committee found a very positive climate between staff, post-docs and PhDs. Interactions, through seminars and internal workshops, are frequent and fruitful, and no problems were brought to the attention of the committee.

Assessment of the unit's involvement in training through research

All PhDs and post-docs expressed satisfaction for their work and the interaction with their supervisors and colleagues. The link with the Paris-Diderot University is also positive, although it should not prevent collaboration with other Universities in the Paris area.

In addition to the training of the young researchers in the team, staff members of LEPCHE have organised three International schools (two of which as P.Is).

Assessment of the five-year plan and strategy

LEPCHE is enjoying an ideal it situation. However it is highly concerned by the uncertain future of high-energy astrophysics in space. Without a strong involvement in a future space mission in the field of X and gamma-ray astronomy (ideally in both fields), the LEPCHE core business is in jeopardy. While, quite correctly, they try to diversify through shifting to ground gamma-ray astronomy and strengthening their multiwavelength profile, they should not give up their traditional link between hardware development and data analysis.

Conclusion

- Strengths and opportunities:

LEPCHE results as well as international standing could hardly be better. LEPCHE thrives on the data analysis of instruments partly built in house, thus exploiting at best the synergies between the technological developments and their scientific use. This is a distinctive feature of the team that should continue to be so in the future. The research carried out at LEPCHE covers many of the fields of high-energy astrophysics through a very fruitful multi-wavelength approach and in many of these fields the members of this group are recognised as world leaders.

- Weaknesses and threats:

The only real threat facing LEPCHE is the lack (so far) of a major space mission dedicated to X and/or gamma-ray astronomy. Such a problem is common to all Space Institutes around the globe: without a driving space mission it would be hard to maintain the tradition of excellence of this group. In turn, the relatively low-level participation to HESS (High Energy Stereoscopic System) and CTA (Cherenkov Telescope Array) represents at present a potential weakness.

- Recommendations:

LEPCHE is encouraged to continue to propose innovative concepts for high-energy astrophysics missions and to be active in the international arena. Strengthen the participation to ground-based VHE (Very High Energy) gamma ray observatories, such as CTA, would be beneficial. The participation to SKA (Square Kilometre Array), often mentioned also in view of a lack of significant interest in the project from a large french scientific community, could be important from the multi-wavelength point of view, but could also result in a loss of focus for the group.

Team 6 : Cosmo Stat (LCS)

Name of team leader: Mr STARCK

Workforce

Team workforce	**Number as at 30/06/2012**	**Number as at 01/01/2014**	2014-2018 **Number of project producers**
N1: Permanent professors and similar positions			
N2: Permanent EPST or EPIC researchers and similar positions	5	5	5
N3: Other permanent staff (without research duties)	1	1	1
N4: Other professors (PREM, ECC, etc.)			
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	5	2	2
N6: Other contractual staff (without research duties)			
TOTAL N1 to N6	**11**	**8**	**8**

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	4	
Theses defended	6	
Postdoctoral students having spent at least 12 months in the unit	7	
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	1	

• Detailed assessments

Assessment of scientific quality and outputs

The “Laboratoire” CosmoStat (LCS) was created recently (February 2010) as an interdisciplinary AIM entity, and has grown rapidly and very successfully over the past period. This growth was significantly helped by an ERC grant obtained by the coordinator of the group. In addition to 6 permanent researchers and 2 Associates, it already includes 4 PhD students and 5 post-docs.

Their research comprises two main, and correlated, field (Statistics & Signal Processing and Cosmology) and is largely based on the development of new methods for analyzing astronomical data, especially in cosmology where the needs of continuously more powerful statistical methods are becoming essential.

Members of the group are highly involved in a number of large international projects, such as for example, Planck, Euclid, Fermi, Herschel. They are among the leaders in the application to astronomical data of the concept of sparse representation of the data and in the development of high-level codes based on this concept. Many different tools developed in-house by this group, and freely available on their web site, have been very successfully applied, both by the group itself and other groups, on several aspects relative to CMB (Cosmic Microwave Background) data, weak lensing analyses and the spatial distribution of galaxies. In all these fields this unit performs its research at the international cutting-edge and has achieved significant breakthroughs.

The staff persons of the LCS have been very successful in the acquisition of third-party funding, both through personal grants on the international level (e.g. ERC) and also by project funding from national agencies, like ANR. This success demonstrates the leading role and the well-recognised scientific quality of the involved scientists of this unit.

Not only the criterion of external funding but also the publication record of the members of this unit, do testify the successful output activity and research quality of this unit.

Assessment of the unit's academic reputation and appeal

The scientific work of LCS scientists is internationally recognised, as testified among other things, by the large number of invited talks at national and international conferences. The significant number of PhD students and post-docs, and the ability to hire brilliant foreign post-doc students are also clear indications of the attractiveness and appeal of this group.

Moreover, LCS staff members have received awards and prizes, have been members of the Scientific Organization Committees of many national and international conferences, and have organised various international conferences and workshops.

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

Because of the highly specialised expertise of the team in the development of innovative statistical methods which can be usefully applied also in fields different from astrophysics, the LCS team is actively participating to two projects in collaboration with private companies.

The group is very active in the organisation of conferences and in the dissemination of astronomical knowledge toward the general public, also through innovative media (e.g. 3D-movie on the large scale structure of the Universe).

Dissemination of the expertises of the members of this group is already taking place toward other AIM teams and their increase is likely in the future. The significant number of LCS doctoral students and young post-docs are contributing to the scientific and social appeal of the whole AIM.

All these activities show very good interactions with the social, economic and cultural environment, both within and outside the AIM unit.

Assessment of the unit's organisation and life

All the team members, both staff, PhD students and post-docs, appear to be very well integrated around a common scientific methodology, with a very good balance between different expertises (cosmology, signal processing, innovative statistical methods). They meet regularly in internal meetings and one gets the impression of a very lively interaction and cohesion within the team, with excellent exchange of communication among members of the team in all the directions. This creates a very good team spirit.

Assessment of the unit's involvement in training through research

The PhD students and post-docs recognise a very good support from the staff members, with a good balance in the time they can dedicate to coding, scientific analysis and thinking. Also, the post-docs actively participate to the training of the PhD students.

In addition to the training of the young researchers in the team, staff members of the LCS team have organised and given lectures in a 2012 Summer School on advanced data processing and reproducible research. This is an excellent way to forward the very specialised expertises of the members of the team to young astronomers.

Assessment of the five-year plan and strategy

Considering the present state of activities and international reputation of the unit members, the future of this team and its scientists looks bright. They have a well-defined scientific strategy for the next five years in both the main fields of interest, i.e. Statistical Methods and Cosmology, and are significantly involved with well recognised responsibilities in large and high priority international projects (e.g. Planck and Euclid).

The preparation for the project Euclid (a satellite devoted to the study of the dark energy), in particular, is one of the pillars of the strategic plan. The main involvements of the team are in the weak lensing working group, in the shear estimation (OU-SHE) and in the management of the unit (OU-Le3) which is in charge of designing the algorithms to be used to derive the Euclid products. The team members, with their highly recognised expertises, are in a very good position to assure the best possible scientific return for the team of the Euclid mission. However, the recent loss of a key person in the field of weak lensing makes important for this group the hiring of a weak lensing expert who could further improve the impact and visibility of the team in view of the future exploitation of Euclid data.

In the other projects (Planck, CFHTLens, Cosmos, XXL) the plans of the team are sound and well-defined and there is no doubt that the results they will achieve will be up to the expectations.

One of the goals of the team is to create researchers with a double profile (cosmologists and statisticians). Such a profile, not often found in the astronomical community, is instead required in order to get the best possible results in the field of “precision cosmology”. In this respect, this group is quite unique in the international panorama and this is one of its main strengths.

Moreover, their plan to continue to collaborate with non-astronomical laboratories and external companies is highly commendable; this will help in transferring their knowledge outside the astronomical community, thus increasing their overall visibility.

Conclusion

- Strengths and opportunities:

One specific strength of the LCS team is that it is an interdisciplinary laboratory at the interface between cosmology, applied mathematics and signal processing. As such, it is quite unique in the international panorama of astrophysical research groups. It has a high visibility and attractiveness, as testified by the excellent young researchers from many different countries who are now members of the team.

The team is involved in large international missions, like Euclid and Planck, which are at the forefront of the present and future European space missions. Their significant involvement in these missions will give this team the possibility of applying their unique skills and expertises to the most exciting cosmological data sets.

● Weaknesses and threats:

Due to their success in fund raising, the LCS team has had the opportunity of increasing rapidly, with a significant number of bright young researchers. While this achievement is undoubtedly one of their strengths, it might however turn into a potential weakness when some of the external funds (e.g. ERC grants) will come to an end. This would imply a decrease in the number of young researchers, then the present leading position of the team might be impacted. Indeed, it will be important to keep the number of researchers at the same level as it is now, if one wants to avoid that the scientific exploitation of the data be performed by groups (possibly using tools and codes developed by LCS), other than by the team members themselves. The team leader is aware of this danger and we are confident that all possible actions will be taken to mitigate the risk.

● Recommendations:

The LCS team is encouraged to follow their strategic plan for the next five years, keeping, as done so far, the good balance between code development and scientific analysis. To do this at the highest level, it is essential that the team keeps the number and quality of young researchers at the same level as it is now, if one wants to avoid that the scientific exploitation of the data is done more by other groups (possibly using tools and codes developed by this team) than by members of the team. This requires that the staff scientists continue, as done in the past, their successful activity in fund raising. We also suggest that CEA and AIM administrations should monitor the LCS situation seriously and continuously over the next period, and eventually help them (perhaps temporarily) in case their scientific quality gets into danger due to external reasons.

Team 7 : Modélisation des Plasmas Astrophysiques (LMPA)

Name of team leader: Mr TEYSSIER

Workforce

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014	2014-2018 Number of project producers
N1: Permanent professors and similar positions	1	1	1
N2: Permanent EPST or EPIC researchers and similar positions	8	9	5
N3: Other permanent staff (without research duties)			
N4: Other professors (PREM, ECC, etc.)			
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	4	4	4
N6: Other contractual staff (without research duties)			
TOTAL N1 to N6	**13**	**14**	**10**

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	3	
Theses defended	10	
Postdoctoral students having spent at least 12 months in the unit	17	
Number of Research Supervisor Qualifications (HDR) taken	3	
Qualified research supervisors (with an HDR) or similar positions	6	5

• Detailed assessments

Assessment of scientific quality and outputs

This “Laboratory” LMPA has been created rather recently and is one of the two interdisciplinary astrophysics groups. The connecting theme is computational astrophysics with a focus on magnetised and radiative fluids and parallel computing. The head of this unit, has developed the grid-based, adaptive-refinement, and massively parallel hydrodynamics (HD) code RAMSES which has become one of the 3 most widely applied HD codes within the computational astrophysical community. It is freely accessible and maintained by the head of LMPA unit himself. The most spectacular application by LMPA of RAMSES is the cosmological well-known MareNostrum simulation with an unprecedented large mass range and spatial resolution. Further scientific highlights place the staff members at the leading edge of their research fields. Among the most prominent are the discovery of the role of cold streams in high-redshift galaxy formation, e.g. the HORIZON project, a simulated full-sky weak-lensing map using 70 billion particles, numerical modelling in the field of protostellar collapse and interstellar medium turbulence including MHD and radiation HD, and of the stellar interior.

The scientific productivity of the team is very high, with 234 refereed publications in this period, among which 29 have 50 or more citations, including 12 in first authorship in this group (with 6 different first authors) and 3 Nature/Science papers. They have given 66 presentations at conferences, including 14 invited talks. The team also produces widely-used open-source codes such as RAMSES and has obtained a patent. This is a very good score given the size of the group. In addition, they contribute strongly to the radiative transfer and opacity calculations in the context of the megajoule project.

Assessment of the unit's academic reputation and appeal

The group is one of the few labs in France providing open source codes for the international community. They play a leading role in this field and obtained an impressive amount of computation time at national supercomputing centres. They have a high visibility in France and cooperate with several leading scientists around the world. The new institute "Maison de la simulation" was also initiated by this group. The team has been extremely successful by receiving six ANR grants, two ERC grants and the Simone et Cino del Duca Prize for the team leader. The numerous invitations to conference talks demonstrate the high international reputation of the group members.

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

The group has an open mind for public outreach, as evidenced by the 3D-movie "Voyage au centre de la galaxie" which has been shown at a prominent exhibition in France. Their basic numerical codes are well-documented and freely available to the public on the web under an open access licence. The organisation of various scientific conferences by staff members also shows their dedication to serve the scientific community.

Assessment of the unit's organisation and life

The group has taken the lead in the COAST, collaboration on computational astrophysics, which includes the members of the LMPA but also a dozen scientists from all other teams of the AIM unit. They serve internally as a center of expertise and as a forum for cooperation between the people working on this topic. The group has an active life with a weekly journal club and pizza lunch with viewing of broadcasted talks from other labs, a monthly COAST-meeting and a supernova journal club. They also maintain web pages about their activities and projects.

Assessment of the unit's involvement in training through research

The group exploits its experience in numerical techniques by contributing to the teaching in 3 graduate schools and 8 undergraduate courses within and outside the Paris area. Over the reporting period, they have supervised 12 PhD students and half a dozen Master students, a number significant higher than for the other groups at AIM. Their expertise in numerical techniques can be considered as the offering of a permanent helpdesk and training tool for the other researchers at AIM. Finally, their role in (co)organising many international conferences also shows their outgoing attitude that helps to acquire or broaden the needed scientific background for other researchers.

Assessment of the five-year plan and strategy

The team proposes to focus its science on a number of fields that are very relevant in the context of present-day astrophysics and where the application of improving numerical tools will still make significant progress. It includes the advancement and maintenance of the successfully applied codes. This concerns star and planet formation, supernova modeling, stellar structure, and the treatment of physical processes at the smallest relevant scales. In order to keep up with the rapid growth of computing facilities, the LMPA intends to enter the field of exascale computing, making use of the recent developments with hardware as well as software optimisation, including hybrid OpenMP-MPI programming, GPU acceleration, and new algorithms. They also plan to contribute to the preparation and interpretation of the huge datasets that will become available through the involvement of AIM in new missions such as Euclid and others. Particularly ambitious focus of further code development and application will be dedicated to model star and galaxy formation, core-collapse supernovae, and stellar interiors, combining sub-scale physics with large-scale dynamics.

With its present size and expertise, and also in collaboration with members of the other laboratories, the team should be able to achieve these goals, although it depends partially on external funding for manpower. This needs to be acquired in national and international competition, but the track record of the group helps in obtaining that.

Conclusion

- Strengths and opportunities:

The group's strength is its broad expertise in computational astrophysics, that is linked to the main research themes of the other groups at AIM. It has a core-role for the computational work of AIM as a whole, and the team is well-connected to the other “Laboratories”. They make successful use of the newest high-performance computational facilities that arise and play a leading role in exploiting those facilities. This leading role has the potential of becoming even more prominent on a National or European level.

- Weaknesses and threats:

Up-to-date development and maintenance of open-source codes are time consuming but less profitable enterprises. The team may not get all credits they deserve through the use of their open source codes by some external partners. They have to maintain their quality in an increasing competition with both other scientific fields of computational research and other worldwide groups involved in computational astrophysics. It is important to maintain the critical size and quality of the group. There is the semi-official information to the review panel that the team leader has accepted an offer by the ETH Zurich laboratory and will leave the AIM. Since all code developer’s expertise with RAMSES will go away with him, this loss will substantially affect the other AIM groups concerning applications of this code, because direct and local cooperation will stop.

- Recommendations:

Due to the foreseen departure of the leading scientist, who has a very strong track record, it will be a challenge to find the proper replacement, but this interdisciplinary group is unique in the French context and perhaps even in Europe. It is very important to maintain this group at the appropriate high-level of expertise, not only for their prominent role within their field of expertise, but also because of the stimulating and coordinating role of the group for all other AIM laboratories. The Committee also encourages LMPA to keep on with its strategy on open sources.

Team 8 : Spectro-Imageurs Spatiaux (LSIS)

Name of team leader: Mr LIMOUSIN

Workforce

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014	2014-2018 Number of project producers
N1: Permanent professors and similar positions			
N2: Permanent EPST or EPIC researchers and similar positions	5	5	5
N3: Other permanent staff (without research duties)	7	7	
N4: Other professors (PREM, ECC, etc.)			
N5: Other EPST or EPIC researchers (DREM, Postdoctoral students, visitors, etc.)	2	2	2
N6: Other contractual staff (without research duties)			
TOTAL N1 to N6	**14**	**14**	**7**

Team workforce	Number as at 30/06/2012	Number as at 01/01/2014
Doctoral students	2	
Theses defended	2	
Postdoctoral students having spent at least 12 months in the unit	7	
Number of Research Supervisor Qualifications (HDR) taken		
Qualified research supervisors (with an HDR) or similar positions	3	4

• Detailed assessments

Assessment of scientific quality and outputs

The LSIS "Laboratory" was recently formed (2010) by the merging of the Space Detection Laboratory, keeping the same people, and the Space Detection Group mission and management. LSIS has a staff of 19 persons including 13 having permanent positions, all on CEA positions. LSIS employs CDD people for short term contracts, and there are 3 post-docs and one apprentice. At present, there are 2 PhD students within the team.

LSIS mission is Research and Technology (R&T) on detectors from far Infra-Red up to Gamma-rays. Mainly oriented around bolometers detectors and micro-calorimeters, the LSIS has also a strong activity on direct ionisation detectors like CMOS-MCT visible and NIR range, X-ray and γ-rays semiconductors.

The strategy of LSIS over the next 10-15 years is clear: reach level TRL6 (Technical Readiness Level) of space qualification for the major part of their production. Since LSIS in involved in R&T from innovative concepts up to flight development, this team works with other teams within the AIM unit: instrumentation labs; Astrophysics labs and all technical divisions inside IRFU (the "Institut de Recherche sur les lois Fondamentales de l'Univers", a CEA subgroup; with SEDI and SIS mainly) and with CEA technological labs (LETI, LIST, INAC, PTA, a.s.o…).

External collaboration is also very important, particularly with other CNRS units or institutes (IRAP, Neel, CSNSM, IAC, APC, LPN …). Collaboration with industry, widely encouraged by CEA, is a specificity of the LSIS team. Work with subcontractors like 3D-Plus, Acrorad, HightTec, Sofradir etc… is extremely efficient and productive. International collaborations with agencies like CNES, JAXA, ESA and NASA give an excellent visibility to the group.

Regarding publications, LSIS is very productive for a technical "Laboratory". Over the reporting period 79 publications have been produced, yielding over 900 citations. Out of these 79 publications, 31 appeared in peer review journals, 33 in reviewed proceeding, and 15 in proceedings. There have been also 4 patents during the period.

Assessment of the unit's academic reputation and appeal

At LSIS all post-docs are foreign people ; they are mainly funded by CNES, ESA, ERC, ANR etc… This appeal to foreign post-docs and PhD students is certainly due the external visibilty, and very likely to the international reputation of LSIS in AIM and CEA. Attractivity results also from the high level of publications produced by LSIS.

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

Interaction with social environment is reduced due to the specific activities of LSIS, while interaction with industry is very good and, in return, the industry is aware of the capabilities and excellence of this team.

Assessment of the unit's organisation and life

Organisation of the team looks very efficient and its results in R&T largely support this impression. External collaborations are more and more necessary due to difficult improvement in technics. In each domain, the personnel is at the cutting edge of their domain, and age distribution gives a good hope for the next 10 years.

Assessment of the unit's involvement in training through research

Main LSIS members are publishing and/or attend several workshops or technical congresses. They are recognised as specialists on bolometers, and especially, on direct ionisation detectors.

Looking at the main goals in project, there will be no problem for the future of the team. A list of improvement in X-Ray detectors arranged in microcalorimeter arrays; Spectrometric bolometers in sub- and mm ranges. Ultra high sensitivity in sub-mm bolometers. CdTe on chip R&D and 3D-integration is a huge and challenging project. Large surface Silicon strip detectors is also a new idea, with great prospects. Polarimetric detectors, and integration (yet in progress) of pixel functions (M-CDS & ADC…). At last, the development of a new MCT IM/MIR infrared detector and characterisation.

All these items will be reachable provided that the LSIS team maintains a constant upgrade of his staff of engineers.

Assessment of the five-year plan and strategy

As written above, ideas and challenges are pretty numerous, and it will be necessary to maintain the technicality and productivity level of the team. Overlap of competences in positions to be left is also important to keep in mind. LSIS however has a good workload planning for the next few years. Its projects depend on space projects which can be canceled or delayed. But, due to the large number of projects LSIS can be considered as relatively free from risk of lacking interesting projects.

Conclusion

- Strengths and opportunities:

Expertise, several areas of activities and complementary competences in the group, strong visibility from space agencies. Cutting-edge R&T with good perception of future needs for detectors. Necessary equipments, including clean rooms, for all the R&D domains are pretty good and up-to-date. This is mandatory to achieve a strong level of performance in prototypes of detectors. Each sub-group is well managed and seems to be aware of the necessity of adapting people competences. Exceptional and recognised expertise in space imaging spectrometers.

Another strength is that CEA status is more flexible than CNRS's, and hiring of high level people is facilitated by better salaries in CEA at the start of the career. At CEA, all engineers are considered as researchers and this feature is attractive for young graduated from engineering schools.

- Weaknesses and threats:

A R&D development for space program has initially no direct connection with a particular approved program, such that it is not easy to join a project at its start without the collaboration of a researcher having implication in the science side of a project.

For PhD students, the backside of R&D or space project development is the timescale, much longer than the normal duration of a thesis, which impacts on the attractivity despite available funding programs.

The big problem at AIM, and not especially for LSIS, resides in the housing. Space available for offices and technical activities is pretty small. This is certainly due to the large number of PhDs and post-docs. Some workshops are not so well organised in terms of surface as it would be expected for so sharp works. Electronics workshop and measurement labs are small and noisy (due to low temperature pumps).

- Recommendations:

The team should maintain a good balance between pure R&D, not committed to a specific space project, and involvement with delivery(ies) in one or two approved projects.

It would be nice if a number of non-permanent positions could again be transformed into permanent ones as this was the case for 3 persons in the previous contract.

5 • Conduct of the visit

Visit dates:

Start: 23 January 2013 at 09:45

End: 25 January 2013 at 16:30

Visit site: Only one location at AIM

Institution: AIM

Address : Service d'Astrophysique
CEA - Saclay
Orme des Merisiers, Bat 709
F-91191 Gif sur Yvette Cedex

Specific premises visited:

Laboratory for detectors, sub-mm instrumentation, clean room, Detector characterisation lab.

Conduct or programme of visit:

Wednesday 23 January

9h45 - 10h15	Welcome (Room 03; building 709)
10h15 - 10h45	Committee closed session: Goals and Methods (Committee members and AERES delegate) (Room 03; building 709)
10h50 – 13h00	*Morning session: presentations open to all; (room Galilée; building 713C)*
10h50 - 11h00	Introduction to the visit by the AERES delegate
11h00 - 12h00	General presentation, Pierre-Olivier Lagage (40 min + 20 min questions)
12h00 - 13h00	Science highlights and research programs by teams
•	Cosmology and Galaxy Evolution (LCEG), David Elbaz (15 min + 15 min questions)
•	Star Formation and Interstellar medium (LFEMI) - Marc Sauvage (15 min + 15 min questions)
13h00 - 14h00	LUNCH (Committee members + direction and team leaders, (room Copernic))
14h00 – 17h30	*Afternoon session: presentation open to all; (room Galilée; building 713C)*
14h00 - 16h00	Science highlights and research programs by teams (continued)
•	Stars Dynamics and their environment (LDEE)- Sacha Brun (15 min + 15 min questions)
•	Rings, disks and planets (LADP) - Cécile Ferrari (15 min + 15 min questions)
•	High Energy Cosmic Phenomena (LPCHE)- Jérome Rodriguez (15 min + 15 min questions)
•	Cosmo-Stat (LCS) - Jean-Luc Starck (15 min + 15 min questions)
16h00 - 16h30	Coffee break

16h30 – 17h30 Science highlights and research programs by teams (end)

- Modelling of astrophysics plasmas (LMPA) – Romain Teyssier (15 min + 15 min questions)
- Spectro-imagers for space (LSIS) – Olivier Limousin (15 min + 15 min questions)

17h30 -18h30 : internal discussions of the committee (Salle 03; building 709)

18h30 to the Hotel

Thursday 24 January

8h30 from the hotel to AIM

9h00 – 10h45 Meeting the teams (2 teams in parallel) (team members + committee members + AERES delegate) (room 03 and TBD; building 709)

9h00 – 9h45 LPMA LSIS

Coffee available

10h00-10h45 LCS LDEE

11h – 13h00 Laboratory visits (staff, direction, committee members + AERES delegate)

11h00 – 11h45 CdTe detectors and participation to Solar Orbiter (Clean room)

12h00 -- 13h00 sub-mm instrumentation : ARTEMIS… (bat 713)

13h00 – 14h00 Lunch Buffet with Committee and Staff (Hall building 713)

14h00 – 15h45 Meeting the teams (2 teams in parallel) (continued) (team members + committee members + AERES delegate) (room 03 and TBD; building 709)

14h00 – 14h45 LCEG LADP

15h00 – 15h45 LFEMI LPCHE

16h00 – 17h30 Discussions with Staff (coffee available)

16h00 – 16h45 Discussion with PhD students and Post-docs (room 03)

17h00 – 17h30 Discussion with « conseil de laboratoire » (room 03)

17h30 - … Closed meeting of the committee

Friday 26 January

9h00 – 11h00 Laboratory visits (continued) (staff, direction, committee members + AERES delegate)

9h00 – 9h45 R&D bolo-X

10h15 -11h00 Visit of VIS-IR detector characterization lab and associated projects; Euclid…

11h00 – 11h15 discussion with administrative and technician staff (room 03) (Committee members and AERES delegate)

11h15 – 12h00 discussion with the staff other than administrative and technician (Committee members and AERES delegate)

12h00 – 13h00 Meeting of the committee with representatives from funding agencies (Committee members and AERES delegate)

13h00 – 14h00	Lunch (Committee members and AERES delegate)
14h00 – 15h00	Discussion with the direction (Committee members and AERES delegate)
15h00 - …	Committee closed session (Committee members and AERES delegate)
16h30 –	end

Specific points to be mentioned:

Very well organised, excellent and constructive spirit everywhere with great openess. Impressive facilities and comprehensive documentation provided by the management staff.

6 • Statistics by field: ST on 10/06/2013

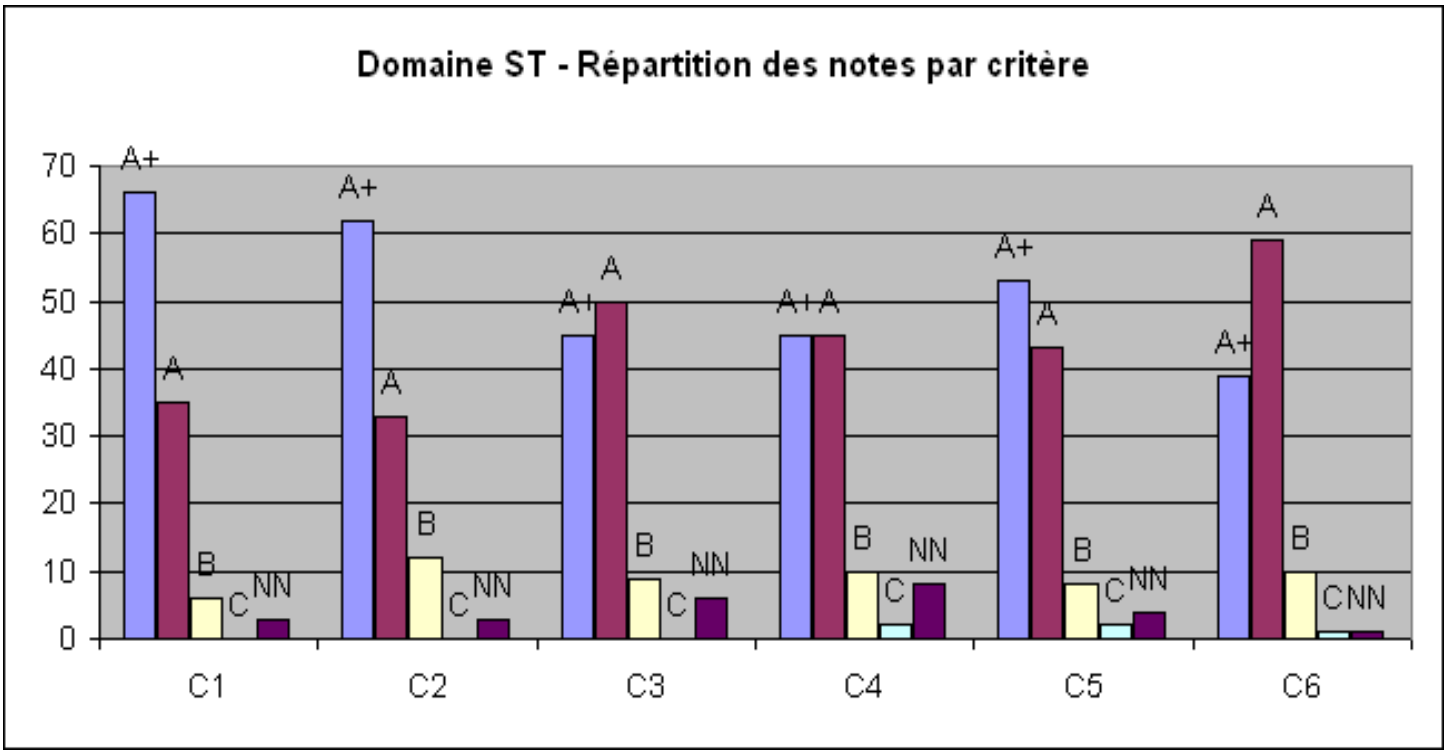
Grades

Critères	C1 Qualité scientifique et production	C2 Rayonnement et attractivité académiques	C3 Relations avec l'environnement social, économique et culturel	C4 Organisation et vie de l'entité	C5 Implication dans la formation par la recherche	C6 Stratégie et projet à cinq ans
A+	66	62	45	45	53	39
A	35	33	50	45	43	59
B	6	12	9	10	8	10
C	0	0	0	2	2	1
Non Noté	3	3	6	8	4	1

Percentages

Critères	C1 Qualité scientifique et production	C2 Rayonnement et attractivité académiques	C3 Relations avec l'environnement social, économique et culturel	C4 Organisation et vie de l'entité	C5 Implication dans la formation par la recherche	C6 Stratégie et projet à cinq ans
A+	60%	56%	41%	41%	48%	35%
A	32%	30%	45%	41%	39%	54%
B	5%	11%	8%	9%	7%	9%
C	0%	0%	0%	2%	2%	1%
Non Noté	3%	3%	5%	7%	4%	1%

Histogram



7 • Supervising bodies' general comments

Le Président

P/VB/MB/RL/YM – 2013 - 105
Paris, le 19 avril 2013

M. Pierre Glaudes
Directeur de la section des unités de l'AERES
20 rue Vivienne
75002 PARIS

S2PUR140006410 - Astrophysique, Interprétation - Modélisation, Paris-Saclay - AIM - 0751723R

Monsieur le Directeur,

Je vous remercie, ainsi que les membres du comité de visite, pour l'envoi du rapport d'évaluation concernant l'unité Astrophysique Instrumentation Modélisation (AIM), rapport qui souligne l'excellence de la qualité de la recherche qui est produite, attestée par le haut niveau qualitatif et quantitatif des publications, tant au niveau national qu'international.

Je me réjouis également des commentaires très élogieux qui sont portés sur le laboratoire d'instrumentation soutenu par l'Université Paris 7-Denis Diderot et les tutelles partenaires, et sur la capacité de l'unité à lever des fonds sur des appels à projets dont le Labex Uivearths ou d'autres appel d'offres nationaux ou internationaux.

Enfin, le comité mentionne que l'unité est trop dépendante de postes temporaires (45% de l'ensemble des personnels) et qu'il existe donc un risque de perte d'expertise clé évident et inévitable si la situation ne change pas. L'université et ses partenaires tenteront, dans un dialogue, de prendre en compte cette remarque, à la hauteur de leurs moyens.

Je vous prie d'agréer, Monsieur le Directeur, l'expression de toute ma considération.

Vincent Berger

université PARIS DIDEROT PARIS 7

Tél +33 (0) 1 57 27 55 10
Fax +33 (0) 1 57 27 55 11
secretariat.president@univ-paris-diderot.fr
www.univ-paris-diderot.fr

Adresse Postale
Présidence
Grands Moulins
75205 Paris Cedex 13

www.cnrs.fr

Campus Gérard-Mégie
3, rue Michel Ange
75794 Paris Cedex 16

T. 01.44.96.40.00

Objet : Observations sur le rapport AERES

Astrophysique, Instrumentation et Modélisation, de Paris-Saclay (AIM – UMR 7158)

Je prends bonne note du rapport d'évaluation de l'Unité AIM par le comité AERES et remercie les membres du travail approfondi qui a été fourni et qui doit permettre aux tutelles du laboratoire de poursuivre leurs soutiens. Je tiens cependant à nuancer la remarque faite à propos du projet SKA dans les recommandations destinées à l'équipe LEPCHE. Il est en effet écrit :

« The participation to SKA (Square Kilometer Array), often mentioned also in view of a lack of a significant interest in the project from the French side, could be important from the multi wavelength point of view, but could also result in a loss of focus for the group ».

L'opportunité ne m'a pas été donnée pendant la rencontre avec le comité de préciser un point qui n'était peut-être pas entièrement connu du laboratoire. D'importantes actions ont été entreprises depuis 6 mois et la France a maintenant une position d'invité au Board de SKA bien que non partenaire de la société UK qui gère SKA. SKA a été placé dans la prospective INSU-AA 2009 dans les grands projets après ELT et CTA, naturellement pour des questions de programmation budgétaire et calendaire mais aussi de maturité. En ce sens un important travail de développement R&D est mené en France avec plusieurs démonstrateurs en opération à Nançay. Nous avons également mis en place en 2009 une Action Spécifique (AS-SKA/LOFAR) de la CSAA destinée à promouvoir ces deux grandes opérations et à préparer la communauté française. Cette action est depuis cet hiver sous la responsabilité de Stéphane Corbel, membre du laboratoire AIM.

La recommandation du comité garde néanmoins toute sa pertinence vis-à-vis de l'équipe.

Fait à Paris, le 12 Avril 2013

Denis MOURARD
Directeur Adjoint Scientifique
Domaine Astronomie-Astrophysique

Laboratoire d'Astrophysique, Instrumentation-Modélisation, de Paris-Saclay
Université Paris Diderot, CEA-Irfu, CNRS-INSU

Saclay, le 12 avril 2013

Pierre-Olivier LAGAGE
Directeur

A l'attention de l'AERES

N/Réf. : 07-04-13.pol-1

Objet : Commentaire sur le rapport AERES de l'UMR AIM

Nous tenons à souligner l'excellent travail du comité. Il n'était pas facile d'appréhender une unité comme AIM qui a un très large spectre d'activités, qui a des spécificités liées à sa tutelle CEA…

Nous remercions le comité pour la qualité des échanges que nous avons eus lors de sa visite.

Pierre-Olivier Lagage

Centre d'Etudes de SACLAY
Point courrier N° 131
ORME DES MERISIERS – BAT. 709
F-91191 GIF-SUR-YVETTE CEDEX
FRANCE
Tel : 33 1 69 08 88 12
33 1 69 08 52 18
Fax : 33 1 69 08 65 77