



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

Research Units Department

AERES report on unit:

Observatoire Astronomique de Strasbourg

UMR 7550

Under the supervision of the following  
institutions and research bodies:

Université de Strasbourg

Centre National de la Recherche Scientifique



January 2012

## Unit

Name of unit:	Observatoire Astronomique de Strasbourg
Acronym of unit:	
Label requested:	UMR
Present no.:	UMR 7550
Name of Director (2009-2012):	Mr Hervé WOZNIAK
Name of project leader (2013-2017):	Mr Hervé WOZNIAK

## Members of the committee of experts

Chair:	Mr Laurent VIGROUX, Paris
Experts:	Mr Pascal BALLESTER, Garching bei München, Germany
	Ms Véronique BUAT, Marseille
	Ms Maryvonne GERIN, Paris (representative of the CNRS)
	Mr Christian GUILLAUME, Saint Michel l'Observatoire
	Mr Jelle KAASTRA, Utrecht, The Netherlands
	Mr Henri MAÎTRE, Paris
	Mr Mark McCAUGHREAN, Noordwijk, The Netherlands
	Ms Roser PELLÓ, Toulouse (representative of the CNAP)
	Mr Christophe SAUTY, Meudon (representative of the CNU)



# | Representatives present during the visit

Scientific Delegate representing AERES:

Mr Jean-Louis BOUGERET

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

Mr Éric WESTHOF, University of Strasbourg

Mr Claude ZEIPPEN, INSU/CNRS



# Report

## 1 • Introduction

### Date and conduct of visit:

The visit of the Observatoire Astronomique de Strasbourg took place on January 11 and 12<sup>th</sup>, the whole days, followed by half a day on the 13<sup>th</sup> for the committee in closed session to prepare the report and the main recommendations. On the 11<sup>th</sup>, following a closed session of the committee, the presentations started by an overview given by the Observatory's Director. It was followed by a presentation on the Observatory activities in Education. Then, each of the 3 scientific teams of the Observatory made a presentation of their activities. This was followed by a visit of the different observatory buildings, with a description of the project to build a new pedagogical telescope. After the visit, the committee met with the technical and administrative staff, the members of the Observatory advisory committee, and the group of professors and associate professors. In the morning of the second day, there was a long exchange of opinions between the representative of the Strasbourg University and CNRS (INSU representative and the Regional Director). The end of the morning was dedicated to interviews with the scientists from the 3 research teams, and the PhD students and post-docs. After a lunch buffet with the whole staff, the visit ended by discussions with the head of the Centre de Données de Strasbourg (CDS), and finally with the director of the Observatory.

The committee wants to thank the management team of the Observatory as well as the whole staff for the very good organization of the meeting and for the openness of discussion. Everything was very well prepared, the documentation was adequate and delivered on time. The overall spirit of the meeting was friendly, professional and constructive.

### History and geographical location of the unit, and overall description of its field and activities:

The Observatory of Strasbourg is an historical observatory built in the middle of 19<sup>th</sup> century. As in most observatories in continental Europe, it is not used anymore for astronomical observations but as support for research, and education. The Observatory includes the Centre de Données de Strasbourg (CDS), who was the pioneering place for the development of concepts and tools in domains which are now known as Virtual Observatory. The CDS is a unique mixture of technical developments, service to the community, and research in astrophysics. The CDS is unique in France, and even, as such, in Europe. In addition to the CDS, two scientific teams focus their activities on galaxies, with emphasis on our own Galaxy for the first one and High Energy astrophysics for the second. The High Energy team is also engaged in the XMM/Newton Science Survey Center.

The Observatory is a joint unit of CNRS and the University of Strasbourg: Unité Mixte de Recherche 7550. But it is also an Observatoire des Sciences de l'Univers (OSU) inside the Université de Strasbourg (UDS). As an OSU, it has also observation duties to serve the general public and the astronomical community, and teaching responsibilities and duties within the university. The Observatory has a large visibility in the local community, combining historical and modern science aspects.

It should be noted that another OSU, l'Ecole et Observatoire des Sciences de la Terre, is hosted by the University of Strasbourg (UDS). Merging of the 2 OSUs has been pushed by the CNRS/INSU, and the UDS, but discussion are still ongoing. This point will be discussed more extensively in Sections 2 and 3 of the present report

### Management team:

The management team is composed of the Director of the Observatory, Hervé Wozniak, and the Director of CDS, Françoise Genova.



Unit workforce:

Workforce	Number on 06/30/2011	Number on 01/01/2013	2013-2017 Number of producers**
<b>N1:</b> Professors or assistant professors	18	18	18
<b>N2:</b> EPST or EPIC researchers	10	10	9
<b>N3:</b> Other professors and researchers	4	2	2
<b>N4:</b> Engineers, technicians and administrative staff *on a permanent position	25 [23.8]	26 [24.8]	
<b>N5:</b> Engineers, technicians and administrative staff * on a non-permanent position	5		
<b>N6:</b> Postdoctoral students having spent at least 12 months in the unit	6		
<b>N7:</b> Doctoral students	5		
<b>N8:</b> PhD defended	15		
<b>N9:</b> Number of Habilitations to Direct Research (HDR) defended	2		
<b>N10:</b> People habilitated to direct research or similar	20	21	
<b>TOTAL N1 to N7</b>	73	56	29

\* If different, indicate corresponding FTEs in brackets.

\*\* Number of producers in the [01/01/2007-06/30/2011] period who will be present in 2013-2017.



## 2 • Assessment of the unit

### Overall opinion on the unit:

The Visiting committee had an overall excellent opinion of the Observatory. Internationally, the Observatory is mainly known by one of its component, the Centre de Données de Strasbourg. The CDS has a unique position which is recognized worldwide as a key institute for the developments of efficient tools to have access to large database, and added value software to extract information from them and putting all the database contents in correspondence. Beyond the historical SIMBAD, which remains the international reference for cross identification and information on astronomical sources, tools like VIZIER for catalogue handling, and ALADIN for multiwavelength images superposition, have been developed since the mid-nineties and are now widely used by astronomers everywhere in the world. The CDS has been a pioneer of the Virtual Observatory (VO) since its beginning in the early 2000's and is still a leader in the development of the VO. The importance of the CDS at national level has been recognized for a long time and it was granted the status of Très Grande Infrastructure de Recherche (TGIR) in 2008.

But the Observatory is not limited to the CDS. At the French scale, it is a mid size research unit, with some prominent researchers, including young people already leader in their field. Scientific researches focus on a small number of topics, which is a good strategy to reach critical mass and visibility. Scientific productivity is high, as can be seen from the publication rate, about 100 papers/year, by the percentage of HDR, more than 50% of scientific staff, and by the number of research contracts obtained from French agencies like the ANR, or from European funds. The Observatory is well implanted in the Strasbourg University. It is leading the Astrophysics part of the Master in Physics of the UDS, but is also involved in other domains, like Computer Science. Thanks to strong outreach activities, the Observatory has a high visibility in the Strasbourg social life, with a visibility extending beyond the town to the whole region.

### Strengths and opportunities:

The CDS is the main strength of the Observatory. As a TGIR, it benefits from a national recognition, which should ensure a high level of resources. The international visibility of the CDS is also an asset to attract young scientists and research contracts.

The local implantation of the Observatory, together as one important component of the Strasbourg University and a player in the social life, is excellent. It has a strong impact in the University teaching programs, which is good for the diffusion of astronomy among the students of the University.

The research teams have many excellent researchers, with a flat age distribution, which will ensure a good continuity of the research quality. The Observatory scientific staff is well engaged in several European large projects, XMM and GAIA in particular. Large programs on ground based and space observatories, the exponential development of wide field observations, and the importance of large spectral catalogues strengthen the need for new tools to get the best use of these data. Data mining and cross matching between large data bases will become more and more important. The CDS and the Observatory teams are ideally suited to contribute to this evolution.

The proximity of the CDS and the existence of a scientific team inside the CDS are strong advantages for the researches performed in the observatory. The scientists benefit from the expertise of the CDS engineers to use innovative tools for their own research, and can also trigger new developments for their own purpose. Several examples of the advantage of this synergy have been presented by the scientific teams during the visit. In this context, the committee wants to stress the importance of the group of scientists associated with the CDS. They are vital as go-between the astronomers inside the Observatory, as well as the whole astronomical community.

### Weaknesses and risks:

To maintain the quality of CDS services and development is at risk. The exponential increase of published papers in astronomy creates a similar increase of the workload, which has not been compensated by a staff increase. In addition, several key engineers and astronomers will retire soon. Without a proper reaction by the funding authorities of the CDS, these 2 effects can create a situation where the CDS would not continue to fulfil its commitments. Due to the fact that the retiring people belong to different organizations, University of Strasbourg, CNRS and CNAP a coordinated plan should be agreed on and worked out by the 3 partners, each of them having different rules and priorities.

As explained above, astronomy with large databases is rapidly growing, and new projects like GAIA and EUCLID in space or the LSST (Large Synoptic Survey Telescope) and later SKA (Square Kilometer Array) on the ground will



create data-bases, images, spectra, and catalogs several orders of magnitude larger than existing facilities. How to engage the Observatory and the CDS in these projects remains to be defined. CDS has limited resources, and is providing services, which are becoming more and more transparent for the clients. Keeping the CDS brand well identified requires that CDS and the scientific teams of the Observatory works together and develop a participation strategy in all these projects, in particular in their initial phases, where the Observatory expertise is the most valuable. How to keep the CDS visibility and how to ensure involvement of the Observatory teams in these new and very large projects? This is the largest challenge of the Observatory for its long term existence. The committee was pleased to see how this was done for GAIA, but recognizes weak participation in future large projects beyond GAIA. The committee would like to encourage the Observatory staff to define a long term strategy for their involvement in new projects, with an emphasis on project relevant for their scientific programs, and sources of very large data flow.

The local environment of the Observatory is changing. The most noticeable fact is the creation of the University of Strasbourg from the merging of the 3 previous universities. Even if the University Vice-President for research has ensured the committee of the strong support of the new university for the Observatory, there is a possible risk that the position of the Observatory would become less prominent in this new larger structure than in the previous configuration.

To improve the quality of services, the University, together with the CNRS would like to create more centralized administrative services. While the committee understands the rationale behind this approach, it wants to convey to the University and to the CNRS, the fear of the Observatory staff of losing a very efficient proximity service.

Perhaps a more serious issue for the long term is the wish expressed by the CNRS and the University to create a new and larger Observatoire des Sciences de l'Univers by merging the 2 existing OSUs : the Observatoire de Strasbourg, and the Ecole et Observatoire des Sciences de la Terre (EOST). It was not on the remit of the committee to evaluate this evolution. Nevertheless, the committee would like to stress that this topic came many time in the discussion with the staff. It is a strong concern for them. From the committee point of view, the scientific rationale behind this operation seems weak. Even if all administrative difficulties are solved, this operation might be at risk for the future of the Observatory by the introduction of a new layer between the Observatory and the management of the University. The committee would like to recommend that, at minimum, in case of a merging, the CDS should remain an international facility, which means at least to maintain authority on the staff and to have mid term and long term priorities decided at the CDS level, with the help of its own advisory committees. For the Observatory as a whole, such an operation should be associated with new development possibilities for the astronomical observatory.

This evolution of the OSU in the University would have also an impact on the teaching of astronomy in the University. For the time being, this is done in the framework of the Master of Physics at Graduate level, but in the Ecole Doctorale Earth Sciences, the Universe and the Environment at PhD level. Professors and associate professors from the Observatory are responsible for the teaching in the Master courses, and are part of the Ecole Doctorale. The committee has noted the very small number of PhD students inside the Observatory. It is well below what it must be and certainly lower than the scientific team capability to have PhD students. It is one strong weakness of the present situation. The committee noted that most, even if not all, interactions of the Observatory staff inside the University are with physics, applied mathematics and computer science departments. In that respect, a move of astrophysics inside an ED with physicists could be considered. It might help to solve the deficit of PhD students by a larger numbers of PhD contracts available for the ED in Physics as a whole. A merging of the 2 OSUs would at the opposite strengthen the present ED Sciences de l'Univers. In that case, rules should be changed to allow the Observatory to get more PhD students.

### Recommendations:

These are recommendations for the Observatory as a whole. Specific recommendations for each of the teams are given at the end of the relevant sections.

The Observatory, the University of Strasbourg and the CDS should work together to ensure continuity in the quality of services provided by the CDS to the astronomical community. This implies a staffing plan that takes into account the retirement of key personnel and the increase of workload. It also implies that the CDS keeps its capability to define internally, with the help of its own advisory committees, the best strategy for new developments.

The Observatory should be more proactive to look for additional supports, through research contracts with national agencies like the ANR, or European agencies, but also with the local world, e.g. sponsorship by private foundations or partnership with industry, in particular IT companies.



The Observatory should define a strategy for the long term, revisiting its role vis-à-vis of the future very large projects and the associated exponential increase of data flows.

The Observatory and the University of Strasbourg should work together to define the best strategy for the future of the Observatory inside the new University context. On several important issues like the merging of the 2 OSUs, or a change of Ecole Doctorale, the Observatory needs to make well defined proposals to the University and the CNRS based on its own analysis of the pro and cons of these changes.





### 3 • Detailed assessments

#### Assessment of scientific quality and production:

The Observatory of Strasbourg has a unique position in the French system. On one hand it is a normal research unit with a scientific staff of 28 FTE. While smaller than the largest French laboratories in the field of astrophysics, it is still a reasonable size for a research unit. On the other hand, the Observatory hosts the Centre des Données de Strasbourg (CDS), a unit providing services to the astronomical community worldwide. For a long time, there was confusion between the CDS and the Observatory. This is no more the case. The Observatory scientific teams have their own research projects, even if they take advantage of their close links with the CDS; and the CDS has been recognized as a TGIR, a status that ensures autonomy to the CDS: a director nominated by the CNRS, its own scientific committee, and its own funding. Several astronomers are working inside the CDS. In that sense, the Observatory has 3 scientific teams: a team “Galaxies”, a team “high Energy Astrophysics” and the CDS. Evaluation of the Observatory requires evaluating the 3 scientific teams, but keeping in mind the special role of the CDS.

This organization in 3 teams does not prevent internal collaborations between scientists, 10% of the publications have authors members of more than one team. This is a very good demonstration of the internal communication inside the Observatory. It should also be noted that the CDS scientists are working with the other teams very efficiently, adding their own expertise in data mining and Virtual Observatory capabilities. The age distribution of researchers has a peak at 40, with 5 persons below 35. Several of them are prominent in their domain and are acting as efficient leaders. This ensures a good vitality of the teams, which can be judged by the high level of publications: 89 papers in 2010, which represent an average of 3 papers a year per researcher. All scientists but one are producing scientific papers and 20 ( $\approx 2/3$ ) of them have a HDR. It should be pointed out that the scientific teams have a wide range of skills, ranging from observations to theory and numerical simulations. This ensures a high quality of research activities done in the Observatory. Some of the results obtained by the teams have had a very large international impact. One highlight among many others is the work done on the stellar halo of M31.

The initial tool developed by the CDS was SIMBAD, a data bank with information like position, photometry, classification and published papers on stars. The SIMBAD software was a breakthrough in astronomy, and has become rapidly an invaluable tool for many astronomers all over the world. Now SIMBAD has been extended to all astronomical sources, and additional tools have been developed to deal with catalogs (VIZIER) and to analyze multi-wavelength images (ALADIN). The CDS was a pioneer in the development of the Virtual Observatory, and remains a world leader in this field.

Thanks to the high quality of the research performed by the teams, and to the quality of the services provided by the CDS, the Observatory of Strasbourg has a national and international recognition much larger than research units of similar size in France.

#### Assessment of the unit's integration into its environment:

The Observatory is an historical place in the heart of Strasbourg, and the local community sees it as an important patrimony for the cultural life. Frequently, local newspapers report on the finding obtained by the staff of the Observatory and they publish interviews of the staff. The Observatory has a vigorous outreach program, with activities directed toward the general public and schools, e.g. visits of the historical telescope. Until 2008, the Observatory owned the planetarium, which has been transferred now to a new structure, “Le jardin des Sciences”. However, there are still many activities in common between the Observatory and the Planetarium. The Observatory is also proactive to strengthen relationships with amateur astronomers societies, and the Observatory hosts 3 of them. They are involved in the refurbishment of the historical part of the Observatory. Common activities have been developed with the planetarium. The inventory and the refurbishment of the Observatory patrimony have been supported by public funds only. It is an area where it is possible to get the support from private donors, as was done at the Nice Observatory. The finalization of the restoration is presently slowed down by the lack of public funding. The Observatory might be more proactive to seek for private funds.

#### Assessment of the research unit's reputation and drawing power:

The Observatory is well recognized internationally, and was able to attract many foreign researchers. 28% of the scientific staff is non-French. In the last 5 years, the staff has been increased by 8 people. Two of them who had already positions in others laboratories in France, have decided to move to Strasbourg. The other ones got their position through very selective competition in CNRS, CNAP and the Strasbourg University. For the two associate professor positions at the University, there were 24 and 27 candidates, respectively, which is a high value for this kind of position in France. All these indicators demonstrate the high attractiveness of the Strasbourg Observatory.



The quality of the staff can also be inferred from the large numbers of national and international awards obtained. Awards were granted to the Observatory staff: The Victor Noury prize from the French Academy of Science, 2 CNRS médailles de bronze and 2 SFZA prizes recognizing the excellence of young scientists, and the Stroobant prize from the Royal Academy of Science in Belgium.

#### Assessment of the unit's governance and life:

The committee took note with pleasure of the good spirit prevailing in the Observatory. All the discussion with the teams and the technical staff have been very open, and demonstrated the good relation between the different components. The governance seems to be efficient and have set up an appropriate advisory structure to ensure the staff participation in the decision process. Two committee members, who were also part of the previous visiting committee, have noticed a strong improvement of the staff morale. This should be credited to the management team. The discussion with the University and the CNRS representatives has shown a good relationship between the Observatory director and the local authorities. Members of the Observatories are part of scientific committees in the Universities, like its scientific Council or the Collegiums Science Council, and in CNRS at the highest level, since one of the staff members is chairing the Astronomy section of the Comité National de la Recherche Scientifique. Both CNRS and University have explained the importance of the Observatory in their future plan, as well as the role of the Observatory for the local public life. The Observatory is well managed, with a strong position in the local academic and social world.

The role of the Observatory reaches beyond the Strasbourg area. It is part of the European Confederation of Upper Rhine Universities, and has developed strong collaboration for education in astrophysics with the universities of Freiburg and Basel. This is a signature of openness. The Observatory management is willing to create development opportunities by widening its local horizon, and the staff shares this. For the time being, these relationships are mainly directed toward the academic world, and the public through a strong outreach program, in particular with the amateur astronomers societies. The committee would like to encourage the Observatory management to strengthen the relationship with the industry world, which could be a source of support in several domains, like restoration of the historical part of the Observatory of partnership with IT companies for R & D in software development.

#### Assessment of the strategy and 5-year project:

The documents presented to the committee as well as the discussion with the teams, the funding agencies and the management of the Observatory have been enlightening to assess the strategic plan of the Observatory for the near future. This plan appears well thought, based on the strength of the Observatory and in line with existing or foreseen size and skills of the staff. Nevertheless, risks exist that the rapidly evolving environment of the research and training organization in the Strasbourg area might hamper the realization of this plan. The committee wants to stress several points:

The success of the CDS is based on a few individuals. Some of them have already or will retire soon. Without a proper replacement plan, CDS will not be able to maintain its position. And even worse, the actual workload increase requires a rapid increase of the staff. CNRS and Strasbourg University should take this situation into account. The Strasbourg University has gone through a major transformation with the merging of the 3 previous universities. This automatically decreases the weight of the Observatory inside the new structure. Care must be taken to keep the Observatory among the priorities of the new structure. As a side effect, the University and the CNRS would like to centralize administrative support to the laboratories to improve the quality of services. Even if the goals could be understood, there is a strong fear by the personal that it would be detrimental to the services provided by the present proximity scheme.

The Strasbourg University and the CNRS are pushing to merge the 2 OSU that exist in the University. The second one, the Ecole and Observatoire des Sciences de la Terre, as indicated by its name, is focused on Earth Science and environmental issues. It encompasses an engineering school, which required specific administrative rules. It does not seem to have strong scientific programs common between the 2 OSUs, and, even if the committee was not officially in charge of the evaluation of this evolution, the committee would like to stress that this possible merging is a strong worry for the whole staff, scientific and technical, which is shared by the committee. The committee wants to recommend that, if this merging would occur, the priorities and the resource allocation of the Observatory should be maintained, based on choices recommended by its own advisory structure. In particular, this merging should not hamper the needed collaboration of the Observatory with Physics and Computer Science inside the University, in particular for training and student attractiveness. In addition, the importance of the CDS beyond the new OSU should be recognized, and the level of resources guaranteed, without dilution in a new common service structure.



There are also several risk factors that are more specific to the research field of the Observatory. The first being the future of high-energy space missions. The Observatory has been very successful in getting a strong involvement in the XMM/Newton mission. But no new European mission has been accepted so far. The Observatory staff is involved in the ATHENA proposal for an ESA mission. But if ATHENA is not accepted, the High Energy team should look for a backup plan. The committee was pleased by the existing involvement in GAIA, but the lack of strong implication in new projects such as EUCLID in Space, or Pan Starr and LSST on the ground, could be an issue in the long term. The Observatory should define a clear scheme between either being involved as full partner in these projects, or remaining as a side organization providing added values tools for the scientific use of the new database provided by these surveys. The committee recognizes that the former option is difficult to achieve due to the size of the existing staff. However, the observatory teams should consider the possibility of reinforcing their involvement in the early phases of some selected projects, where their expertise and skills are the most valuable, in order to ensure a leading position in future developments and to avoid becoming only a service provider.

#### Assessment of the unit's involvement in training:

As expected, the Observatory is leading the education in astrophysics inside the Strasbourg University. It is leading the specific astrophysics degree in the Physics master courses. This correspond to 1 course by semester in the first year of the master for  $\approx 30$  students and a fully specialized curriculum for  $\approx 10$  students in the second year. Staff members are also taking part of teaching in other areas than astrophysics: physics, mathematics, and computer science. It should be noted that the Observatory staff is over performing its normal duties, by providing the equivalent of a full time associate professor teaching over its nominal allocation. The committee notes the strong link with the Ecole Nationale Supérieure de Physique de Strasbourg, that will become Telecom Physique Strasbourg in 2012. Students of this school can follow the Master of Physics in the UFR of Physics with a specialization in Astrophysics, and some of them continue with a PhD in the Observatory or in other French laboratories.

While the situation is very good at master level, it is less satisfactory at PhD level. PhD students working at the Observatory must register to the Ecole Doctorale for Earth Sciences, the Universe and the Environment. In addition to the Observatory, 3 other laboratories are part of this Ecole Doctorale (ED), all of them working in Earth Science or Environmental issues. Scientific collaborations between these 3 laboratories and the Observatory are weak or null. And none of the Strasbourg laboratories that have scientific collaboration with the Observatory is part of this ED. In addition, the numbers of PhD contracts that can be obtained by this ED are very low. The Observatory can get only 1 or 2 new contracts a year. This is definitely too low for an institute of the size of the Observatory. An average number of 3 to 4 a year would be more in line with the capability of the Observatory, and would have a strong impact on the overall scientific production. This low number is not due to a poor attractiveness of the Observatory PhD proposals, but to a lack of funding inside the ED. The committee urges the Observatory and the University managements to work together to find ways to increase the number of PhDs inside the Observatory. One possibility might be to move the Observatory inside the Ecole Doctorale of Physics and Chemistry, which is much larger, and can offer more possibility to attract good students, even if this would mean a higher competition with the ED partners than in the present scheme. The committee recognizes that this change of ED would also make sense from a scientific point of view. The committee is aware that such an evolution depends on the evolution of the OSU structure in the University. The creation of a single large OSU would imply to keep the astronomical observatory in the present Earth Sciences, the Universe and the Environment ED. The 2 decisions are linked, and should be discussed between the University, the CNRS and the Observatory. But, whatever the final configuration will be, the increase of the number of PhD students in the Observatory remains a strong priority.

The PhD interview by the committee has been open and direct. The PhD students find their working conditions very good, and appreciate the level of interaction with the staff. All of them appreciate the level of assistance from their supervisor. None of them have expressed concerns or dissatisfaction about their situation in the Observatory. This is an additional proof that the Observatory could have more PhD students without difficulties.



## 4 • Team-by-team analysis

**Team 1:**

Galaxies

**Team leader:**

Mr Benoît FAMAËY

**Workforce**

Workforce	Number on 06/30/2011	Number on 01/01/2013	2013-2017 Number of producers**
<b>N1:</b> Professors or assistant professors	6	6	6
<b>N2:</b> EPST or EPIC researchers	2	3	2
<b>N3:</b> Other professors and researchers	2	0	0
<b>N4:</b> Engineers, technicians and administrative staff * on a permanent position	0	0	
<b>N5:</b> Engineers, technicians and administrative staff * on a non-permanent position	0		
<b>N6:</b> Postdoctoral students having spent at least 12 months in the unit	2		
<b>N7:</b> Doctoral students	3		
<b>N8:</b> PhD defended	8		
<b>N9:</b> Number of Habilitations to Direct Research (HDR) defended	0		
<b>N10:</b> People habilitated to direct research or similar	8	8	
<b>TOTAL N1 to N7</b>	15	9	8

\* If different, indicate corresponding FTEs in brackets.

\*\* Number of producers in the [01/01/2007-06/30/2011] period who will be present in 2013-2017.



## • Detailed assessments

### Assessment of scientific quality and production:

The research carried out in this team is of very high quality, with two main fields of expertise: observations including large imaging surveys on one side and numerical simulations and theoretical modeling on the other side. The main topic is the formation and evolution of galaxies, which is studied over a large range of physical scales. The originality of the team is the strong synergy between both activities that enables them to address the formation and evolution of galaxies like the Milky Way, from the early phases of the re-ionization up to near field cosmology and nearby stellar systems, and including developments on the MOND alternative theory. This approach is original; the team is young and its potential quite high. All staff members are active in research.

The level of publication is high with 200 refereed publications for 10 permanent researchers (with 6 assistant professors and professors), and the number of citations is also high (~4000) for the period 2007-2011.

The number of PhD students is reasonable (15 PhD students for 8 permanent researchers with HDR over the last 4 years) whereas the number of post-docs is rather low (4 for the last 4 years).

### Assessment of the research team's integration into its environment:

The team is well positioned in the national and international context with a strong participation in international collaborations such as RAVE, Gaia-ESO survey, NGVS, PanSTARRS. They lead (or act as co-I) in several open time programs on various telescopes (CFHT, VLA, Kitt Peak, Subaru, OHP). The team has developed good contacts on the topic of HPC with other groups of the Strasbourg University. They also obtained several ANR contracts as PI or co-I (1 contract as PI (RAVE) and 4 as co-I). They are associated with the Strasbourg node of the mesocentre network (EQUIP@MESO).

The team as a whole or as individual members is well qualified in obtaining small or large external grants from the European Community. The team must be encouraged to apply.

### Assessment of the research team's reputation and drawing power:

Even if the team is young, several of its members are highly recognized in their field. Two staff members received prizes in 2010 (Victor Noury Prize of the Academy of Sciences and SF2A young researcher prize). They gave 12 invited talks during the last 4 years.

The attractiveness of the team is assessed by the high rate of recruitment of young researchers, also from abroad, and the shared supervision of PhD students.

### Assessment of the strategy and 5-year project:

The main mid-term project of the team is centered on GAIA. The team is deeply involved in the preparation of the mission and will be ready to analyze the data. We encourage the team to increase its connection to the core team of GAIA, especially with Heidelberg. The very large surveys of the nearby universe (RAVE, PanSTARRS, NGVS etc..) in which several team members are involved will be in the phase of scientific exploitation for the next 2-3 years, also preparing the team to the exploitation of GAIA data.

The team will also continue its theoretical and numerical analysis on the physics of re-ionization and modified gravity. The study of stellar clusters with a dynamical and observational approach coupling gas and stars as well as the chemo-dynamical simulations of galaxies will also put the team in a very good position for the exploitation of GAIA data.

Regarding the development of numerical codes, the team developed a specific expertise on the use of GPU for numerical simulations that seems to be very promising for the future. They are encouraged to build on this expertise to develop their links with applied mathematics and computer science groups in Strasbourg, with the goal of being identified in the future as one of the main players at the national level in computational astrophysics.

The team aims at increasing the synergy between simulations and observations in the framework of near-field cosmology. Their acquired expertise is likely to be promoted in future projects like LSST and later SKA. The committee encourages the team to develop contacts with these teams.



## Conclusion:

*Overall opinion on the team:* The quality of the research performed in the team is very high. The team is young and dynamic, with a high potential. Several members of the team are highly recognized. The team is clearly increasing its visibility as a whole.

*Strengths and opportunities:* The high synergy between theory, numerical simulations and observations is very promising to address the formation and evolution of galaxies. It gives them a strong position in the GAIA project and is likely to give them opportunity to participate to further projects like LSST or SKA. Their specific GPU expertise is very interesting for this purpose and they are encouraged to build new collaborations on it.

*Weaknesses and risks:* Whereas the medium term strategy is clearly identified with the participation to GAIA, the development of theoretical and numerical analysis and the on going work on stellar systems, long term projects (>5-10 years) are not yet identified. This absence of such a long-term strategy can be dangerous in terms of future hiring and grants.

*Recommendations:* The team probably needs to clearly define a long-term project promoting their current and future expertise; it might comprise participation to large projects (WEAVE, LSST, or SKA). The connection with CDS could be an asset in entering a large project, and should be better emphasized. We also encourage them to apply for EU grants (network, ERC, Marie Curie) especially to hire PhD students and/or post-docs. Numerical computing expertise, specific to this team, would gain to be developed through collaborative projects at the national or international level.



**Team 2:** High-Energy Astrophysics

**Team leader:** Mr Hubert BATY

## Workforce

Workforce	Number on 06/30/2011	Number on 01/01/2013	2013-2017 Number of producers**
<b>N1:</b> Professors or assistant professors	5	5	5
<b>N2:</b> EPST or EPIC researchers	5	4	4
<b>N3:</b> Other professors and researchers	1	1	1
<b>N4:</b> Engineers, technicians and administrative staff * on a permanent position	1	1	
<b>N5:</b> Engineers, technicians and administrative staff * on a non-permanent position	0		
<b>N6:</b> Postdoctoral students having spent at least 12 months in the unit	3		
<b>N7:</b> Doctoral students	2		
<b>N8:</b> PhD defended	6		
<b>N9:</b> Number of Habilitations to Direct Research (HDR) defended	2		
<b>N10:</b> People habilitated to direct research or similar	7	6	
<b>TOTAL N1 to N7</b>	17	11	10

\* If different, indicate corresponding FTEs in brackets.

\*\* Number of producers in the [01/01/2007-06/30/2011] period who will be present in 2013-2017.





## • Detailed assessments

### Assessment of scientific quality and production:

The High Energy team is a very active and young team with a strong group around the XMM-Newton SSC and a strong group in theory and modeling/data interpretation.

The level of publications is high in terms of quality and quantity, considering the structure of the team. Despite the heavy administrative and teaching duties of some of the permanent staff members, all of them can be considered as “producers”. Altogether the quality and production of the team is of high standards considering that there is a strong theoretical component where there are fewer publications with a smaller number of authors. The average H-index of the permanent staff is 18 with on average 15 refereed papers per person over the last 5 years, of which 4 as a first author. This reflects the high scientific level of a young team with a strong theoretical component. The low number of PhD students and postdocs remains a concern.

### Assessment of the research team’s integration into its environment:

The research team is well positioned in the national context as one of the few leading groups in X rays. They also contribute to the public outreach of the unit through their three press releases. They have applied to several contract proposals and are the PI of a newly started promising ANR project, EMPERE.

They performed their tasks in the XMM-Newton SSC very well, fulfilling their commitment to this project since 1996. They maintain their role in delivering pipeline products to ESA (mainly source identifications), and after the withdrawal of the UK from the SSC they foresee a stronger role in the production of several new products, including the 3XMM catalog, giving them excellent international visibility. They have a clearly added value at being close to CDS. The team as a whole or individual members should be well qualified in obtaining small or large external grants, e.g. from the EU. This is an opportunity that could be exploited further.

### Assessment of the research team’s reputation and drawing power:

The team has a very good international reputation. One of the members recently received a bronze medal from CNRS. Together they gave 19 invited reviews at international conferences. Though all of the permanent staff is French or got their PhD in France, several have experience in working abroad, helping to strengthen their international collaborations. The small number of available PhD and postdoc positions hampers further internationalization. Overall, they are well embedded in the French and international networks.

### Assessment of the strategy and 5-year project:

The XMM-Newton SSC can continue its work at least for the coming five years and possibly beyond, depending on the ending of the operations, which may occur anywhere between 2016 and 2026. Though not all present or planned X-ray missions will be operational in 2016, at least some of them will be active and the team foresees to utilize them well. On the longer term (2020 and beyond) the situation is unclear and the team, not being involved in hardware, is completely dependent on what the outside world will deliver. A pro-active role in new mission concepts like Athena or LOFT can help to become a more prominent actor in this field. The presence of the CDS can certainly help in this aspect. The more theoretical work of the team has less of such risks, and somewhat broader wavelength coverage might be helpful on the long term to maintain the level of activity. The present 5-year project seems a recollection of different theoretical aspects while, it is clear that the team can refocus on the astrophysical processes on which they have a long expertise, namely X-ray emission and dynamics of the accretion-ejection processes in stellar and compact objects.

### Conclusion:

The team does a very good job and all members contribute to this. They are well recognized in the national and international context, and have a balanced program and suitable collaborations. They have sufficient critical mass, but could benefit clearly from the presence of more PhD students and postdocs, as well as a professor to reinforce their links with the University of Strasbourg. For the coming five to eight years they can continue to exploit the present and soon to be launched high-energy missions, but on the longer run this is not yet so clear. An active involvement in future missions, like their role in the SSC in the past and present, could be beneficial. The scientific focus on X-ray populations, accretion structures, and jets and winds is well motivated. A more coherent presentation of these topics may enhance their visibility and help strengthening the group. In summary, the HE team is well recognized internationally as one of the few prominent teams in this field in France. With several young and bright researchers, the range of skills, and the synergy with the CDS, they have the potential for ramping up, but they should keep focus on the physics of accretion-ejection mechanisms.





## Recommandations

The team should define more carefully a long-term positioning, focusing on its main strength, accretion-ejection mechanisms, and taking into account the possible decrease of large high-energy observatories in a near future.



**Team 3:**

CDS

**Team leader:**

Ms Françoise GENOVA

**Workforce**

Workforce	Number on 06/30/2011	Number on 01/01/2013	2013-2017 Number of producers**
<b>N1:</b> Professors or assistant professors	6	6	6
<b>N2:</b> EPST or EPIC researchers	3	3	3
<b>N3:</b> Other professors and researchers	1	1	1
<b>N4:</b> Engineers, technicians and administrative staff * on a permanent position	18	19	
<b>N5:</b> Engineers, technicians and administrative staff * on a non-permanent position	4		
<b>N6:</b> Postdoctoral students having spent at least 12 months in the unit	1		
<b>N7:</b> Doctoral students	0		
<b>N8:</b> PhD defended	1		
<b>N9:</b> Number of Habilitations to Direct Research (HDR) defended	0		
<b>N10:</b> People habilitated to direct research or similar	4	5	
<b>TOTAL N1 to N7</b>	33	29	10

\* If different, indicate corresponding FTEs in brackets.

\*\* Number of producers in the [01/01/2007-06/30/2011] period who will be present in 2013-2017.



## • Detailed assessments

### Assessment of scientific quality and production:

CDS provides excellent and essential scientific products to the international astronomical community. The data services SIMBAD and VizieR, as well as the ALADIN visualization platform are used worldwide with very high usage statistics (238 000 queries per day in SIMBAD for a list of 5.5 millions astronomical objects, 246 000 queries per day in VizieR with 9600 catalogues and 10 000 tables, and 16 500 queries per day in ALADIN). Moreover, CDS has a leading role in the international development of the Virtual Observatory (VO). CDS provides several chairs of the VO Working Groups, and CDS has, for instance, participated in the definition of 13 out of 35 IVOA standards.

CDS has fully recognized that the involvement of active scientists is a key to the success and sustainability of CDS and the way to ensure the quality of content as well as the relevance of the data services in the long-term. The CDS research team is very active both in the astronomical domain and in computer science. During the reference period, CDS has published about 100 refereed publications with nearly 2600 ADS citations, as well as an additional 100 non-refereed publications.

Following the recommendation of the 2008 AERES evaluation, CDS has been labeled as TGIR.

### Assessment of the research team's integration into its environment:

Strength of CDS is its leading role in the Virtual Observatory, which has allowed the team to successfully apply for European funding. CDS has coordinated three European projects (Euro-VO DCA: Data Centre Alliance, Euro-VO AIDA: Astronomical Infrastructure for Data Access, Euro-VO ICE: International Cooperation Empowerment), and has been a partner in the Infrastructure Design Study VO Technology Centre (VO-TECH), as well as one ANR study: VIRAGE (Virgo - Altération des Galaxies dans des Environnements denses).

CDS has a worldwide impact reaching well beyond the community of professional astronomers. This is demonstrated for instance by the SIMBAD usage map, that shows that only four countries (Azerbaijan, Kosovo, North Korea, Western Sahara) had not used SIMBAD during a 30-months survey period (Jan. 2007 to June 2009). The tools of CDS have a potential for the teaching of astronomy at all levels and an outreach version of ALADIN was released as part of the EuroVO-AIDA project.

CDS has many long-term scientific partnerships with journals, astronomical societies, and other astronomical data providers. At the time of review, six contracts are on going, including three international perennial contracts with Smithsonian Astrophysical Observatory (SAO), ESO, and Astronomy & Astrophysics. Three other contracts are regularly renewed at the national level, with CNRS/INSU TGIR, Action Structurante Université de Strasbourg, and CNES.

A concern remains that ANR applications involving computer scientists have failed in the recent period, this is a weak point, which is hardly explainable. Also more recently, proposals for obtaining EU funding have been less successful, but CDS remains active in this domain.

### Assessment of the research team's reputation and drawing power:

The visibility of the CDS team at the international level is extremely high. CDS staff has responsibilities in the IVOA (International Virtual Observatory Alliance), as Board Executive Secretary, members, and CDS provides several chairs of IVOA Working Groups. The CDS Director is, amongst others, chair of the National Scientific Research Committee (coCNRS) Section 17, member of INSU Scientific Council, and chair of VO-France, as well as president of the International Astronomical Union Division XII "Union-Wide activities".

The international reach of CDS makes the team attractive at the international level, and two of the nine permanent members of the CDS science team come from abroad. Three scientists of the team are CNRS, and six are CNAP. The activities of CDS fit very well in the framework of CNAP activities, and the committee recommends that CNAP maintains a strong support of the service.

At the time of review, CDS has no PhD student or postdoc. The reason is the difficulty to obtain financial support for them because of their position at mid way between astrophysics and computer science. New applications have been prepared and submitted by CDS. Regardless of the success of this action, the committee encourages CDS to seek the support of the University for PhD students and postdocs.



## Assessment of the strategy and 5-year project:

The merit of the leadership of CDS has to be underlined. They have been able to foresee a long-term project and to maintain a leading role in the evolution of the astronomical data services.

The policy for allocation of means is science-driven under the supervision of the CDS Scientific Council. The CDS Scientific Council is international and involves representatives of all major partners, like ESO, ESA, and NASA. The CDS Science Team identifies priorities, proposes and discusses them once a year with the CDS Scientific Council. When choices have to be made, in first line, the French astronomical community should be served: CoRoT and CFHTLS as well as Gaia are among the priorities. The CDS team is a good blend of astronomers, computer scientists, and documentalists. Each member has a clear vision of the common objective, of her/his role within the team, and weekly priority meetings take place.

CDS maintains an active science and technological watch activity and CDS has been very successful in identifying and adopting technologies at the right time. Recent developments like SIMBAD annotations, the creation of a CDS Portal, SAADA, DJIN, HEALPix formatting, and new cross-match algorithms are some of the original developments that maintain CDS at the forefront of astronomical data services.

The strategy of CDS for the coming five years is coherent and consists of extending the range of science products (very large catalog surveys, Gaia, preparation of Spectral Energy Distributions), and improving the underlying technology (VO, CDS Portal, Web 2.0/3.0 developments for user-centric and semantic Web evolutions).

Because of the extremely fast evolution of the domain, the possible emergence of competing actors based on completely different paradigms is not to be discarded. Therefore, CDS should maintain its effort to test and adapt the most advanced software technologies and to guarantee the best compatibility with emerging solutions.

A middle-term prospect is to study the possibility for CDS to provide services in the domain of astronomical data curation. This is a new area that would extend the range of activities of CDS to final processed data published in journals. The committee recommends CDS to undertake a study in view of this activity.

## Conclusion:

CDS has a unique scientific position in the French astronomical community with an extremely wide international visibility, obtained with a relatively small team. CDS has a very high visibility at the international level, which makes the Observatory of Strasbourg known by basically every astronomer in the world, through the SIMBAD and VizieR services.

One of the weaknesses of CDS is that it relies on a very small number of key people. The activities at CDS are part of a long-term project that requires long learning. The core business is very specialized, even within the astronomical community, which makes it difficult to recruit scientific leaders and technical staff with the adequate profile. Adequate replacement of the key people must be planned long ahead and requires full support from the funding agencies and the University.

## Recommendations:

1. CDS should attract more PhD and postdoc students, and explore all possible means like Marie-Curie grants, ANR, EIFFEL, ERC grants, PhD grants in collaboration with Industry or major institutes and organizations.
2. CDS should enhance collaboration with external teams, in particular by the exchange of senior scientists or co-direction of students.
3. As in the 2008 AERES report, the committee renews the recommendation to properly define and recognize the activity of those people working in CDS on data ingestion. This task definition should include some means to ensure adequate continuing professional development.
4. The Funding Agencies and the University should maintain their involvement in the support of CDS, in particular give priority to maintaining the staffing of CDS at a level that take into account the increase of workload, in order to guarantee the continuity of the services.
5. Observatory management, funding agencies and the University should maintain the balance between the three profiles: Science, Computer Science, Documentalists, which is essential to the good functioning of CDS.