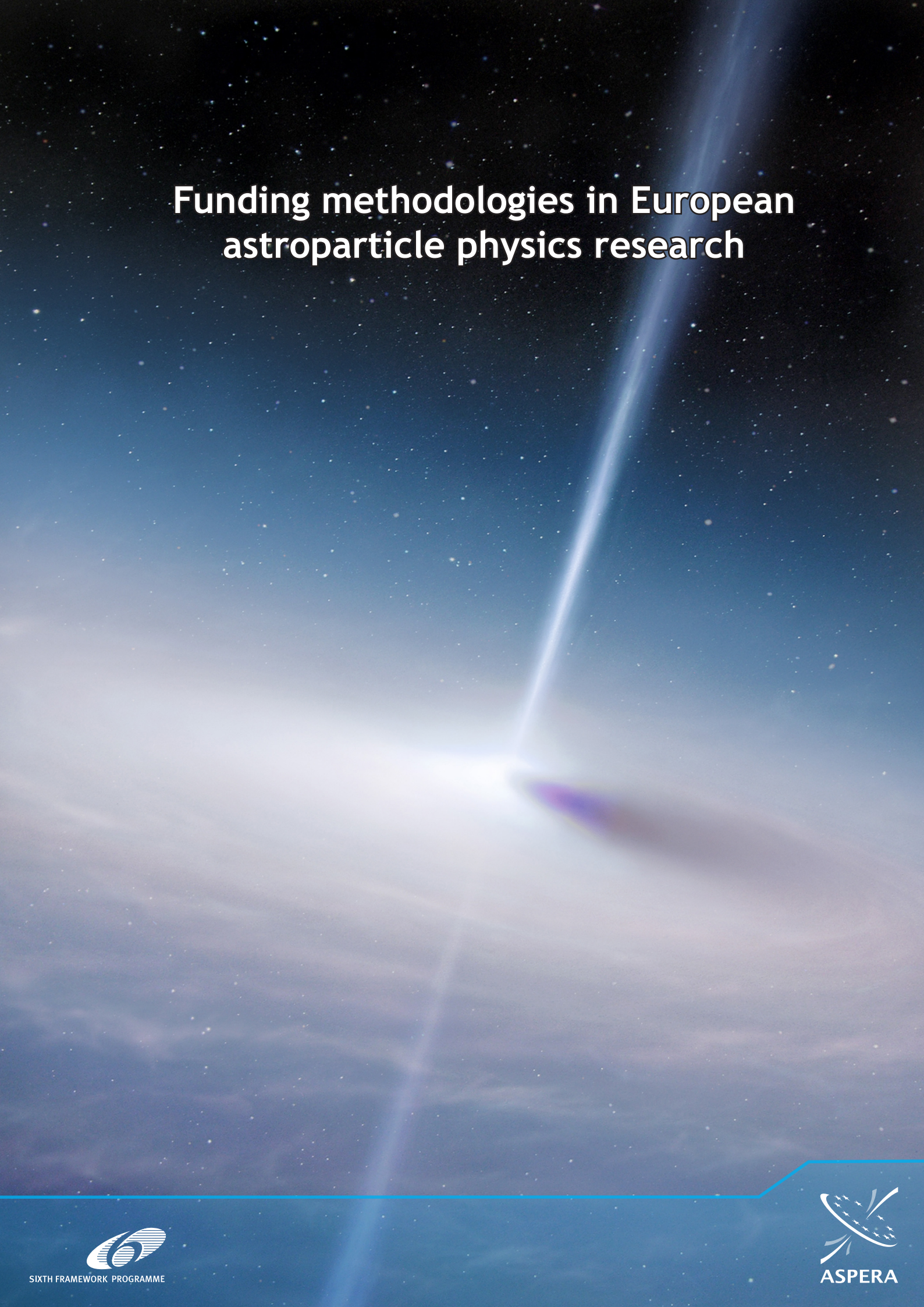
Funding methodologies in European astroparticle physics research



SIXTH FRAMEWORK PROGRAMME

ASPERA

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1. Executive summary

Astroparticle Physics (ApP) has emerged as a subject area in its own right, with both experimental and theory practitioners. It lies at the intersection of astrophysics, cosmology, nuclear and particle physics. It is a relatively newly emergent subject and has the capacity to expand. The subject matter is intrinsically collaborative and has succeeded in drawing on a range of skills from several communities. As an experimental discipline it operates on a scale comparable to particle physics, astronomy and astrophysics or space science: large scale experimental facilities, long duration experiments, expert teams comprising a wide range of scientific and engineering skills.

ApP now has a recognisable community in Europe. A case study on its emergence has been able to target the ApP community and to indentify its origins from surveys in particular topics among French, Italian and German astroparticle physicists. The existence of ApPEC and the formation of ApP special interest groups within national academic institutions (e.g. within the Institute of Physics in the UK) and the willingness of researchers to identify themselves as astroparticle physicists testify to the strength and identity of the community. About 2300 scientists (FTE) were working in the research area defined as astroparticle physics in the roadmap document, in the year 2006.

There are currently about 80 high quality innovative research ApP programmes in operation with European participation. They have been evaluated in competitive peer reviews across Europe and have succeeded in achieving funding alongside other established subject disciplines. While particular funding arrangements differ between national funding agencies in Europe, ApP has been able to obtain funding from central government agencies for large scale observatories and platforms (e.g., H.E.S.S/MAGIC, VIRGO/GEO, Auger Observatory, neutrino telescopes and underground facilities such as at Gran Sasso, Canfranc and Modane, as well as experiments in space such as GLAST and AMS). A consolidated budget of 186 M€ was available for astroparticle physics in the ASPERA countries for personnel, investments and running costs in 2006. Out of this sum about 70 M€ was more specifically invested in construction, running costs and R&D. It is also interesting to note that according to preliminary data and modulo differences in the definition of astroparticle physics, the spending for this activity is on the same level as in the U.S.A.

This report is an integral component of other tasks in the ASPERA project and it has strong links with the other deliverables. It notably forms the basis of what is possible to project in the roadmap and action plan, supports the case study, the compilation of evaluation rules, the proposal for common evaluation rules, the efforts of a posteriori linking and the establishment of co-operation agreements for large infrastructures. The report gives a description of the funding situation and does not value the differences and similarities or rank the systems, nor does it give recommendations to change any system. The descriptions of the role of the various subjects later in this chapter are objective observations.

To achieve this deliverable, mainly two processes were used. The first was a detailed questionnaire to be filled by each partner. It permitted the precise comparison of funding levels, evaluation processes and grant attribution in each country of the consortium, the results are presented in a series of graphs in the second part of this text. The second was the organisation of visits by high level policy makers from the partner countries to each country of the consortium, in the so called “open national days” where local high level officials, members of the ministries and the agencies presented in a single day the system operating in their country, answered to questions and interacted closely with the visiting officials.

While the questionnaire gave a static image of the field, a snapshot of the activity in the year examined (year 2006), the ”national days” gave a more dynamical view, revealed interdependencies and future trends. Furthermore, it had an educational impact on all the participants, through the well known principle stating that the effort to understand foreign institutions is the best way to put in context its own structure. In the course of the national days, a few axes on which one can project and classify the institutions funding astroparticle physics in Europe emerged. The resulting image is quite complex: there is a multiplicity of schemes, and it is rapidly changing: e.g. more than one system of research organisation drastically changed during the period of the census. The roles of the different funding sources and the methods by which large infrastructures, interdisciplinary and knowledge transfer are treated are presented below.

Role of operators of research or funding agencies

In most countries intermediate institutions are responsible for the funding of research. This method assures a long-term continuity supporting the exploitation of large infrastructures through rolling grants, a closer contact with the field through scientifically specialised personnel, the possibility to organise the scientific field over large thematic axes assuring uniformity of evaluation within each sub-discipline and sometimes greater reactivity to emergent disciplines such as ApP. The majority of the countries in Europe are organised along research council schemes launching annual or multiannual open calls for proposals (UK, Netherlands, Germany, Spain …). A few smaller countries develop structures mirroring the thematic priorities of the EU and its system of calls. There are some major players in the field that are organised historically as operators of research (INFN, IN2P3/INSU/IRFU, MPG, Helmholtz Association). The correlation with the rapid emergence of this interdisciplinary field in the corresponding countries (Italy, France, Germany, …) should not pass unnoticed. It looks as if a more centralised scheme has the possibility to be proactive with new directions of research, redirect the available technical personnel and overcome endemic disciplinary conservatisms of evaluation committees.

Role of universities

Most of the researchers in Europe are employed at universities. Sources of funding for personnel are divers and allow universities to open staff positions and hire researchers for dedicated projects. External agencies often provide the funding for the necessary investments for research and temporary personnel. In France, Italy and Spain there is also a large body of researchers directly funded by the agency, although the majority work in mixed university-research laboratory units. Cooperations between universities and (nearby) large laboratories with astroparticle activities (DESY, FZ Karlsruhe, Nikhef, …) are also visible. In many countries there is a tendency to move towards a separation of functions, entrusting to the universities the funding of salaries and infrastructure and to the agencies the funding of project investments. In the UK the tendency is to move to funding the totality of research costs. While this scheme is compatible with astroparticle physics, it requires long-term commitments to ensure a certain permanence of expert personnel in the longer lasting large scale projects. This permanence has developed up to now within specialised particle physics laboratories (e.g. RAL, Nikhef, DESY, Gran Sasso, LIP …) or institutes working with a certain autonomy (IN2P3, INSU, IRFU, INFN…), however, long-term commitments with universities have to be considered as well. The ApP field has developed rapidly because it was based on the accumulated technical expertise and did not have to reconstruct its technical base with the random pace of successful grants.

Role of large laboratories

The technical base and long term funding capabilities of large laboratories has been instrumental, in some countries, for the first generation of astroparticle experiments. It is felt that large laboratories will also play an important role in the upcoming generation of large infrastructures. They can serve as “heat baths” for budget, personnel, and workshop capacity. The facilities of ETH in Zurich and CERN have been used for technical support (clean rooms for AMS), but also many observatories have used the concept of “CERN recognised experiment” in order to rely on CERN financial services and to profit from its international status for the centralisation of common fund management. A particular mention should be also made to the role of the establishment of underground laboratories as a means of stabilisation and development of the ApP field. This is clearly visible in the case of the underground laboratory of Gran Sasso whose presence boosted the astroparticle physics domain in Italy but also the smaller labs in France, Spain and UK that have played a similar role. In parallel with the above, one has also to mention the recent efforts across Europe to organise research in campuses (also sometimes called poles of excellence). Astroparticle physics has a natural place in most of them both in respect of its intrinsic outreach content and its knowledge transfer capabilities.

Role of regions

A few European countries have a strong regional component in their funding structure mirroring the federal character of the country i.e. Germany, Switzerland, and Belgium. While this adds to the multiplicity

of funding sources we were unable to find any real difficulty arising from the regional schemes. On the contrary, regions may play a leading role in the future deployment of astroparticle physics infrastructures (e.g., a neutrino telescope in the Mediterranean Sea or underground laboratories).

Role of private foundations

The practice in Europe is quite different from that in the US or Japan, where the cosmological aspects of the field have a large appeal to private foundations (Kavli, Perimeter, Keck, Google, etc) and attract direct funding from them. The only notable exception is the Wallenberg Foundation in Sweden with a remarkable record of astroparticle funding. Nevertheless many private foundations in Europe support projects in physics and ApP researchers may apply for funding. It is necessary that, in the future, the European leaders of the field include in their managerial goals the attraction of private funds.

Funding of large infrastructures

Many countries have specific funding lines for larger infrastructures (e.g. UK, France, Germany, the Netherlands, Switzerland, Italy and Spain) and have included since very early on astroparticle infrastructures in this category. In some "ApP wise" smaller countries a mechanism of rolling grants for larger infrastructures is lacking. The ESFRI process and the accompanying effort to chart national roadmaps support the tendency to put the large projects on a different funding level. The need of the stability of funding permitted by rolling grants, based on a national level evaluation and national roadmap, has been considered a necessity in many countries. Astroparticle physicists are eager to participate in the definition of national strategic plans, since it is felt that the nature of the investments required (in both budget and duration) do not fit the criteria of periodic bottom-up short-term open calls.

Funding of interdisciplinarity

All countries have a peer review system. In some countries this task is undertaken by specialised committees with a mandate of a few years, while in other countries the evaluation is done by ad hoc committees including experts in the field. In some countries a series of metrics is used in order to determine the level of funding of University teams; this procedure has obvious shortcomings (funding of the average performance) and should be handled with care. Concerning interdisciplinarity, the most common practice is to distribute projects to evaluation committees according to the track record discipline of the main researchers. It is felt that since interdisciplinarity is not the main concern of committees organised along disciplinary lines, this can create a certain inertia concerning emergent fields such as ApP. In some countries (France, Germany, Italy) there are specialised astroparticle physics evaluation committees. Depending on the scale of the programme in each country this is probably a practice to be encouraged. Another important issue concerning astroparticle physics is the relationship between particle physics and astrophysics institutions in the same country. In some countries the relationships are those of close synergy, having overcome an initial period of mutual misunderstanding and conflict of scientific culture. In some others the process of coming together is in progress while there are countries where the disciplines work in parallel and the need for a closer contact and mutual information is recognised by both sides. In some countries/agencies where the scientists of both disciplines are under the same structure, this experience up to now has been quite positive.

Relationships with industry, knowledge transfer

The large potential for knowledge transfer is recognised and an intensification of efforts is felt to be an urgent need. There are obvious synergies with geosciences, climate studies and risk monitoring as well as with biomedical research and national security. Some smaller countries (e.g. Czech Republic) have an impressive track record in this area and feel that this activity is helping the overall funding of the field. Furthermore, a very rich program of outreach is present in each country. Cosmic rays and the basic ideas of their detection can be easily explained to the general public and there are relevant school programs in many countries. There is currently a coordination of these efforts, which needs to be encouraged and supported.

2. Introduction

This document is the concluding report of Task 1.1 of ASPERA, and thus represents deliverable D1.1, "Report on the funding methodology of research in astroparticle physics in Europe", of ASPERA. The aim of task 1.1 is to identify similarities and differences between the funding agencies participating in ASPERA regarding their general funding philosophy for ApP research. Which programmes exist? Can individual researchers as well as laboratories/organisations be funded? What kind of research is being conducted in ApP? What criteria are being used for funding decisions, etc.? The answers to these questions will form the basis for the development of common rules and regulations that are needed once large pan-European research infrastructures are built for ApP research.

The information was collected by organising National Days (NDs) on ApP research funding in the participating countries and by sending questionnaires to all participating funding agencies. Eleven National Days were organised in the partner countries, during which the funding agencies of the host country explained to the other partners the ApP funding structure in its country. In addition, a questionnaire was sent to all agencies asking about the funding structure in their country. The information provided by the answers to the questionnaires was used together with the information obtained during the National Days to prepare this report. Once the information was collected in tables and summarized in concluding paragraphs, the agencies were asked to check the conclusions to ensure that the report properly reflected the situation in their country.

In chapter 3 of this document the methods used to collect the data are described in more detail. Chapter 4 provides, for each country, a summary of the information from both the National Days and the Questionnaires in a common format. In chapter 5 the results extracted from the data are compared per subject in separate tables. This includes an overview of the resources available for ApP research in the various countries in 2006. The conclusions of the report are reported in the Executive summary in chapter 1. This chapter also gives a description of the similarities and differences found between the partner agencies in ASPERA. In the appendix, the programmes of the National Days, with references (URLs) to relevant presentations given at these National Days, are listed. The documents provided by the agencies in answer to the questionnaire are listed in a separate appendix.

3. Methods

The philosophy and organisation of the National Days and the questionnaire are described in the next two sections. Based on the presentations at the NDs, and the answers to the questionnaires, several additional questions were formulated. Each of these questions was phrased in such a way that a very short answer would suffice to clarify the issue at stake. In that way, the answers of all countries could easily be collected on a short time scale. At the same time, a preliminary version of this report was circulated among the ASPERA funding agencies with the intention of ensuring that a good and properly verified picture is obtained of the funding situation for ApP research in each country.

3.1 National Days

Eleven National Days were organised. These events typically took the form of a 1 or 2 day workshop, where presentations were given by the host country on the structure and organisation of funding in astroparticle physics in that country. In some cases a lab-tour was included as well. The attendance was limited to people invited by the agencies. The dates of the workshops were spread over a period of almost 2 years, as can be seen from Table 1. National Days in countries that jointed ASPERA after the start have not been scheduled.

No.	Country	Date	Place	Organizer
1	France	16-17 January 2007	Paris	CNRS/CEA
2	the Netherlands	13 April 2007	Amsterdam	Nikhef/FOM
3	Germany	22 June 2007	Hamburg	PT-DESY
4	United Kingdom	24 July 2007	London	STFC
5	Italy	16-17 October 2007	Gran Sasso	INFN
6	Spain	6 November 2007	Madrid	FECYT/MICINN
7	Switzerland	3 December 2007	Geneva	SNF
8	Belgium	15 February 2008	Brussels	FNRS/FWO
9	Czech Republic	4 April 2008	Prague	MEYS
10	Portugal	5 May 2008	Lisbon	LIP/FCT
11	Sweden	3 June 2008	Stockholm	VR

Table 1: Dates and places of the eleven National Days, organised by ASPERA, where presentations were given by the host country to give detailed information about the structure and organisation of funding in astroparticle physics in that country.

The presentations given at the various National Days are linked to the agendas, which are provided in the appendices. Every ND started with a short introduction on the purpose of ASPERA in general and the NDs in particular. Typically, representatives of ministries, agencies, institutes, projects and researchers were present. At the end of each ND a short overview of the highlights of the day was given by the ASPERA coordinator. A summary of the "lessons learned during the ND" was made by the organising agency. These summaries are provided in the appendices as well.

The National Days were a great success. The presentations illustrated in a thorough manner the complexity of the various funding systems. Four general observations applied to all National Days:

- The meeting also served as a unique occasion for all ApP stakeholders to come together and thus strengthen the position of the field in that country.
- Funding systems are dynamic and often subject to change.
- European collaboration received unanimous support.
- The rules for EU projects need not be the same as those for national projects.

The observations by individual countries can be found in the next chapter in the descriptions per country.

3.2 Questionnaires

A questionnaire was sent to all agencies participating in ASPERA. In a first round the questionnaire was only distributed to 4 agencies as a trial. The responses received were different in length and depth. As a result some of the questions were modified, some questions were added and a vademecum was written to provide some guidelines for the agencies and to clarify the requested level of detail. In this report only the results of the second round, the questionnaire sent to all the agencies, are used. The questionnaire itself and the answers returned by the agencies are provided in the appendix.

The main questions contained in the questionnaire are listed below. Most questions had supplementary questions asking for more detailed information.

- Give a brief general overview of the complete research system used in your country.
- Define or describe the astroparticle physics domain in your country.
- Who are the main players in astroparticle physics research in your country?
- Do strategic plans for astroparticle physics research exist in your country?
- Describe and quantify astroparticle physics funding across the various agencies
- Quantify the scientific personnel in astroparticle physics in your country.
- What Pan-European collaborations exist in your country today?

The format used to summarise the answers provided by each country in chapter 4 is based on these questions.

4. Information per country

Information gathered through the questionnaires and the National Days is summarised in this section. Both the status of ApP funding, qualitatively and quantitatively, and the funding procedures and boundary conditions are described. For each country the information is presented in a separate subsection in the same format. In each subsection the following issues are addressed for a given country:

- Main funding agencies: who is providing the main source of funding for ApP research in the country?
- Main players in ApP: where is ApP research taking place and which are the subfields covered?
- Large Infrastructures related to ApP: are there large infrastructures available in your country dedicated to ApP research, like underground labs, etc?
- Total budget and personnel involved in ApP: what are the resources for ApP in the country? How many FTE and M€ were dedicated to ApP in 2006?
- Funding system, evaluation, follow-up: who is allowed to submit a proposal and what procedures need to be followed? What is the evaluation process? What are the duration of the grants? How are projects followed-up?

The order of the countries in the next subsections is alphabetically according to the 2 letter abbreviation used at the end of internet addresses.

4.1 Belgium (BE)

The main funding agencies for research in Belgium are:

- the Federal Ministry of Economy
- the Federal scientific policy office
- the regional funding agencies
  - FWO (Flemish community) and
  - FNRS (French community)
- the local government organisations that fund the universities

At the moment the two regional funding agencies (FWO and FNRS) provide the largest contribution to ApP research.

ApP research in Belgium is performed at four universities:

- Universiteit Gent
- Université Libre de Bruxelles
- Université de Mons-Hainaut
- Vrije Universiteit Brussel

No large infrastructures for ApP research are available in Belgium.

The total ApP research budget for 2006 was 730k€, divided into:

- 420 k€ for personal
- 160 k€ for running
- 150 k€ for equipment

There were about 17 FTE working in ApP research.

Projects are reviewed by scientific committees elected for 3 (FWO) or 5 years (FNRS) whose members are experts from each university of the relevant region, 3 to 5 experts from universities of the other regions and 2 foreign experts. A board comprising the Rectors of the universities of the relevant region selects the project on the basis of the recommendation of the scientific committees.

4.2 *Switzerland (CH)*

In Switzerland, basic research is performed mainly in the 12 universities, i.e. 10 cantonal universities and 2 Federal Institutes of Technology. The cantons are responsible for the cantonal universities, with the support of the Confederation that contributes financially to the operating costs of these universities. The financing of the Swiss Federal Institutes of Technology (ETH) is under the responsibility of the Confederation.

The main agency providing funds for ApP and Science in general in Switzerland is the SNF (Swiss National Science Foundation). It funds basic research on a project basis, fellowships for young researchers and various specific programmes. Division II is dedicated to Mathematics, Natural and Engineering Sciences. ApP has to compete with other fields for funding.

ApP research in Switzerland is performed in 7 universities, i.e.

- 5 cantonal universities (Geneva, Zurich, Bern, Basle, and Neuchatel)
- 2 Federal Institutes of Technology (Zurich and Lausanne).

Switzerland is active in all subtopics of ApP.

Switzerland has an operational research infrastructure at Jungfraujoch (3450 m above see level) for cosmic ray research (http://www.hfsjg.ch/).

There are about 50 FTE dedicated to ApP research in Switzerland of which around 25% are women. The total budget spent during 2006 was 5 MCHF (~3 M€), mostly devoted to personnel costs.

The SNF accepts applications for project funding for basic research directly from researchers. Any researcher working in Switzerland is entitled to participate. Researchers are free to choose their research topics. SNF funding grants cover direct research costs (staff salaries, materials, travel costs, etc.). Applications are evaluated by the SNF Research Council based on peer review by external experts. The central criteria for evaluation are the scientific quality, originality and project methodology as well as the qualifications and track record of the applicants. Grants are awarded on a competitive basis.

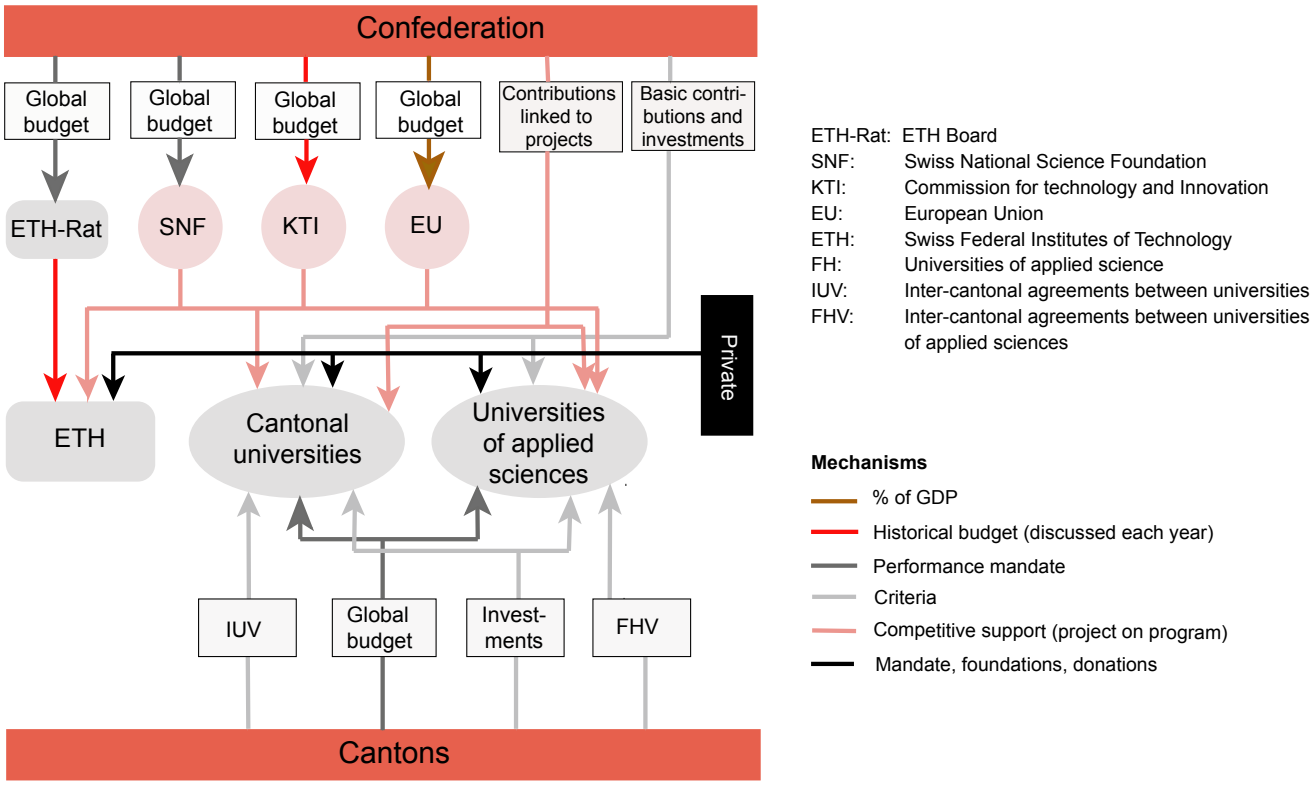

Figure 1: Schematic overview of the funding system in Switzerland

4.3 Czech Republic (CZ)

The research system is divided into three general categories:
- Universities – public (vast majority) and private (mostly economy, law, humanities or topical like engineering for car manufacturer)
- Academy of Sciences of the Czech Republic (ASCR)
- Other – mainly Departmental research financed by various ministries

The individual institutes of ASCR are all Public Research Institutions.
Regarding the public funding of research, there are two major agencies (according to importance):
- Ministry of Education, Youth and Sports (MEYS)
- Grant Agency of the Czech Republic (GACR)

In addition to this, practically every ministry runs its own agency for the research in its sphere of its activity (e.g. Ministry of Health, Ministry of Commerce and Industry, Ministry of Defence) funding mainly research in the third category 'Other' mentioned above. Moreover, there are smaller funding institutions like the Grant Agency of the Academy of Sciences (GAAV), the Grant Agency of Charles University (GAUK) etc. Altogether there are about 22 public bodies involved in science and research funding, however the most important ones are MEYS and GACR.

A small group based at Charles University is active in the research field of Gamma Astronomy and it is funded mainly by MEYS. Research in Ultra High Energy Cosmic Rays is based at ASCR and at various universities, and it is funded by MEYS. Double ß decay and low background technology is being studied at the Czech Technical University in Prague (CVUT), more in particular at the Faculty of Nuclear Sciences and Physical Engineering (FNSPE).

The list of institutions involved in astroparticle research is given below:
- Institute of Physics ASCR
- Inst. of Nuclear and Particle Physics of the Charles University in Prague
- Inst. of Technical and Experimental Physics of the Czech Technical University in Prague
- Palacky University in Olomouc
- Silesian University in Opava

No large infrastructures for ApP research are found in the Czech Republic.

MEYS provides resources for investments and running costs (equipment, travel and direct payments in case of international scientific consortiums). Personnel costs are mostly paid by participating institutions.

The total budget is about 200 k€ for investments and running costs and about 170 k€ for personnel. The personnel costs correspond to gross salaries as listed in the table item 7. The obligatory health and social insurances are covered by the employer and increase the personnel costs by 37 % to 233 k€.
About 20 FTE are currently working in ApP research.

MEYS: Proposals are evaluated on the basis of expert opinions by review panels.
Proposals have to specify milestones and deliverables. Funded projects are subject to a yearly public defence where the status of the milestones and deliverables is reviewed by an expert panel. Each project has its own panel approved by MEYS.

GACR: Proposals are evaluated on the basis of expert opinions by scientific advisory boards. Proposals have to specify milestones and deliverables. The GACR has a set of defined benchmarks like originality of the proposal, feasibility, scientific merit of the proposed subject, funding demands, quality of the team etc. Funded projects have to report yearly on the status of their milestones and deliverables. Each project has its own referee assigned by GACR.

Currently the whole funding system for R&D is under review with the aim of streamlining and simplifying the decision making processes.

4.4 Germany (DE)

The German funding landscape is governed by the federal system and the different responsibilities of the Federal Government and the 16 Länder. Actually, supporting science is one of the duties of the Länder and therefore all the public universities are institutionally funded by the Länder. A convention between the Federal Government and the Länder defines cases where the Federal Government (mainly by the Federal Ministry of Education and Research BMBF) is allowed to provide funding for science. For instance, the BMBF is responsible for the German contributions to international large infrastructures.

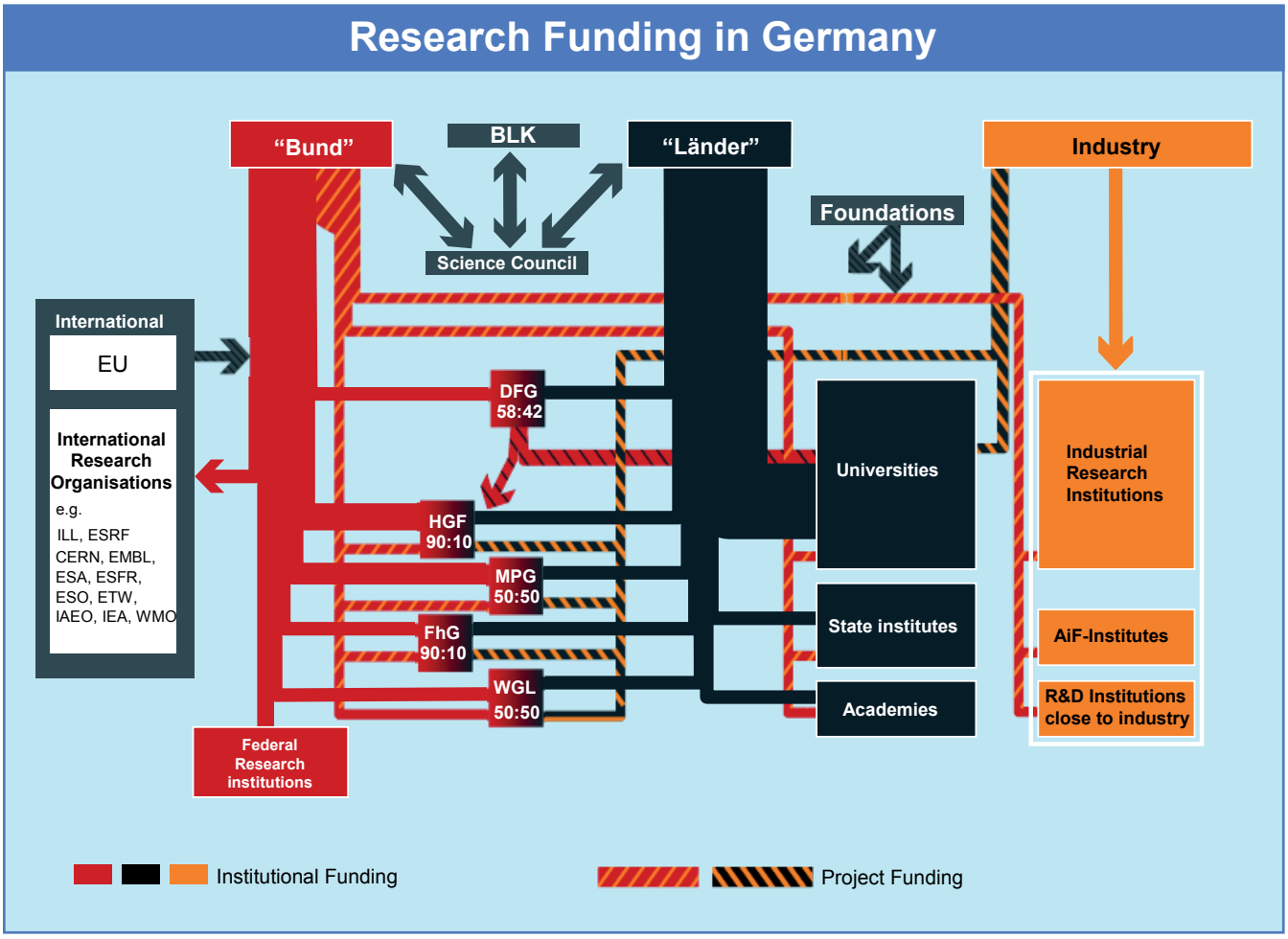

Figure 2: Schematic overview of the German funding system for basic research including astroparticle physics

The major source of funding for basic research is the German Research Foundation (**DFG**). It is a central self-governed research funding organisation, serving all branches of science and provides support to individuals or coordinated research programmes at universities and other publicly financed research institutions.

Non-university institutions active in the field of astroparticle physics are operated by the Helmholtz Association of German Research Centres (**HGF**) and the Max Planck Society (**MPG**). Both organisations are partly funded by the Federal Government and the Länder. The HGF comprises 15 national centres for natural scientific, technological and biomedical research and is centred on big infrastructures. The MPG is a research organisation maintaining about 80 institutes, supporting cutting-edge basic research outside of higher education institutions in the areas of biomedical research, chemical, physical and technical research and the humanities.

Space borne experiments are funded by the German Aerospace Centre (DLR). Mainly for researchers at German universities, the BMBF maintains a funding programme to support the extension and use of large infrastructures, the so-called Verbundforschung.

Currently Germany supports several international research infrastructures for ApP: ANTARES, Auger, Gerda, H.E.S.S., IceCube, KATRIN, and MAGIC.

There are many institutions and university groups working in ApP in Germany: 3 HGF institutes, 7 MPG institutes and 28 universities.

Large ApP research infrastructures in Germany are Kaskade-Grande at FZ Karlsruhe, KATRIN at FZ Karlsruhe, and GEO600 near Hannover.

The total German budget for ApP research in 2006 was 19.9 M€. This number does not include personnel costs.

ApP in Germany is funded institutionally as well as on a project basis. Depending on the eligibility, researchers, research group and research institutes can apply for funding at the agencies described above. Each funding agency has its own evaluation procedures and strategy for decision making. A common national roadmap on large infrastructures is currently under discussion. Where major decisions need to be taken, the Wissenschaftsrat (German Council of Science and Humanities) acts as an advisory body to the Federal Government and the state (Länder) governments.

4.5 Spain (ES)

In Spain, Science is funded by an Inter-Ministerial body called CICYT (Comisión Interministerial para la Ciencia y la Tecnología), under the governance of the President of the Government. Research in all fields is funded directly from the Ministry of Science and Innovation (MICINN), through a series of specific programmes (basic research, fellowships, etc). See Figure 3.

10 universities are involved in Spain in ApP projects. There are also two research institutes (CSIC and CIEMAT) with some participation. Spain participates in several collaborations covering most of the subtopics commonly described as ApP and plays an important role in some of them.

There are two main infrastructures related to ApP in Spain:

- LSC: Canfranc Underground Laboratory, the second largest underground laboratory in Europe and part of the ILIAS network.
- ORM: Roque de los Muchachos Observatory which is basically an astronomy observatory. Thanks to the existing infrastructure it was possible to build the high-energy gamma-ray telescope MAGIC there.

The total budget in Spain in 2006 for ApP is around 10 M€ including:

- Personnel: 7 M€
- Investment: 3 M€

This does not include the running costs of the infrastructures indicated in 3.5.3.
The personnel involved in ApP in Spain totals 168 FTE of which around 20% are women.

Up to 2007, ApP was funded through the National Program for Particle Physics. Then, all basic research programs merged to form the Basic Research National Program where projects from every field in basic research compete for funding. Applications are presented by the principal investigator (PI) of the group (from universities, public research institutes, etc) and the evaluation proceeds in a two step process where each project is evaluated by ad hoc experts committees.

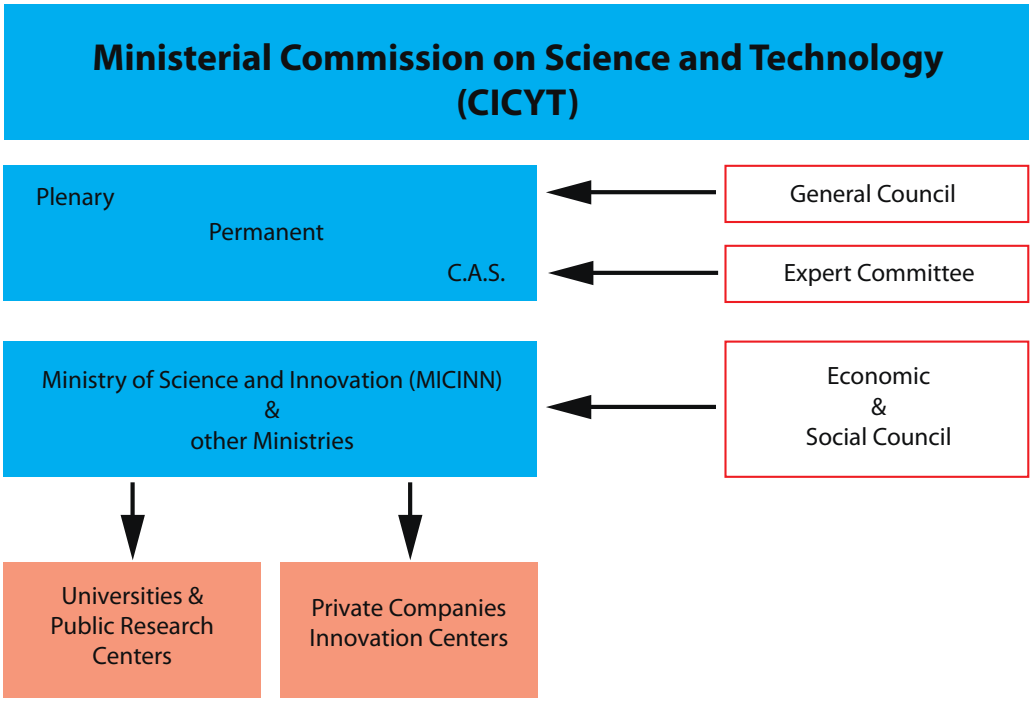

Figure 3: Structure of CICYT, the Interministerial Commission on Science and Technology, responsible of the National Plan of Research in Spain. It is composed of three bodies: Plenary, Permanent and an Experts Committee (CAS). Once the plan is approved, the Ministry of Science and Innovation (MICINN), evaluates, funds and follows the research programs, with the advice of the Economic & Social Council. The executors of the research projects are below in the figure: Universities, Public Research Centers as well as Private companies and Innovation centers.

4.6 France (FR)

The French public research system falls under the authority of the Ministry of National Education, Higher Education and Research. There are three main groups funded by the ministries:

- The research institutions funding both researchers, laboratory infrastructures, multiannual projects and very large infrastructures (e.g. CNRS, CEA and CNES, see below)
- The grant agencies issuing open calls leading to funding on a project by project basis (e.g. ANR, see below)
- The Networks or Pôles of Excellence (e.g.; the GIS P2I, see below)

Some agencies (CNES, CEA…) are funded by ministries other than the Ministry of National Education, Higher Education and Research.

Within CNRS, astroparticle physics research is funded through its two institutes IN2P3 (Institut National de Physique Nucléaire et Physique des Particules) and INSU (Institut National des Sciences de l'Univers). Since 1999, there has been a CNRS interdisciplinary programme funding ApP research, as well as a Very Large Infrastructure budget line funding VIRGO and H.E.S.S. There are also laboratories of the Physics and Mathematics Department performing astroparticle physics research.

On the CEA side, research teams working on astroparticle physics belong to IRFU (Institut pour la Recherche des lois Fondamentales de l'Univers), a department of the matter science division (DSM).

The research activities in astroparticle physics are mainly performed by laboratories that are 'joint-ventures' between Universities and CNRS, and sometimes, CEA.

The ANR issues annual calls on proposals, funding projects on a three-year basis. The calls where astroparticle physicists can apply are the calls belonging to the so called "White" (or "blue sky") category.

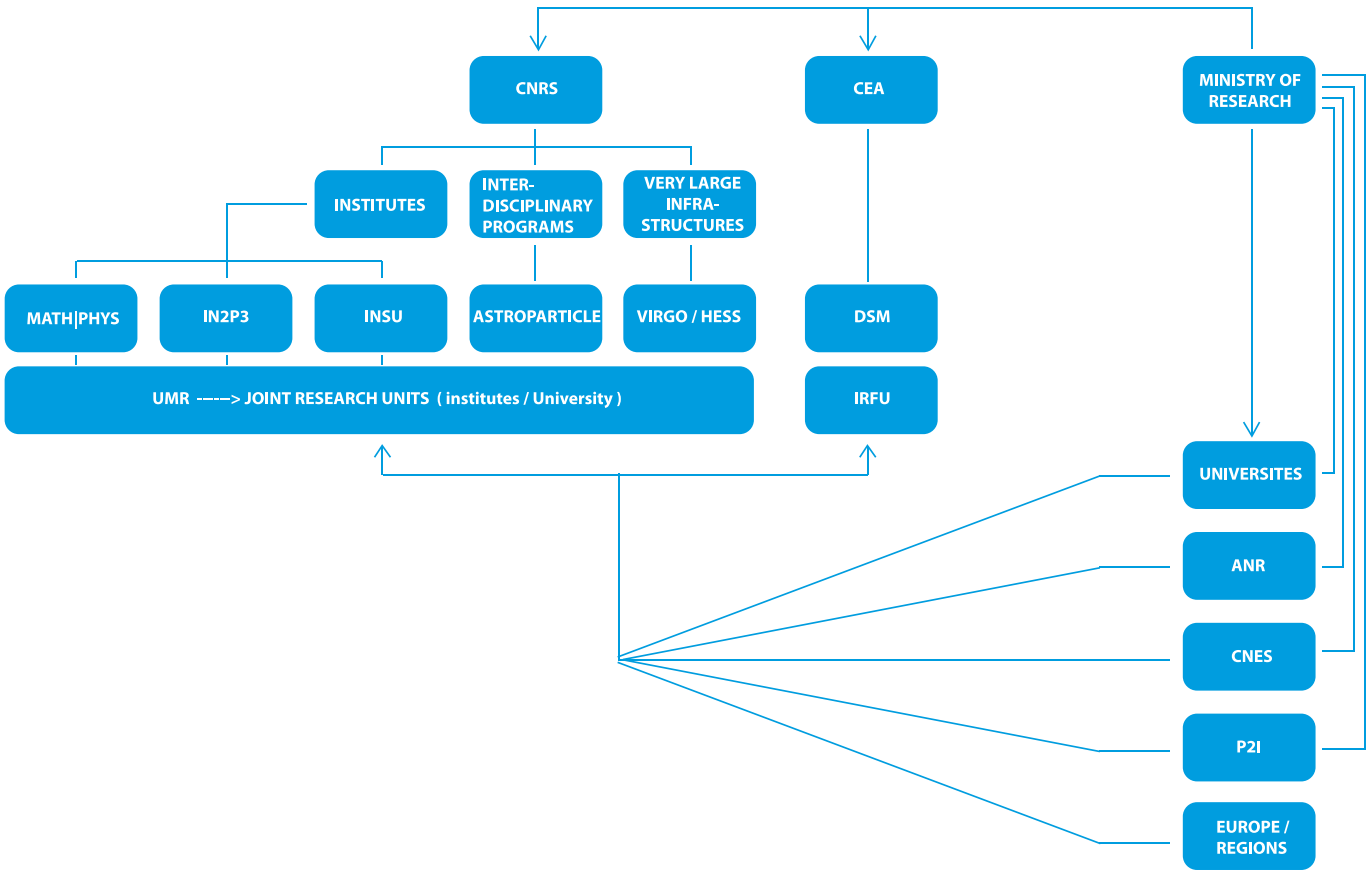

Figure 4: Schematic overview of the French funding system for ApP research

Researchers in France are involved in all subfields of astroparticle physics.
Research is carried out at:

- 3 Research institutions (IN2P3, INSU, IRFU)
- 3 Research Infrastructures and platforms (Underground Laboratory LSM, Centre de Calcul CC-IN2P3, LMA Laboratoire des Matériaux Avancés)
- 15 IN2P3 Laboratories and 15 INSU Laboratories
- 10 Mathematics and Physics Laboratories
- 1 Saclay IRFU Laboratory

There are 3 large infrastructures for ApP research in France:

- LSM, Laboratoire Souterrain de Modane, in Modane
- CC, Centre de Calcul, in Villeurbanne
- LMA, Laboratoire des matériaux avancés, Villeurbanne

The total ApP budget for 2006 was 40 M€ including salaries, for CNRS (IN2P3) and CEA (IRFU) together. The total number of FTE in ApP research in 2006 was 552 (CNRS) + 56 (CEA) = 608

CNRS
Scientific projects are proposed by researchers and are examined by the relevant scientific councils (CS-IN2P3, CSA-INSU) that give advice to the head of the relevant institute. For large projects, launching reviews and technical reviews are organised. In the case of IN2P3, there is also a steering committee formed from members of the Institute directorate, directors of the laboratories concerned and experts. Its mission is to evaluate the project on an annual basis. The final decision on funding is taken by the head of the Institute, upon the recommendation of the deputy director.

CEA
Scientific projects are proposed by researchers and are examined by relevant scientific committees that give advice to the head of the appropriate division. Then, the proposal is examined by the "resources council" and the final decision is taken by the head of IRFU. The scientific committee is composed of world experts, some of them from CEA.

ANR
Applicants are academic laboratories and private companies in partnership with academic laboratories. A scientific project is submitted following a call for proposals, either in the thematic section or non-thematic section. The selection of the projects within a given call for proposals is carried out on quality of the scientific aspects of the proposal plus the economic relevance for the companies This is a four step process.

Regional or local public funds
The project proposal is written by researchers and submitted to the funding agencies like CNRS and/or CEA, who ask for a technical study and report. Once finalised, representatives of the funding agencies start negotiations with the policy makers of the regions. If all parties agree, a financial contribution and a schedule are decided upon.

4.7 Italy (IT)

Funds for research and universities in Italy come from the Ministry for Universities and Research (MUR). The main agencies benefiting from MUR funds are:

- ASI: the Italian Space Agency
- CNR: the National Research Council
- INAF: the National Institute for Astrophysics
- INFN: the National Institute for Nuclear Physics

INFN is the agency with a more direct involvement in ApP although ASI and INAF are also important in projects at the frontier between ApP and astrophysics.

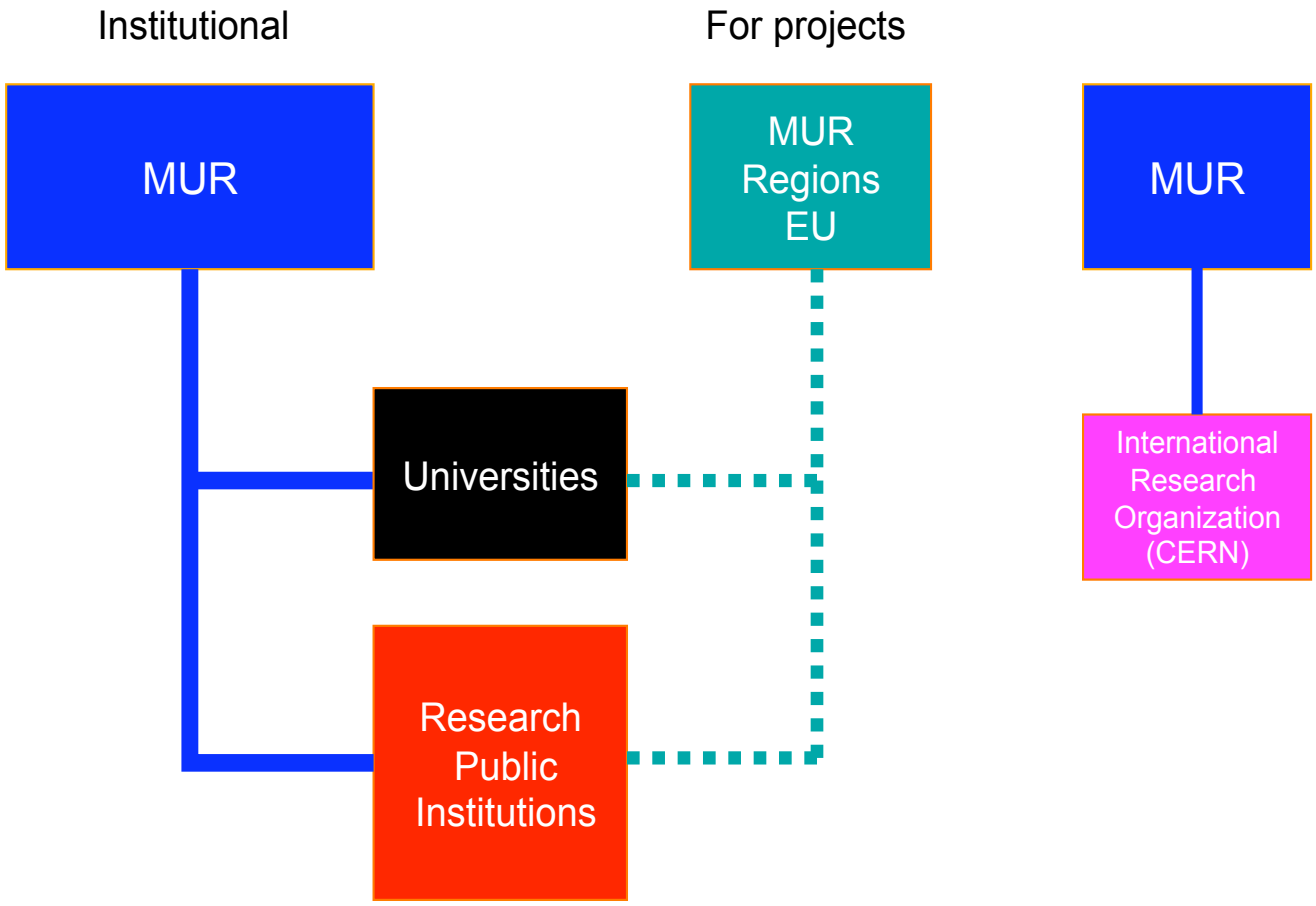

Figure 5: Schematic overview of the Italian funding system for basic scientific research

Experimental research in ApP is performed in various INFN, INAF and ASI organisations. Most of the University staff are associated with INFN as a result of bilateral conventions between INFN and Universities. The INFN organisations include 20 Sections that are located at the University sites and where the INFN/University collaboration is exploited, 4 National Laboratories and 1 Computing centre.

There are three big astroparticle physics research facilities in Italy:

- LNGS: the INFN Gran Sasso National Laboratory is presently the largest underground laboratory in the world. Most of the experiments hosted by Gran Sasso are performed by international collaborations.
- EGO: the European Gravitational Observatory is the infrastructure hosting the Virgo experiment. A consortium formed by CNRS and INFN manages the observatory.
- NEMO: the Neutrino Mediterranean Observatory is one of the undersea experiments contributing to the KM3NeT project. It is part of the LNS (Sud National Laboratory) in Catania, which is one of the four INFN National Laboratories.

The total funding for experimental ApP research in the year 2006 was about 58.5 M€, including:

- Personnel: 18.4M€
- Investment: 17.6M€
- Running: 22.6M€

The personnel resources amounted in the same year to 650-700 FTE working in all the subtopics commonly labelled as ApP. The fraction of female researchers was about 20%.

INFN has five scientific research lines. For each line a Scientific National Committee (CSN) advises the INFN governing bodies (Council of Directors, Executive Board) on experiment approval and funding. CSN2 is devoted to astroparticle and neutrino physics. INFN researchers (staff and associates) may apply for experiment funding. CSNs appoint an expert committee for each experiment with the aim of first examining the proposal and then assessing progress during the experiment's lifetime. The advice of these committees is taken into account by the CSNs when they formulate proposals to the Governing Bodies.

Research at the frontier between ApP, Astrophysics and Cosmology may also be supported by ASI and INAF. The three agencies have 3-year strategic plans, which are updated every year. ApP plays a crucial role in these plans.

4.8 Netherlands (NL)

In the Netherlands science and research are funded in two, largely independent, ways: through the universities and through the national organisation for scientific research (NWO). Both the universities and NWO are almost entirely funded by the Ministry for Education, Culture and Science (OC&W). Larger scale research projects and most PhD positions are funded by NWO, while most academic staff are on the pay-roll of the universities. NWO has divisions and institutes. The physics division is called FOM, which is an independent foundation.

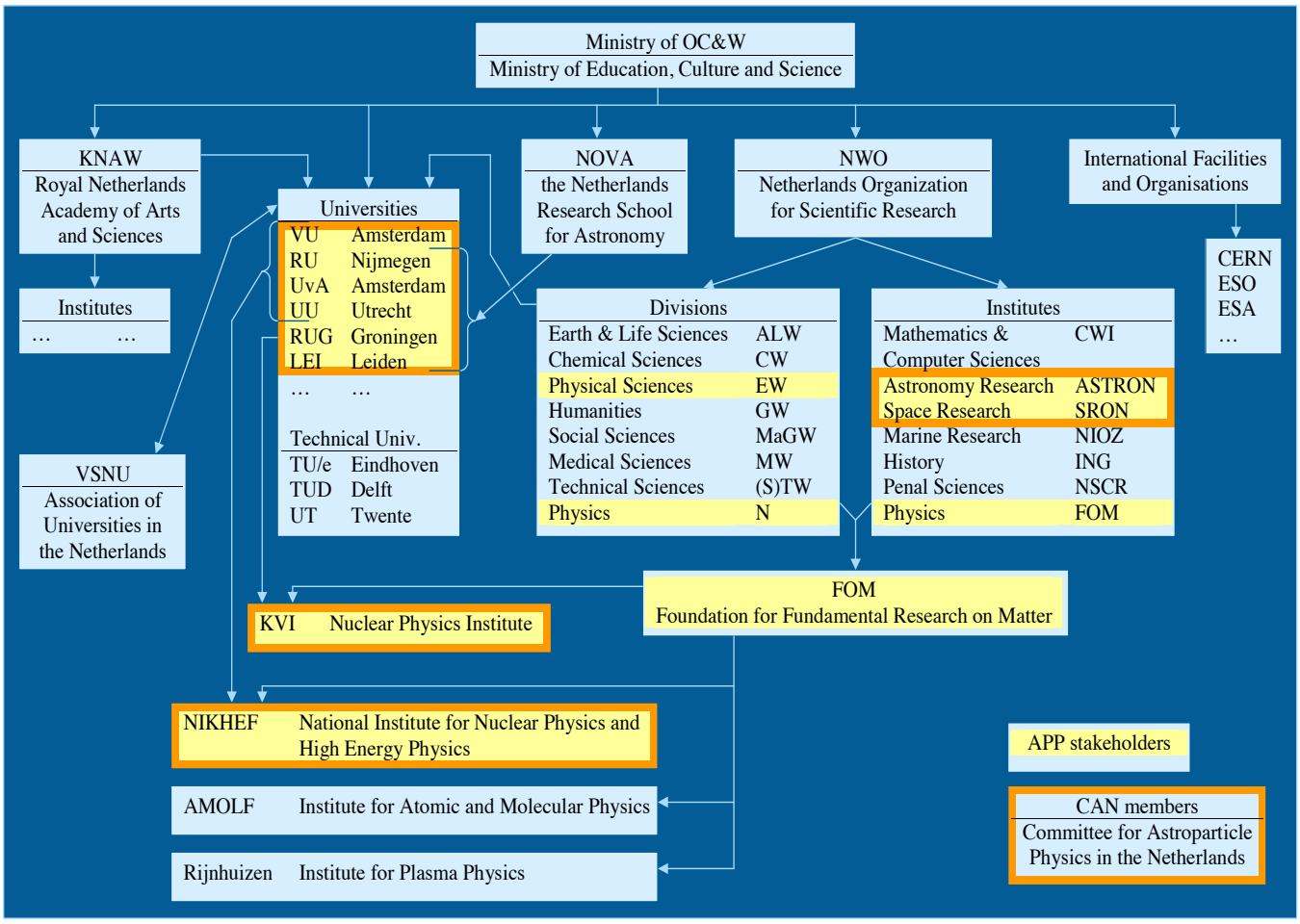

Figure 6: Schematic overview of the Dutch funding system for ApP research

The main players in ApP research in the Netherlands are:

- Nikhef, the FOM institute for subatomic physics
- 6 university groups
- KVI, which is a university institute, partly funded by FOM
- two NWO institutes (ASTRON, SRON)

LOFAR is a large research infrastructure that is mainly used for radio astronomy, but as well for ApP research in the Netherlands.

The total budget in 2006 for ApP was 6.1 M€ and the total number of FTE was 55, of which about 18% were woman.

For fellowships, the Postdoc or junior researcher can apply directly, but will receive the grant through one of the research institutions. For projects, a senior researcher has to apply, while the money (if approved) will be granted to the research group. For larger programmes the research leader/professor will request the funds for a set of research groups. For large investments, the institute director has to apply for the funding. The institute or infrastructure will receive the money.

All calls rely on evaluation by external reviewers. In most cases the review committee proposes a priority list to a board, which decides on funding.

For large programmes, first a letter of intent (preproposal) is submitted. The selected group is invited to write a full proposal, which is reviewed by the executive board, based on recommendations from external reviewers and a presentation of the proposal. The general board finally decides which programmes are funded.

For very large infrastructural investments the general board does the reviewing, based on recommendations from external reviewers and a presentation of the proposal and a site visit. Some very large funding requests like LOFAR, go directly to one or more ministries. There is usually no call for these large investment funds, but one can submit a request at any time. Large programmes and very large infrastructural investments compete with all other science fields for funding.

4.9 Portugal (PT)

FCT – The National Foundation for Science and Technology is the only funding agency in Portugal. Projects in astroparticle physics have to make use of the general calls issued by FCT. The Ministry for Science, Technology and the Universities provides the money to this agency.

The main players in ApP research in Portugal are:

- LIP (Lisbon and Coimbra),
- CENTRA (Lisbon, IST)

There are no large infrastructures dedicated to ApP research in Portugal.

In 2006 astroparticle physics research received a total of 205 k€.

There are no specific calls in Portugal dedicated to astroparticle physics. These projects apply when calls for high-energy physics are issued.

4.10 Sweden (SE)

The coordination of the research policy is the responsibility of the Ministry of Education and Research. The major research funding bodies are governmental agencies (sectoral research agencies and research councils), private foundations (e.g. Knut and Alice Wallenberg Foundation) and fundraising organisations. State research funds are allocated both by direct appropriations to higher education institutions and by means of appropriations to research councils and sectoral research agencies.

The main funding bodies for ApP are:

- The Swedish Research Council (Vetenskapsrådet, VR)
- Knut and Alice Wallenberg Foundation (KAW)
- The Swedish National Space Board (SNSB)

The main players in ApP research in Sweden are found at Uppsala University (UU), Stockholm University (SU), Royal Institute of Technology (KTH), and Kalmar University.

There are no large infrastructures for ApP research in Sweden.

The funds allocated in Sweden to ApP research amount to approximately 2000 k€ in 2006. About 34 FTE work in ApP of which ~15% are women.

Once a year the Swedish Research Council accepts applications for funding. The projects for basic research need to be submitted directly by the principal investigator who has to be employed full or part-time by a Swedish Higher Education Institution. The project grants include 35% indirect costs. Applications are evaluated, based on peer review, by panels and external experts appointed by the Research Council. The central criteria for evaluation are scientific quality, feasibility and qualification of the applicant. Grants are awarded on a competitive basis.

Applications can also be made for research equipment (> 200k€), project planning and operation grants. The latter form of grant is intended to enable Swedish researchers to get more access to national and international research infrastructures through contributions to operation, support and user support. The duration of grants varies usually from three to five years.

4.11 United Kingdom (UK)

From April 2007 the main funding agency for basic research in UK is the STFC (Science and Technology Facilities Council) which was created following the merger of PPARC (Particle Physics and Astronomy Research Council) and CCLRC (Council for the Central Laboratory of the Research Councils). STFC is one of seven Research Councils of the DIUS (Department of Innovation, Universities and Skills). It provides research grants to universities, infrastructure support, project grants, education and training support and also subscriptions to international agencies like ESA, ESO and CERN. In 2007 it published a 2 year strategic plan covering all branches of Science.

Research in ApP in UK is performed in 17 Universities and two Institutes (RAL and Daresbury). UK researchers are involved in several ApP subtopics giving the UK a significant presence in the field. In particular, they have presence in Dark Matter searches, High Energy Cosmic and Gamma Rays, Gravitational Waves and neutrino mass experiments.

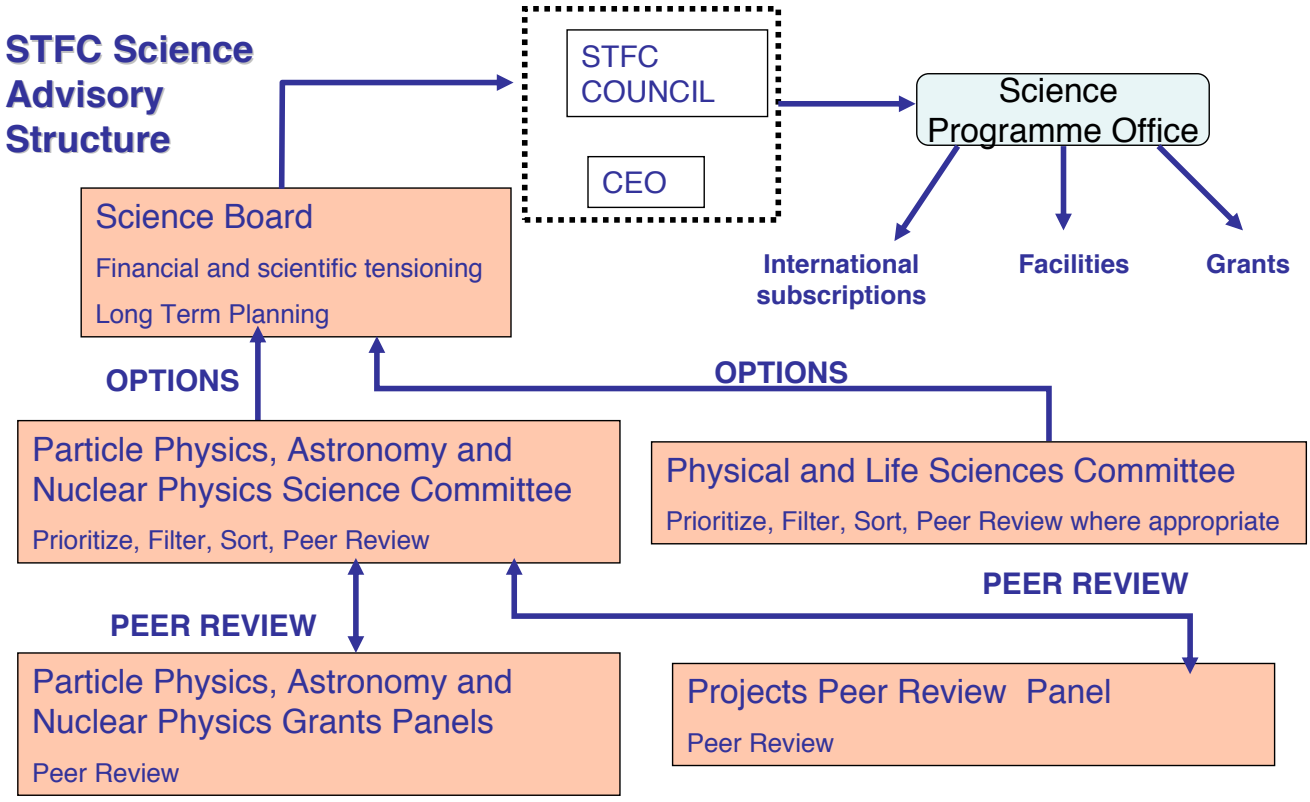

Figure 7: Schematic overview of the UK funding system for ApP research

UK has one important infrastructure related to ApP, the Boulby Underground Laboratory (BUL) located in the Boulby mine facility. It is part of the ILIAS network which makes it part of a network of European underground labs. It holds various experiments devoted to Dark Matter searches like Zeplin and Drift.

Including astronomy and astrophysics, UK has of the order of 600 people (158 FTE) involved in the field, of which approximately 25% are women. The total amount of money spent during the year 2006 on specific targeted projects was around 9 M€ including salaries, although a precise classification into running, investment or personnel costs was not easy to extract from the data.

Formal applicants for research grant funding in UK are the PIs of research groups who have to be resident in the UK and employed as an academic member or staff in a UK research organisation. Astroparticle physics does not have a specific panel to review proposals so this field has to compete for funding in the same way as other areas in particle physics and astronomy. Separate Astronomy Grants Panels (AGP) and Particle Physics Grants Panels (PPGP) exist, which review major rolling grants on a 3 yearly basis to UK institutes. These grants are intended to support the staff and infrastructure of the research programme on a long term basis at the institute, rather than being project specific. Where appropriate, rolling grants are awarded in astroparticle physics. The current astroparticle physics rolling grant in

gravitational waves is reviewed by a specially convened panel for each review. The AGP and PPGP panels also review requests in response to ad hoc invitations to bid to specific calls for proposals.

Project specific grants in astroparticle physics are reviewed by the Project Peer Review Panel (PPRP), which reviews project proposals across particle physics, astronomy and nuclear physics. It has a core panel of members, but also seconds additional experts relating to the specific area of science being reviewed.

The recommendations of AGP, PPGP and PPRP are considered by the Particle Physics, Astronomy and Nuclear Physics Committee (PPAN) where funding decisions are made.

Once funds are awarded, grant-holders report on how the work has progressed and the money spent. For running experiments and exploitation grants, the report is submitted at the end of the grant and reviewed by experts, for construction projects progress reports are also required and an oversight committee is normally set up to monitor progress.

5. Comparison

In this section the information collected at the National Days and in the questionnaires is presented in a different way. For each question or issue a table has been prepared in which countries are compared. The questions in this chapter are simple questions that allow answers to be written and compared in small tables. These questions do not correspond exactly to the questions from the questionnaire, but together they should cover most of the information.

The status of ApP funding is described, both qualitatively and quantitatively in section 5.1. The funding methodology and boundary conditions are compared in section 5.2.

5.1 Overview of the research funding system

An overview of the research funding system as it was implemented in 2006/2007 in each country was included in the answers to the questionnaire. These overviews can be found in the appendix. In this section a comparison is given of the most important aspects, relevant for this report. Apart from the funding methodology, the resources available for ApP research in 2006 are mentioned as well. This provides a basic reference for the overall funding level of ApP in Europe. The numbers were carefully collected by the agencies and are presented as correct to the best of our knowledge.

The stakeholders in ApP research are the funding agencies and the researchers. The funding agencies are described in section 5.1.1. Dedicated sections are devoted to the way strategic decisions are taken at each agency (5.1.2), the current policy with respect to ApP research (5.1.3), the availability of a forward look for ApP (5.1.4), the type of research considered as ApP (5.1.5), the spread of ApP research over universities and research institutes (5.1.6), an overview of ApP research facilities (5.1.7), a list of ApP collaborations in Europe (5.1.8), budgetary and human resources information (5.1.9) and some general information about the various participating countries (5.1.10).

5.1.1 Main funding agencies

What are the main agencies funding ApP research in your country?

Country	Main funding agencies
BE	Federal - (Federal Ministry of Economy, Federal scientific policy office), Regional - (Flanders (Government, FWO, IWT), Wallonia (Government, FNRS, FRIA)) and local (universities)
CH	SNF (projects), State Secretariat for Education and Research (large infrastructures and programmes)
CZ	Ministry of Education, Youth and Sports (MEYS) Grant Agency of the Czech Republic (GACR)
DE	Federal States (Länder) Federal Ministry (BMBF) DFG, HGF, MPG
ES	Ministry (MICINN)
FR	Ministry (CNRS(IN2P3, INSU), CEA(IRFU), ANR, CNES, Universities)
IT	Ministry (INFN, ASI, INAF, Universities)
NL	Ministry (NWO (FOM(Nikhef), ASTRON, SRON), Universities)
PT	Ministry (FCT)
SE	Ministry (VR, SNSB) KAW (private foundation)
UK	Ministry (STFC)

Table 2: main funding agencies in ASPERA countries

5.1.2 Strategic level decisions

What is the body that decides about the relative importance of ApP funding with respect to other research fields?

Country	Decision taking body for strategic level decisions
BE	None, funding is approved on competitive basis
CH	None, funding is approved on competitive basis within SNF
CZ	None, funding is approved on competitive basis
DE	All agencies operate independently but have different responsibilities
	BMBF: responsible for national science policy
	DFG, HGF, and MPG have own decision making bodies
ES	MICINN
FR	General directors of CNRS, CEA, CNES
	Directors of IN2P3, INSU,IRFU
IT	All agencies have an independent strategy INFN: Governing Bodies (Council of Directors, Executive Board)
NL	All research institutions and foundations have their own strategy. The board of each institution (FOM, NWO, ASTRON, SRON, NOVA, universities) decides on the relative importance of ApP funding.
PT	None, funding is approved on competitive basis
SE	None, funding is approved on a competitive basis within VR
UK	STFC Science Board

Table 3: strategic level decisions

5.1.3 Funding strategy for the ApP research field

What is the current attitude of policy makers and funding agencies towards ApP?

Country	Current attitude of policy makers towards ApP
BE	ApP is financed on the basis of projects by the FNRS and the FWO.
CH	ApP is financed by SNF on the basis of projects submitted. ApP projects must compete with all the rest.
CZ	ApP is financed by MEYS and GACR on the basis of projects submitted
DE	ApP is a recognised field and is well integrated in various funding bodies. Funding through all agencies is in principle possible.
ES	One main programme from MICINN for basic research. ApP projects have to compete. ORM and LSC have institutional support.
FR	ApP is well integrated in the funding bodies CNRS and CEA.
IT	ApP is a recognized field that is integrated within INFN. INFN has a specific scientific line for ApP with dedicated funding.
NL	ApP is an interdisciplinary field, funded mostly from FOM, ASTRON and the universities with growing support from NOVA and NWO. Fellowships, projects and programmatic funding are available. There are no specific ApP calls.
PT	ApP is financed by FCT on the basis of projects submitted for the normal call for the high energy physics. ApP projects must compete with all the rest.
SE	ApP is financed on the basis of projects submitted for the normal call for grants one a year by the VR.
UK	ApP interdisciplinary field with one rolling grant. Other funding for research grants in competition along with Astronomy and Particle physics. ApP project-specific grants reviewed by Project Peer Review Panel (PPRP).

Table 4: current attitude of policy makers towards ApP

5.1.4 Forward looks

In most countries strategic plans are available describing the future perspective of ApP research. In the table below the availability and location (if applicable) of these plans are listed. In the 2nd column the organisations responsible for the plans are listed including the last date (year) when a report was produced. The 3rd column gives a brief description of the fields covered by the strategic plan, the 4th column gives the renewal time and the last column gives a link to the electronic version if available.

Country	Strategic plan?	Content	Renewal	Electronic version
BE	No	-	-	
CH	CHIPP 2004 road-map	Particle physics	Undefined	document
	Swiss Commission for Astronomy of the Swiss Academy of Sciences	Astrophysics	?	document
CZ	No ApP plan			
	Nationwide strategic plan	Science and R&D	?	document
DE	KAT (2006)	ApP science vision	Undefined	document
ES	MICINN, Spanish R&D National Plan	R&D on all sciences	4 years	document
	MICINN, Spanish Science and Technology Strategy	All sciences	4 years	document
FR	IN2P3/IRFU (2004) INSU (2004)	Particle, Nuclear and Astroparticle Physics	4 years	document document
IT	ASI (2006)(3y)	Spatial and Aereospatial technological and scientific research	1 year	document
	INAF (2006) (3y)	Astronomy Radioastronomy Astrophysics Cosmic physics	1 year	document
	(10y)			document
	INFN (3y) (2007)	Particle, Astroparticle, Nuclear, Theoretical physics and Technology research	1 year	document
NL	CAN (2005)	ApP only	3 years	document
	FOM (2004)	Physics	5 years	document
PT	No	-	-	
SE	VR (2007): Strategy guide for research infrastructures. VR(2008): The Council's Research Strategy 2009-2012	All science	Infrastructure Guide 2009	document
UK	STFC (2007)	All sciences (physics)	2 years	document

Table 5: forward looks in ApP

Most strategic plans are incorporated within a wider strategy for all of physics research. In Germany and the Netherlands dedicated ApP committees representing all research groups have produced independent forward looks. In Italy the strategic plans look forward for three or ten years. The three year plans are renewed every year.

5.1.5 Astroparticle physics coverage

Definition of the ApP domain

ApPEC accepts a very wide definition of ApP, which was adopted by ASPERA. Within ASPERA ApP research is defined through the following questions:

- What is the Universe made of? (Matter, Dark Matter, Dark Energy)
- Do protons have a finite life-time?
- What are the properties of neutrinos? What is their role in cosmic evolution?
- What do neutrinos tell us about the interior of Sun and Earth, and about Supernova explosions?
- What is the origin of cosmic rays? What is the view of the sky at extreme energies?
- What is the nature of gravity? Can we detect gravitational waves? What will they tell us about violent cosmic processes?

In the questionnaire each agency was asked to provide a description of the research fields belonging to astroparticle physics in their country. All countries agreed that astroparticle physics was an interdisciplinary field between astrophysics (astronomy) and particle physics. Some countries included cosmology or high energy astrophysics. The precise definition in individual countries differs, although in most countries similar subjects are included.

Participation in various ApP subfields

In ApP many different research fields came together. To see what subfields a country is involved in, it has been identified in which of the 8 major areas that were used in the ApP Roadmap that country participated. Theory is added as a separate 9th field. The nine subfields used are given below:

- High Energy Gamma Rays (HEγR)
- Neutrino Mass (νMass)
- High Energy Cosmic Rays (HECR)
- High Energy Cosmic Neutrinos (HECν)
- Dark Matter (DM)
- Dark Energy (DE)
- Gravitational Waves (GW)
- Low Energy Neutrinos & Proton decay (LEν&P)
- Theory

Table 6 shows in which of these 9 subfields in ApP research each country is actively participating.

	Research fields								
Country	HEγR	νMass	HECR	HECν	DM	DE	GW	LEν&P	Theory
BE				✓					✓
CH	✓	✓	✓	✓	✓	✓	✓	✓	✓
CZ	✓	✓	✓		✓			✓	✓
DE	✓	✓	✓	✓	✓	✓	✓	✓	✓
ES	✓	✓	✓	✓	✓	✓	✓	✓	✓
FR	✓	✓	✓	✓	✓	✓	✓	✓	✓
IT	✓	✓	✓	✓	✓	✓	✓	✓	✓
NL			✓	✓			✓		✓
PT	✓		✓		✓			✓	✓
SE	✓		✓	✓	✓	✓			✓
UK	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 6: overview of the participation of each ASPERA country to the 9 subfields of ApP

While the smaller countries only participate in a limited number of ApP research fields, the larger countries participate in essentially all subfields.

5.1.6 Where are ApP researchers employed?

The next table gives an overview of the employment situation for ApP researchers, where universities and independent research institutes, and national laboratories are counted in a country.

Country	Universities + research institutes + national laboratories
BE	4
CH	7
CZ	5
DE	38
ES	13
FR	28
IT	30
NL	9
PT	5
SE	3
UK	19

Table 7: number of universities, institutes and national laboratories active in ApP research in the ASPERA countries

Most ApP researchers work at the universities.

5.1.7 Large ApP research facilities

In this section an overview is given of large ApP research facilities (anywhere in the world), in which European teams participate.

The large ApP research facilities are divided in three groups:

- underground labs (section 5.1.7.a)
- facilities and observatories, other than underground labs (section 5.1.7.b)
- satellites (section 5.1.7.c

There will be an update of the information in these tables available in the "long write-up of the Roadmap Paper Phase-III".

5.1.7.a Underground labs

In the table below the four large European underground laboratories are listed. The columns show (respectively) the host country, the name, the experiments operated in that lab and the financial information.

Country	Underground Lab	Experiments	Initial investment	Annual cost
ES	Canfranc Underground Laboratory, LSC	ANAIS, Rosebud	3.5 M€	1.6 M€
FR	Laboratoire Souterrain de Modane, LSM	Edelweiss, NEMO	1.5 M€ (construction cost)	300 k€ (but 1 M€ including salaries)
IT	Laboratorio Nazionale del Gran Sasso, LNGS	BOREXINO, COBRA, CRESST, CTF, CUORE, CUORICINO, DAMA/LIBRA, GERDA, ICARUS, LVD, OPERA, XENON, WARP		12M€
UK	Boulby Underground Laboratory, BUL	ZEPLIN, DRIFT	4.6M€	420k€

Table 8: underground ApP labs in ASPERA countries

5.1.7.b Facilities and observatories on the ground

In the table below the ground based facilities and observatories with European participation are shown. The name, participating countries, type of facility, location, and financial figures (if available) are shown.

Facility/ Observatory	Countries	Type	Location	Initial invest-ment	Annual cost
Jungfraujoch	CH	Cosmic rays research	CH		
GEO600	DE, UK	GW interferometer	DE	10 M€	
KATRIN	DE, RU, US, UK, CZ	Beta spectrometer	DE	33.5 M€	
KASKADE Grande	DE, IT, PO, RO	CR array	DE		
Lopes	DE, NL, IT, PO, RO	CR array	DE		
MAGIC	DE, ES, IT, CH, PO, FI, US, UKR, ARM, BU	Imaging Air Cherenkov Telescope	ES		
ANTARES	FR, IT, DE, ES, NL, RO, RU	Underwater neutrino telescope	FR	20 M€	0.5 M€
NESTOR	GR	Underwater neutrino telescope	GR		
EGO/VIRGO	IT, FR, NL	GW interferometer	IT	85 M€	10 M€
NEMO	IT	Underwater neutrino telescope	IT	13 M€	0.7 M€
LOFAR	NL, UK, DE, FR	CR antennas	NL	52 M€	
IceCube	US, DE, BE, SE, JP, NZ, UK, NL, CH	Deep-ice neutrino telescope	Antarctica	180 M€	
Pierre Auger Observatory	FR, IT, DE, UK, CZ, NL, PO, PT	EAS array	Argentina		
H.E.S.S.	FR, DE, UK	Cherenkov Imaging Air Telescope	Namibia		
ARGO-YBJ	IT, P.R. of China	RPC array for gamma astronomy and cosmic rays	P.R. of China	12 M€	0.8 M€
LIGO	US, DE, UK, AUS	GW interferometer	US		
VERITAS	US, UK, IR, CA	Gamma ray telescope	US		

Table 9: facilities and observatories with participation of ASPERA countries

5.1.7.c Satellites

In the table below those satellite missions are listed that are of importance for ApP research. The name, participating countries, type of facility, (estimated) launch date, and financial figures (if available) are shown.

Satellite	Countries	Type	Launch	Initial invesment	Annual cost
Pamela	IT, DE, SE, RU, US, India	Cosmic rays	2007	~ 20 M€	~ 0.8 M€
AMS	16 countries: DE, FI, FR, IT, PT, ES, CH, RO, etc.	Cosmic rays	2010		
AGILE	IT	Gamma rays	2007		
GLAST	FR, IT, DE, SE, JP, US	Gammy rays	2008		
Planck	FR, RO, etc.	(Dark) matter distri-bution / cosmology	2008		
LISA PF	FR, ESA, DE, IT, UK, ES, CH, NL, US	GW interferometer	2009		
LISA	FR, ESA, DE, IT, UK, ES, CH, NL, US	GW interferometer	2018		

Table 10: satellites with participation of ASPERA countries

5.1.8 Existing collaborations

There are many international collaborations active in ApP research. The table below lists the name of the existing collaborations, the type of experiment or infrastructure, the status in 2008, and two columns with the collaborating countries inside and outside Europe. The costs listed in the 3rd column represent the investment costs in 3 categories: small (< 5 M€), medium (5—30 M€), and large (> 30 M€).

There will be an update of the information in this table available in the "long write-up of the Roadmap Paper Phase-III".

Name	Type	Cost	status	European	Others
advLIGO	Gravitational Waves	large	R&D	UK, DE	US, AUS
AGILE	Gamma Telescope	large	running	IT	
AMS	Cosmic Ray LE	large	construction	16 countries: DE, FI, FR, IT, PT, ES, CH, RO, etc.	US+
ANAIS	Dark Matter		construction	ES	
ANTARES	Neutrino Telescope	medium	running	FR, DE, IT, NL, SP, RO	RU
ArDM	Dark Matter	medium (small in R&D phase)	R&D	CH, ES, PO	
ARGO-YBJ	Gamma Astronomy and Cosmic Rays	medium	running	IT	CHINA
Auger North	Cosmic Ray HE	large	running	FR, DE, IT, NL, PO, SL, ES, UK, CZ	US+
AURIGA	Gravitational Waves	medium	running	IT	
Baikal NT200	Neutrino Telescope	small	running	DE	RU
BOREXINO	Low Energy Neutrino	large	running	IT, FR, DE, PO	RU, HUN, US
CAST	Dark Matter	small	running	FR, DE, GR, ES, CH	CA, CR, RU, TU, US
COBRA	Double Beta	large (small in R&D phase)	R&D	UK, DE	
CODALEMA	Cosmic Ray HE	small	R&D	FR	
CREAM	Cosmic Ray LE	medium	running	IT, FR	US, ME
CRESST	Dark Matter	medium	running	DE, UK, IT	
CTA	Gamma Telescope	large	R&D	DE, ES, IT, CH, PO, FR, UK, …	US, UKR, ARM, BU, JP, …
CTF	Low Energy Neutrino	small	running	IT, FR, DE, PO	RU, HUN, US
CUORE	Double Beta	medium	construction	IT, NL, ES	US
CUORICINO	Double Beta	small	running	IT, NL, ES	US
DAMA/LIBRA	Dark Matter	medium	running	IT	CHINA
Double-CHOOZ	Reactor	medium	construction	FR, DE	US, RU
DRIFT	Dark Matter	small	R&D	UK	US
DUAL	Gravitational Waves	small	R&D	IT	
EDELWEISS	Dark Matter	medium	construction	FR, DE	RU
E.T.	Gravitational Waves	large	R&D	…	…
EURECA	Dark Matter	large	R&D	FR, DE, SE, UK	

EUSO	Cosmic Ray HE	large	R&D	FR, DE, IT, PT, ES, CH	JA, BRA, US
Name	**Type**	**Cost**	**status**	**European**	**Others**
EXO	Double Beta	medium	R&D	CH	US, RU, CA
GAW	Gamma Telescope	medium	R&D	IT, ES, PT	
GENIUS-TF	Dark Matter	small	running	DE	RU
GEO 600	Gravitational Waves	medium	running / upgrade	DE, UK	
GERDA	Double Beta	medium	construction	DE, IT, BE, PO	RU
GLACIER	Low Energy Neutrino	large	R&D	CH, FR, IT, PO, ES, UK	RU
GLAST	Gamma Telescope	large	running	FR, IT, DE, SE	US, JP
HDMS	Dark Matter	small	running	DE	RU
H.E.S.S.	Gamma Telescope	medium	running / upgrade	DE, FR, UK, IR, CZ	ARM, SAF, NAM
ICARUS	Low Energy Neutrino	medium	construction	CH,FR,IT,PO,ES,UK	RU
IceCube	Neutrino Telescope	large	running / construction	BE, DE, NL, SE, UK, CH	JP, NZ, US
Integral	Gamma Telescopes	large	running	DE, FR, IT, CH, NL, DK, ES, UK	
KASCADE-Grande	Cosmic Ray HE	medium	running	DE, IT, PO, RO	
KATRIN	Single Beta	large	construction	DE, UK, CZ	US, RU
KM3NeT	Neutrino Telescope	large	R&D	CY, FR, DE, GR, IT, NL, ES, UK, RO	
LENA	Low Energy Neutrino	large	R&D	DE, FI	RU
LIGO	Gravitational Waves	large	running / upgrade	UK, DE	US, AUS
LISA	Gravitational Waves	large	R&D	FR, DE , IT, NL, ES, CH, UK	US
LISA PF	Gravitational Waves	large	construction	FR, ESA, DE, IT, UK, ES, CH, NL	US
LOFAR	Cosmic Ray HE	large	construction	NL, DE, SE, UK, IT, FR, PO	
LOPES	Cosmic Ray HE	small	R&D	DE, NL, PO, IT, RO	
LVD	Low Energy Neutrino	medium	running	IT	US, RU, BRA, JA
LUX	Dark Matter	medium	construction	UK	US +
MAGIC	Gamma Telescope	medium	running	DE, ES, IT, CH, PO, FI	US, UKR, ARM, BU
MANU2	Single Beta	small	R&D	IT	
MARE	Single Beta	small	R&D	IT	US
MEMPHYS	Low Energy Neutrino	large	R&D	FR, IT, CH, ES	
MIBETA	Single Beta	small	R&D	IT	US
MiniGRAIL	Gravitational Waves	small	R&D	NL, IT, CH	
NEMO	Neutrino Telescope	medium	R&D	IT	
NEMO-3	Double Beta	small	running	FR, CZ, UK	US, RU, JP
NESTOR	Neutrino Telescope	medium	construction	GR, DE, CH	RU, US
NuMoon	Cosmic Ray HE		running	NL	
PAMELA	Cosmic Ray LE	medium	running	IT, DE, SE	RU, US, IN

PICASSO	Dark Matter	small	running	CZ	CA, US
PLANCK				FR, RO, etc.	
Name	**Type**	**Cost**	**status**	**European**	**Others**
PVLAS	Dark Matter	small	running	IT	
ROSEBUD	Dark Matter	small	construction	FR, ES	
ROG	Gravitational Waves	small	running	IT, CH	
SIMPLE	Dark Matter	small	running / construction	PT, FR	US
SNO	Low Energy Neutrino	large	terminated	UK, DE	US, CA
SNO++	Low Energy Neutrino			UK ?	US, CA
SuperNEMO	Double Beta	medium	R&D	FR, CZ, UK	US, RU, SL, JP
TGV	Double Beta	small	running	FR, CZ	RU, SL
TRACER	Cosmic Ray LE	small	running	DE	US
TUNKA	Cosmic Ray HE	small	running/ construction	RU, DE,IT	
VERITAS	Gamma Telescope	medium	running	IR, UK	CA, US, ARG
VIRGO/EGO	Gravitational Waves	large	running / upgrade	FR, IT, NL, CH	
WARP	Dark Matter	small	running / upgrade	IT	US
XENON	Dark Matter	medium	running / upgrade	IT, PT	US
ZEPLIN I-III	Dark Matter	small	running	PT, UK	RU, US

Table 11: Existing collaborations in ApP research, with contributions from European countries

5.1.9 Quantitative information about 2006

The quantitative information about 2006 consists of a summary of the total amount of money available for ApP research and the total amount of scientific personnel in FTE (Full time equivalent) persons working in ApP research. The original tables can be found in the appendix.

5.1.9.a ApP budget in 2006

The agencies were asked to complete a table where they list the budgets for the various projects and groups active in ApP research. These tables are provided in the appendix. The numbers from these tables are compared in this section. Numbers from countries with another currency than the Euro are converted into Euros. The original numbers can be found in the original tables. The exchange rates used were:

- 1 CHF = € 0.61 for Switzerland and
- £ 1 = € 1.50 for the UK.
- 28.34 CZK = € 1

The table below gives an overview of the total ApP research budget in each country split into personnel, investment, running costs (for projects, labs and universities) and overhead costs. The amounts in the table are in k€ and reflect a best estimate of the 2006 budget.

Country		Personnel	Investment	Running	Overhead	Total
BE		420	150	160	included	730
CH				3,100	15-20% extra	3,600
CZ		230		200	included	430
DE		24,000	19,900		not included	44,000
ES		7,000		3,000		10,000
FR	***CNRS***	31,700	14,400	2,000	not included	51,460
	CEA	3,360				
IT		18,400	17,600	22,600	29% overhead on personnel excluded	58,600
NL		5,000	380	700	50% included	6,080
PT		300	210		not included	510
SE				2,000	35% (VR)	2,000
UK				9,000	included 46% on staff	9,000
Sum						***186,410***

Table 12: Overview of the available ApP budget in 2006 in ASPERA countries

Government budget appropriations or outlays on R&D — GBAORD — are one way of measuring how much governments spend on R&D, in other words, of ascertaining what priority governments give to the public funding of R&D. GBAORD includes all appropriations allocated to R&D in central government or federal budgets, and therefore refers to budget provisions, not to actual expenditure. The GBAORD is on average about 0.9% of the Gross Domestic Product (GDP). To compare the relative amount of funding in each country the ratio of the ApP research budget to the GBAORD is given in the next graph. The value and the source of the GBAORD for each country are given in section 5.1.10.

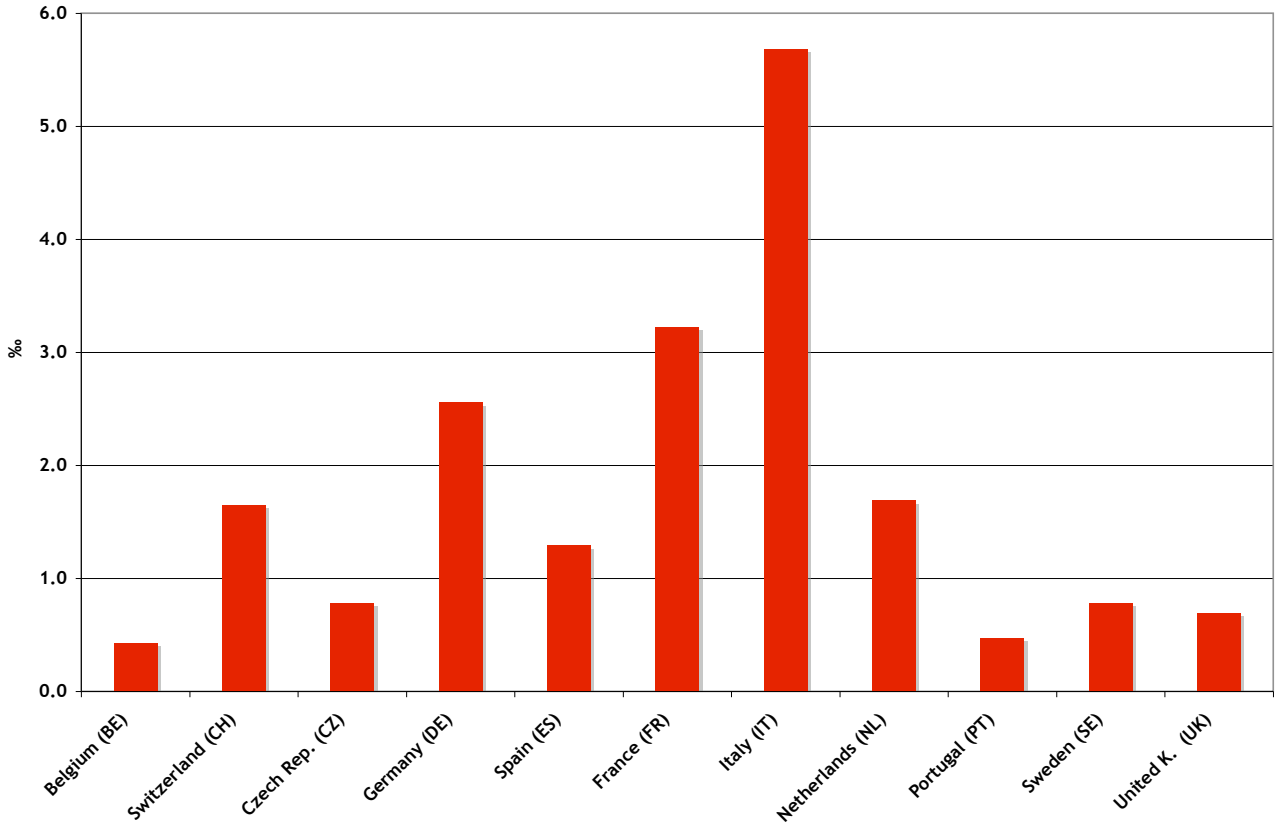

Figure 8: ratio of ApP budget to the government budget for R&D in the ASPERA countries

5.1.9.b Scientific personnel in ApP research

For each country the total number of FTEs active in ApP research in 2006 is listed in the table. Undergraduate students have been excluded in the count.

Country	FTE	% Women
BE	17	16
CH	52	26
CZ	20	10
DE	494	17
ES	168	20
FR	608	15
IT	679	20
NL	55	18
PT	40	33
SE	34	15
UK	158	24
Total	***2,325***	

Table 13: number of FTEs active in ApP research in 2006 and the percentage of women

Except for Portugal, the relative number of female researchers is about 20%.

To compare the relative number of people working in ApP in each country the ratio of the total FTE number to the entire population is given in the next graph. The value and the source of the population for each country are given in section 5.1.10.

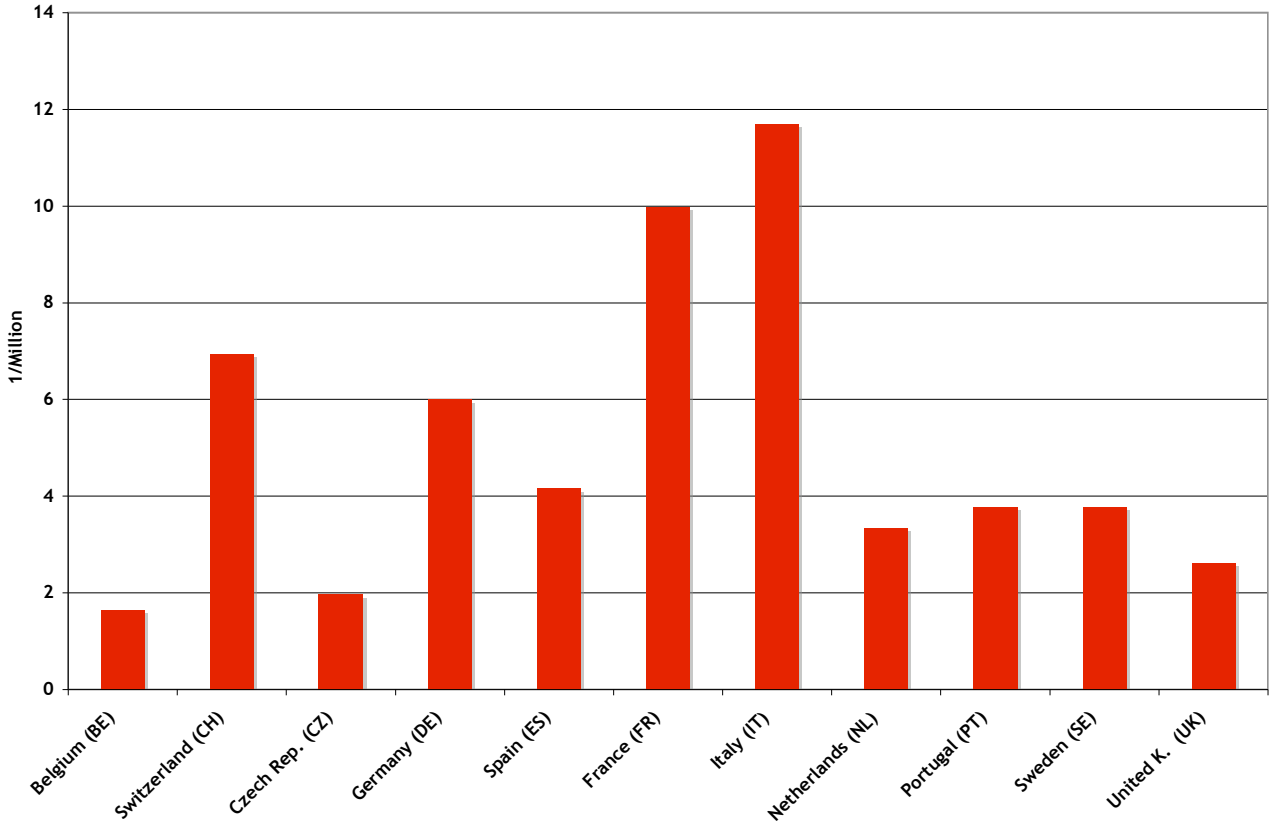

Figure 9: ratio of number of active ApP researchers to the total population of each country

5.1.9.c What is the average salary range?

The average salary range is an important number to compare between countries when in the process of requesting support from any funding agency. We are fully aware that each country has its own way of referring to salary cost. Therefore we provide in this table the gross salary that a person finds on his contract and/or on his tax papers. The column overhead shows the percentage that the employer uses to calculate the actual costs of such a person for the employer.

The various function levels are defined as listed in the table below.

PhD	Person working on his PhD research
Postdoc	Person with a doctorate title, with a temporary job. This includes junior fellowships.
Researcher	Person with permanent research position, or tenure track position, not being a professor.
Professor	Any person with the title professor (junior, assistant, associate, full), also professors with higher functions, as director or dean
Technician	Technical support staff
Engineer	Person with a degree in engineering, who has other duties than a researcher.

Table 14: description of various research levels

The salary range of the most common research functions is given in the next table. In the table a salary range is given from the lowest start position in the indicated function to the highest rank. The numbers are given in k€ per year.

Country		PhD	Postdoc	Researcher	Professor	Technician	Engineer	Overhead %
BE		25 — 40	40 — 65		70 — 100		35 — 65	
CH *		20 — 35	40 — 65	NA	70 — 125	40 — 65	60 — 85	NA
CZ		4 — 9	7 — 12	10 — 18	11 — 15	8 — 12	14	37%
DE		15 — 35	35 — 60	35 — 70	65 — 90	30 — 45	35 — 60	included
ES				50 — 70	55 — 75	35 — 45		
FR	***CNRS***	17	30	30 — 70	30 — 70	20 — 30	30 — 55	
	CEA	35	50	65 — 100	65 — 100	40 — 60	65 — 100	78%
IT		15	25	30 — 90	40 — 90	25 — 30	30 — 90	29%
NL		25 — 35	40 — 60	45 — 80	65 — 115	25 — 50	30 — 80	20%
PT				45 — 50	50 — 70	20 — 25		
SE		30	35	35 — 40	65	35		56%
UK		20	40 — 50	35 — 65	100 — 120	35 — 55		46%

*Table 15: Salary range in k€ per year. This table shows the gross salary that a person finds on his pay cheque. The last column shows the percentage that the employer uses to calculate the actual costs of such a person for the employer (this includes taxes, social contributions that are not deducted from the employee's gross salary, but are paid by the employer) additional employer costs, not including heating, etc. * For Switzerland the numbers are based on figures relevant for SNF and University of Geneva.*

5.1.10 Extra information

In this subsection some additional figures are given for all participating countries, such that the data given in the questionnaire can be compared in a better way. The information shown in the table below was used to calculate the ratios in the previous tables and graphs.

The data in the second and third column of the table were taken from the CIA World Factbook 2006 (ISSN 1553-8133). For each item some additional explanation is given below:

- Population in Millions
- GDP: Gross Domestic Product in G€ (10^9 €). (purchasing power parity, i.e. corrected for the cost level of the country)

The data in the fourth column are taken from Eurostat (http://epp.eurostat.ec.europa.eu) from the statistical book on "Science, technology and innovation in Europe".[*]

- GBAORD in M€

The data in columns 5 and 6 comes from the answers to the questionnaire:

- Total ApP research Budget in M€ (including salaries, etc)
- FTE: number of FTE working in ApP research quoted in the questionnaires.

Columns 7 and 8 contain derived quantities:

- ApP Budget / GBAORD: Total ApP budget divided by the GBAORD (column 5 / column 4. The unit of the column is per mill (1/1000).
- FTE/pop: Total number of FTE active in ApP divided by Population in Millions (column 6 / column 2), so the numbers are in per million.

Country	Population	GDP	GBAORD	ApP budget	FTE	ApP Budget / GBAORD	FTE / Population
	Million	G€	M€	M€		‰	per Million
BE	10	272	1,714	0.7	17	0.4	2
CH	8	217	2,189	3.6	52	1.6	7
CZ	10	153	552	0.4	20	0.8	2
DE	82	2,015	17,221	44.0	494	2.6	6
ES	40	835	7,740	10.0	168	1.3	4
FR	61	1,496	15,950	51.5	608	3.2	10
IT	58	1,355	10,309	58.6	679	5.7	12
NL	17	412	3,598	6.1	55	1.7	3
PT	11	161	1,082	0.5	40	0.5	4
SE	9	220	2,561	2.0	34	0.8	4
UK	61	1,535	12,950	9.0	158	0.7	3
Total	***367***	***8,670***	***75,866***	***186.4***	***2,325***	***2.3***	***6***

Table 16: Information from other sources combined with the information from the questionnaires to make comparison between countries possible. Explanation of column contents can be found in the text above the table.

** Eurostat Statistical book on "Science, technology and innovation in Europe" can be found on http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1073,46587259&_dad=portal&_schema=PORTAL&p_product_code=KS-EM-08-001*

5.2 Application procedures

In this section an overview is given of the procedures or processes followed to distribute the available funding over the various projects, persons, groups, facilities, etc. Firstly an overview is given of the participants in the application process (section 5.2.1), then an overview is given of the application process in each country (section 5.2.2).

5.2.1 Who should apply for funding?

An overview is given of the main participants in the application procedure:

- Who can apply for funding in each country? Who should sign the application?
- Which organisation/person receives the requested money?

Country / Agency		Formal applicant	Receiving entity
BE	*FNRS-FWO*	Researcher	Researcher
	Belspo/Univ	Unit directors	Research unit
	Flemish region	Unit directors	Research unit
CH		Any researcher working in Switzerland	Any researcher working in Switzerland
CZ		Any researcher working in Czech Republic	Any researcher working in Czech Republic
DE	*HGF*	HGF researchers / groups	HGF institute
	MPG	MPI researchers / groups	MPI institute
	DFG	All researchers / research groups	University
	BMBF	Mainly university groups	University
ES		Public and non profit private R&D+i centres, technological centres and other scientific organisations to which the PI belongs	Institute
		Special call that requires the PI to be under 40 years old.	
FR	*CNRS*	Researchers/professors	Researchers/Professors
	CEA	Researchers	Researchers
	ANR	Academic laboratories	Academic laboratories
IT	*INFN, INAF, ASI*	Staff and university associates	Research groups
	MUR/PRIN	Academic staff.	Projects over all disciplines can be co-funded up to 70% for 2 years.
NL	*Fellowship*	Post Doc or junior researcher	Host institution
	Projects	Senior researcher	Research group
	Programme	Research leader / professor	Set of research groups
	Large investment	Institute director	Institute
PT		Researcher	Institute
SE		For VR the PIs must be employed as member of staff at Swedish Higher Education Institution	Host university/institute
UK		PIs must be resident in the UK and employed as academic member of staff of a UK research organisation.	Institute

Table 17: overview of formal applicant and receiving entity for funding requests

5.2.2 *Evaluation process*

In order to compare the evaluation procedures in the various countries, the following questions had to be answered in the questionnaire for each programme/agency:

- Who are evaluating the proposal?
- Who does the ranking after the evaluation?
- Who takes the final decision after the ranking?
- How is the process constructed:
  - one step
  - Is first a letter of intent needed?
  - Is there a reply necessary/allowed after the first review?
  - Is there a presentation requested?
  - Is there a site visit involved?

The answers to these questions are summarized in the table below.

Country	Agency / Programme	Evaluators	Ranking	Decision	Process
BE	*FNRS-FWO*	Internal and external experts	Scientific committee	Board	
	Belspo/Univ	External experts	External experts	Universities	
	Flemish region	External experts	External experts	Minister	
CH		SNF research council with help of external experts			Reply
CZ	*MEYS*	Expert opinions	Review panel	Review panel	
	GACR	Expert opinions	Scientific advisory board	Scientific advisory board	
DE	*HGF*	Expert board	External experts	Senate	
	MPG	Expert board	Expert board	General assembly	
	DFG	Expert board	Expert board	Joint committee	Depends
	BMBF	Expert board	Expert board	BMBF	One step
ES		Experts, coordinators of the ANEP, and managers of the DGI.	Committee	Committee	Two step
FR	*CNRS*	Scientific council	Scientific council	Head of institute	One step
	CEA	Scientific committee	Resources council	Head of IRFU	Two step
	ANR	Evaluation committee	Evaluation committee	Director of ANR	
IT	*INFN*	ApP scientific committee	ApP scientific committee	Governing bodies	Letter of intent + full proposal + review
	MUR/PRIN	Expert committee of undisclosed composition	Committee	Committee	
NL	*Fellowships*	External review	Review committee	FOM board	One step + presentation
	Projects	External review	Review committee	FOM board	One step + reply
	Programme	External review	Executive board	FOM board	Letter of intent + full proposal + presentation + reply
	Large investment	External review	Review committee	NWO board	As programme + site visit

PT		External experts	External experts	funding agency (following the recommendations)	One step
SE	***VR***	Evaluating panels	Evaluating panel	Scientific Councils for natural and engineering sciences/ Committees	One step
UK	***Rolling grants***	External experts	Grant panels	Executive	Full proposal + presentation+ reply
	Projects	External experts	Projects Peer Review panel	Executive	Letter of intent + full proposal + presentation+ reply
	Fellowships	External experts	Selection panel	Executive	Full proposal + shortlisting+ presentation

Table 18: overview of evaluation processes

In most countries there is a transition between the AC (additional cost) model and the FC (Full cost) model. Some countries are further in this transition than others. There should be no problem for future collaborations or European infrastructures to use either of these models.

Benchmarking the requests for funding is an important part of the evaluation process. The criteria for benchmarking will be evaluated in Deliverable D1.3.

In a few countries, the matching of funds and valorisation of research play a role with some funding requests. Matching seems to play a role only in the Netherlands, where for project money there is always the requirement to provide, from another source, sufficient money for the leading researchers and basic equipment and infrastructure to perform the requested research project. Such matching criteria are not explicitly mentioned by other countries, although they implicitly may exist by making sure that the research groups have a sound financial basis first.

Valorisation is mentioned as a criterion in a few countries, especially, in BE, NL and UK. In Belgium, there are valorisation requirements for Education & Outreach and Social connection, when requesting university grants. When requesting funds though the Flemish region, there should be an added value for the industry. In the Netherlands some calls require added value for industry, but valorisation is not generally used as a criterion for curiosity driven proposals. In the UK the valorisation is embedded in the benchmarking, but these are secondary issues in the peer review process.

From the overview given above, it is concluded that there is a large diversity in funding mechanisms in Europe. However, all the procedures are essentially always based in peer review. As a result so far large international ApP projects such as H.E.S.S., ANTARES or VIRGO did not suffer from the mentioned differences. The question of the legal and financial barriers hindering pan-European cooperation is the subject of a separate report (D1.4).

6. Acknowledgements

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D1.1 authors	R.L.J. van der Meer (FOM) C. Pobes (FECYT)
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7. Appendices

7.1 Appendix 1: List of Acronyms

The following table contains the acronyms used throughout the document in alphabetical order.

AC	Additional cost
AGP	Astronomy Grants Panels, United Kingdom
ANEP	Agencia Nacional de Evaluación y Prospectiva
ANR	Agence Nationale de la Recherche, France
ApP	Astroparticle Physics
ApPEC	Astroparticle Physics European Coordination
ARM	Armenia
ARG	Agentina
ASCR	Academy of Sciences of the Czech Republic
ASI	Italian Space Agency
ASPERA	AStroparticle Physics ERA-NET
ASTRON	Netherlands Institute for Radio Astronomy
AUS	Australia
BE	Belgium
BMBF	Federal Ministry of Education and Research, Germany
BRA	Brazil
BU	Bulgaria
BUL	Boulby Underground Laboratory, United Kingdom
CA	Canada
CAN	Committee for Astroparticl physics Netherlands
CAS	Commission on Science and Technology, Spain
CC	Centre de Calcul, in Villeurbanne, France
CCLRC	Council for the Central Laboratory of the Research Councils, United Kingdom
CEA	Commissariat à l'Énergie Atomique, France
CENTRA	Multidisciplinary Centre for Astrophysics, Portugal
CERN	European Organization for Nuclear Research
CH	Switzerland
CHF	Swiss Franc (1 CHF = € 0.61)
CHIPP	Swiss Institute of Particle Physics
CICYT	Comisión Interministerial para la Ciencia y la Tecnología
CNES	Centre National d'Études Spatiales, France
CNR	National Research Council, Italy
CNRS	Centre National de la Recherche Scientifique, France
CR	Cosmic Ray
CR	Croatia
CSN	Scientific National Committee, Italy
CY	Cyprus
CZ	Czech Republic
CZK	Czech Krown (28.34 CZK = € 1, 2006)
DE	Germany
DE	Dark Energy

DESY	Deutsches Elektronensynchrotron
DFG	German Research Foundation
DK	Denmark
DLR	German Aerospace Centre
DM	Dark Matter
DSM	Direction des Science de la Matiere
ES	Spain
ESA	European Space Agency
ESFRI	European Strategy Forum on Research Infrastructures
ESO	European Southern Observatory
ETH	Swiss Federal Institutes of Technology
EU	European Union
FC	Full cost
FCT	National Foundation for Science and Technology, Portugal
FECYT	Spanish Science and Technology Foundation
FI	Finland
FNRS	Fonds de la Recherche Scientifique, agency of French community, Belgium
FOM	Foundation for fundamental research on Matter, the Netherlands
FR	France
FTE	Full time equivalent
FWO	Fonds voor Wetenschappelijk Onderzoek , agency of Flemish community, Belgium
GACR	Grant Agency of the Czech Republic
GBAORD	Government budget appropriations or outlays on R&D
GDP	Gross Domestic Product
GIS	Groupement d'Intérêt Scientifique (France)
GR	Greece
GW	Gravitational Waves
HE	High Energy
HECν	High Energy Cosmic Neutrinos
HECR	High Energy Cosmic Rays
HEγR	High Energy Gamma Rays
HGF	Helmholtz Association of German Research Centres
HUN	Hungary
ILIAS	Integrated Large Infrastructures for Astroparticle Science
IN2P3	Institut National de Physique Nucléaire et Physique des Particules, France
INAF	National Institute for Astrophysics, Italy
INFN	National Institute for Nuclear Physics, Italy
INSU	Institut National des Sciences de l'Univers, France
IRFU	Institut pour la Recherche des lois Fondamentales de l'Univers, France
IT	Italy
JA	JAPAN
KAT	Komitee fuer Astroteilchenphysik, Germany
KAW	Knut and Alice Wallenberg Foundation, Sweden
LE	Low Energy
LEν&P	Low Energy Neutrinos & Proton decay
LIP	Laboratory of Instrumentation and Experimental Particles Physics, Portugal

LMA	Laboratoire des matériaux avancés, Villeurbanne, France
LNGS	INFN Gran Sasso National Laboratory, Italy
LSC	Canfranc Underground Laboratory, Spain
LSM	Laboratoire Souterrain de Modane, in Modane, France, underground Lab
ME	Mexico
MEYS	Ministry of Education, Youth and Sports, Czech republic
MICINN	Ministry of Science and Innovation, Spain
MPG	Max Planck Society
MUR	Ministry for Universities and Research, Italy
NA	Not Appropriate
NAM	Namibia
ND	National Day
Nikhef	FOM institute for subatomic physics, the Netherlands
NL	the Netherlands
νMass	Neutrino Mass
NOVA	The Netherlands Research School For Astronomy
NWO	national organisation for scientific research, the Netherlands
NZ	New Zealand
ORM	Roque de los Muchachos Observatory which hosts the MAGIC experiment
P2I	La Physique des deux Infinis
PI	Principal Investigator
PO	Poland
PPGP	Particle Physics Grants Panels, United Kingdom
PPRP	Project Peer Review Panel, United Kingdom
PT	Portugal
PT-DESY	Projektträger DESY
RAL	Rutherford Appleton Laboratory, UK
R&D	Research and Development
RO	Romania
RU	Russia
SAF	South Africa
SE	Sweden
SNF	Swiss National Science Foundation
SNSB	Swedish National Space Board
SRON	Netherlands Institute for Space Research
STFC	Science and Technology Facilities Council, United Kingdom
UK	United Kingdom
UKR	Ukraina
UMR	Joint Research Units (Unité Mixte de Recherche)
VR	Vetenskapsrådet, Sweden
WP	Work Package

Table 19: list of acronyms used throughout the document in alphabetical order.

7.2 Appendix 2: Programmes of the National Days

In the next sections the programmes of the National Days are listed. Although only the presenter and the title of the presentation is listed, the order within the programmes reflects the importance of various topics or entities in each country. Where possible, the entries in the programme contain a link to the presentations on the ASPERA website.

BE: Belgium National Day on 15 February 2008 in Brussels

Summary of Belgium National Day.

Presentation title	Presenter	
Welcome	D. Bertrand	
The Solvay Conferences	P. Marage	
Introduction to the ASPERA National Day	S. Katsanevas	
Particle and astroparticle physics in Belgium	C. de Clercq	
Presenting the Federal Belgian Science Policy Office	B. van Doninck	
Presenting FWO (Fonds voor Wetenschappelijk Onderzoek)	B. Hinnekint	
Presenting FNRS (Fonds National pour la Recherche Scientifique)	D. Bertrand	
Presenting the Flemish Community	K. Haegemans	
Funding of the Flemish universities	J. Cornelis	slides
Funding of the French universities	C. Lardinois	
Outreach activities in Belgium	J. D'hondt	
Discussion and Conclusion remarks	S. Katsanevas	

CH: Swiss National Day on 3 December 2007 in Geneva

Summary of Swiss National Day

presentation title	presenter	
Welcome	M. Bourquin	slides
Swiss National Science Foundation support to astroparticle physics	C. Leumann	slides
Swiss Federal Institutes of Technology and large scientific infra-structures	L. Rivkin	slides
Swiss Universities and large scientific infrastructures	P. Spierer	
ApP and particle physics in Switzerland	A. Rubbia	slides
Astronomy in Switzerland in relation with ApP	T. Courvoisier	slides
Cosmology in Switzerland in relation with ApP	R. Durrer	slides
Nuclear Astrophysics in Switzerland in relation with ApP	F. Thielemann	slides
Swiss Contribution to Magic Experiment	F. Pauss	slides
Swiss Contribution to AMS Experiment	M. Pohl	
The status of Recognised Experiments at CERN	R. Aymar	slides
Discussion and Remarks	S. Katsanevas	

CZ: Czech National Day on 4 April 2008 in Prague

Summary of Czech National Day

presentation title	Presenter	
Astroparticle physics in the Czech Republic	J. Ridky	slides
The Pierre Auger Observatory	M. Prouza	slides
GRID computing for AUGER	J. Chudoba	slides
Optical system of AUGER fluorescence detectors	M. Palatka	slides
Short overview of mirrors segments production facility	M. Pech	slides
H.E.S.S. experiment	L. Rob	slides
Basic Information about the Institute of Experimental and Applied Physics, Czech Technical University in Prague	I. Stekl	slides
Double beta decay as a tool in neutrino physics	I. Stekl	slides
Detection of Dark Matter in experiment PICASSO	I. Stekl	slides
Detection of high-energetic cosmic rays in experiment CZELTA/ALTA	I. Stekl	slides
Astronomical Institute ASCR: astroparticles, ERA and ASTRONET	P. Heinzel	slides
Nuclear astroparticle physics and neutrino physics in the nuclear physics Institute ASCR	J. Dobes	slides

DE: German National Day on 22 June 2007 in Hamburg

Summary of German National Day

presentation title	Presenter	
Welcome to PT-DESY	K. Böhlke A. Wagner	
Purpose of ASPERA & National Day	T. Berghöfer	slides
The German research and funding landscape	P. Schroth	slides
HGF (Helmholtz-Gemeinschaft Deutscher Forschungszentren / German Association of Helmholtz Members)	S. Schmidt	slides
MPG (Max-Planck-Gesellschaft / Max Planck Society)	E. Echinger	slides
DFG (Deutsche Forschungsgemeinschaft / German Research Foundation)	K. Zach	slides
BMBF (Bundesministerium für Bildung und Forschung / (Federal Ministry of Education and Research): Project funding	K. Boehlke	slides
Universities/ Countries	G. Drexlin	slides
DLR (Deutsches Zentrum für Luft- und Raumfahrt / German Aerospace Center)	W. Klinkmann	slides
Summary and panel discussion		
Astroparticle physics in Germany	W. Hofmann	slides
Organization of the German ATP Community	H. Blümer	slides
International Relations	L. Mennicken	slides
Legal requirements for international activities	T. Berghöfer	slides
Concluding remarks and discussion	S. Katsanevas	

ES: Spanish National Day on 6 November 2007 in Madrid

Summary of Spanish National Day

presentation title	Presenter	
Welcome	J.Fuster	
The Spanish Research System: Scientific policy & future.	M. Torné	slides
The Spanish Technological System and Infrastructures: Scientific policy& future.	J. Doncel	slides
CSIC: Research National Council. Regional Structure and Organization.	J.M. Fernández Labastida	slides
Particle (and Astroparticle) Physics National Program.	J. Fuster	slides
Research at CIEMAT.	J.A. Rubio	slides
Canfranc, the Spanish Underground Laboratory	S. Bettini	slides
Outreach in Spain: The role of FECYT	E. Pérez	slides
Concluding remarks.	S. Katsanevas	slides

FR: French National Day on 16-17 January 2007 in Paris

Summary of French National Day

presentation title	Presenter	
ASPERA Goals for the Status of Funding	S. Katsanevas	slides
Review of National research systems	Y. Caristan	slides
IN2P3	M. Spiro	
Astroparticle physics	N .Palanque-Dela-brouille	slides
ANR	B. Erazmus	slides
CNRS International Structures	I. Abram	slides
Very Large Infrastructures (Très Grands Equipements TGE) - legal and financial aspects	C. Werlen	slides
Interdisciplinary programs	J.P. Lasota	slides
Evaluation and Decision process, budget allocation, human re-sources (CNRS)	N. Rubel	slides
Evaluation and Decision process, budget allocation, human re-sources (CEA)	P. Micolon	slides
Regions and Universities	M.J. Philippe	slides
Information system Database	L. Malet; A.M. Ferrer	slides
Communication Policy/ Education/ Outreach	A. de Bellefon	slides
Discussion on Questionnaire	G. van der Steenhoven	slides
CEA	J. Zinn-Justin	slides
INSU	J.M. Hameury	slides
Management of astroparticle in IN2P3	S. Katsanevas	slides
Management of a DAPNIA service	B. Mansoulie	slides
Management of an UMR	P. Binetruy	slides
Management of a Platform	G. Gerbier	slides
Management of a Project (ANTARES)	J. Carr	slides
Discussion and Conclusion of ND		
CNES	R. Bonneville	slides

IT: Italian National Day on 16-17 October 2007 in Gran Sasso

Summary of Italian National Day

presentation title	Presenter	
Welcome to INFN	E. Coccia	
Purpose of ASPERA & National Day	S. Katsanevas	slides
Universities and Public Research Institutions. Organization and Fundings.	C. Rizzuto	
National Institute of Nuclear Physics (INFN)	R. Petronzio	
National Institute of Astrophysics (INAF)	G. Vettolani	
Italian Space Agency (ASI)		
The INFN CSN2 scientific activity	F. Ronga	slides
The INFN CSN2 review and funding methodology	A. Marini	slides
International relationships and legal aspects	R. Pellegrini	slides
Summary and panel discussion		
Management of a large scale ApP Infrastructure: LNGS	E. Coccia	
Management of an INFN section involved in ApP: The Padova Section	A. Masiero	slides
Concluding remarks and discussion		

NL: Dutch National Day on 13 April 2007 in Amsterdam

Summary of Dutch National Day

presentation title	Presenter	
Welcome to NL, Amsterdam & Nikhef	F. Linde	slides
Purpose of ASPERA & National Day	S. Katsanevas	slides
Science policy & future @ Ministry level (Ministry of Education, Culture & Science)	C. van Bochove	slides
Science policy & future @ NWO level (National science funding agency)	R. Dekker	slides
KM3NeT: some reflections	H. Chang	slides
ApP Research in the Netherlands	G. van der Steenhoven	slides
Science policy & future @ university level	J. Kuijpers	slides
Science policy & future @ NWO-EW (Astronomy, mathematics & computer science funding agency)	F. Molster	slides
Science policy & future @ KNAW (Royal Netherlands academy of arts & sciences)	E. Broesterhuizen	slides
Outreach & ApP in the Netherlands	B. van Eijk	slides
Science policy & future @ NOVA (Astronomy research school)	W. Boland	slides
Science policy & future @ ASTRON (Astronomy research institute)	M. de Vos	slides
Science policy & future @ SRON (Space research institute)	K.F. Wakker	slides
Science policy & future @ KVI (Nuclear physics institute)	A.M. van den Berg	slides
Science policy & future @ Nikhef (FOM institute for subatomic physics)	F. Linde	slides
Legal Issues in European collaboration	A. van Rijn	slides
Concluding remarks	S. Katsanevas	slides

PT: Portuguese National Day on 5 May 2008 in Lisbon

Summary of Portuguese National Day

presentation title	Presenter	
Welcome session	J. Sentieiro	
FCT	J. Bonfim	
Presentation of LIP	G. Barreira	
Astroparticle physics in Portugal	M. Pimenta	
Observational Cosmology	An. Mourão	
GRID	J. Gomes	
Outreach	P. Abreu	
Discussion / Summary		

SE: Swedish National Day on 3 June 2008 in Stockholm

Summary of Swedish National Day

presentation title	Presenter	
Welcome session	B. von Sydow	
Purpose of ASPERA and National Day	S. Katsanevas	slides
The Ministry of Education and Research	S. Gerdes-Barriere	slides
Swedish Major Funding Agencies	J. Björck	slides
Committee for Research Infrastructures	L. Börjesson	slides
The Knut and Alice Wallenberg Foundation	E. Möller	
The Swedish Polar Research Secretariat	A. Karlqvist	
The Swedish National Space Board	P. Tegnér	
Panel Discussion. Theme: The Swedish Funding System		
Astroparticle physics and Outreach	M. Pearce	slides
Ice Cube	P-O. Hulth	slides
Discussion : Theme 1: Astroparticle physics and outreach Theme 2: Funding strategies for astroparticle physics		
Concluding remarks		

UK: UK National Day on 24 July 2007 in London

Summary of UK National Day

presentation title	Presenter	
Welcome & Introduction	R. Wade	slides
Overview of ASPERA	S. Katsanevas	slides
Role & remit of the Science & Technology Facilities council and overview of funding and bidding process	R. Wade	slides
Overview of peer review	R. Wade	slides
How strategies and priorities are set	J. Womersly	slides
Monitoring and oversight of capital projects	A. Coates	slides
Education and Training	J. Hough	slides
Outreach	M. Edmunds	slides
The new Knowledge Exchange Directorate	V. Wright	slides
Summary of the day	S. Katsanevas	slides
Closeout and thanks	R. Wade	

7.3 Appendix 3: Answers to the questionnaire

The questionnaire as described in section 3.2, that was sent to all the agencies, can be found online at:
http://www.aspera-eu.org/images/stories/questionnaire/questionnaire.pdf,
the vademecum that accompanied the questionnaire at:
http://www.aspera-eu.org/images/stories/questionnaire/vademecum.pdf.

The answers to the questionnaire to the agencies consisted of three documents, one text document with answers to the questions, a table with budget information and a table with personnel information. These files will only be available online at:
http://www.aspera-eu.org/images/stories/questionnaire/<filename>.
The next table lists the links to the files.

Country	text answers	budget table	personnel table
BE	BE-text_answers.pdf	BE-budget.pdf	BE-personnel.pdf
CH	CH-text_answers.pdf	CH-budget.pdf	CH-personnel.pdf
CZ	CZ-text_answers.pdf	CZ-budget.pdf	CZ-personnel.pdf
DE	DE-text_answers.pdf	DE-budget.pdf	DE-personnel.pdf
ES	ES-text_answers.pdf	ES-budget.pdf	ES-personnel.pdf
FR	FR-text_answers.pdf	FR-budget.pdf	FR-personnel.pdf
IT	IT-text_answers.pdf	IT-budget.pdf	IT-personnel.pdf
NL	NL-text_answers.pdf	NL-budget.pdf	NL-personnel.pdf
PT	PT-text_answers.pdf	PT-budget.pdf	PT-personnel.pdf
SE	SE-text_answers.pdf	SE-budget.pdf	SE-personnel.pdf
UK	UK-text_answers.pdf	UK-budget.pdf	UK-personnel.pdf

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