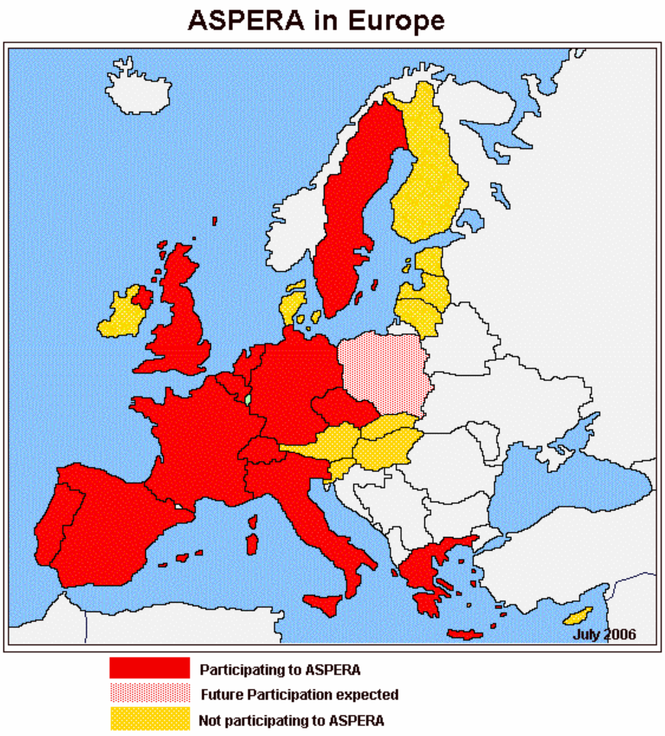
ASPERA vade-mecum



AStroParticle ERAnet

Implementation of Astroparticle Physics European Coordination

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1. What is Astroparticle Physics?

Astroparticle physics is a new field of research emerging from the convergence of physics at the smallest and the largest scales of the Universe. In particle physics we investigate the intimate structure of matter and the laws that govern it. In astronomy and astrophysics, we study the structure of the Universe and its evolution from the initial hot Big Bang. It is cosmology that links the theory of particle physics with that of the very early Universe. Any discovery in particle physics has an immediate consequence on the understanding of the Universe and, inversely, discoveries in cosmology have fundamental impact on theories of the infinitely small.

Until the early 1950s, cosmic rays - charged high-energy particles from outer space – were our main source of information for advances in knowledge about the nature of matter in the Universe. Then, particle accelerators opened the path to tremendous progress, providing high-energy particle beams to investigate the structure of matter. Today, however, we are going back to study cosmic rays because new kinds of detectors allow us to detect cosmic rays with energies far beyond the limits of accelerators.

As the field of Astroparticle Physics develops, it is opening up new observing windows in astronomy. For the first time, light or more generally electromagnetic waves are not the only messengers from distant objects in the Universe, as we begin to observe very high-energy cosmic rays, neutrinos, or gravitational waves.

By comparing observations through different windows and at various energies, we aim to learn more about high-energy cosmic phenomena in the Universe and the violent processes that give rise to them. A series of astrophysical objects demand an interdisciplinary, multi-wavelength and multi-messenger approach for their comprehension. Furthermore, astrophysical sites of violent phenomena can be used as a laboratory to test the structure of the fundamental laws of particle physics and gravitation.

On the instrumentation and methodology side, particle physics detector techniques are used to detect astrophysical objects and conversely astrophysics methods are used to study topics of importance to particle physics (e.g. dark matter and energy).

Up to now, many pioneering experiments in Astroparticle Physics have been on a scale whereby they could be implemented by small teams funded nationally. This has now changed such that, except for some specific topics the most promising new projects need large multidisciplinary teams on a European scale or even world level. The rapid development of the field has led to the design and the construction of infrastructures whose size, complexity and cost reach often levels requiring the cooperation of several scientific teams from different countries. These infrastructures are of three kinds:

- Underground laboratories (shielding the experiments from the cosmic muon background), where room and services are provided to receive experimental devices.
- “Observatories” or “telescopes” or “antennas” on earth whose optimal size is generally large due to the weakness (for gravitational waves) or the scarcity (for very high energy gamma rays, neutrinos or very high energy cosmic rays) of the signals which are to be detected.
- Satellite observatories of high energy gamma rays, cosmic rays or gravitational waves.

Europe is already a leading player in the field of Astroparticle Physics and European teams have already made significant contributions in many key areas. There are about 2000 European scientists involved in the field in some fifty laboratories. The consolidated cost of the current European program is close to 400 million Euros. The investment cost of current experiments range from ten to a hundred million euros per experiment. Future projects will increase the scale of investment by at least a factor 5. The consolidation of the existing coordination of the different projects at the European level has become a necessity.

2. What Is ASPERA?

ASPERA arises from the existence of ApPEC (Astroparticle Physics European Coordination). This is a consortium of national funding agencies which came into being in 2001 when six European scientific agencies (later growing to thirteen) took the initiative to coordinate and encourage Astroparticle Physics in Europe. ApPEC's aims are
a) To develop long term strategies
b) To express the views of European Astroparticle Physics in international forums, and
c) Establish a system of peer review assessment applicable to Astroparticle physics projects.

The FP6 ERANET program ASPERA, starting on the 1st of July 2006, comprises **16 national funding agencies in Europe** responsible for funding Astroparticle physics research. It also comprises two transnational agencies: (CERN) as full participant and (ESA) as associated partner. Among its goals is the inclusion, before the end of the program, of all European national agencies having programs in Astroparticle Physics.

ASPERA will contribute to consolidation of European research expertise by improving the coherence and co-ordination across European funding agencies with responsibility for funding Astroparticle physics research. It will also enable national systems to resolve funding issues collectively which they would not have been able to address alone.

The aims of ASPERA for European research in Astroparticle Physics will be translated into the following 10 goals (dispatched into 5 Workpackages described further below):

- Propose **common or compatible methods of benchmarking and managing** large European Astroparticle Physics infrastructures
- Compile a **common information system**, which lists and compares the various review and funding mechanisms for Astroparticle Physics research in Europe.
- Establish **joint transnational electronic infrastructure facilities**, comprising tools for communication, coordination and internet based information systems.
- Create a **scientific roadmap** for Astroparticle Physics, and linking with the more general European scientific infrastructure roadmap, as planned by EU structures (for instance ESFRI).
- **Assess and identify which innovative Research and Development fields** are inherently convergent and are most suitable for joint research projects with high European added value.
- Propose **uniform processing and evaluation schemes** for all types of joint transnational proposals, which can be agreed by the national agencies.
- Identifying **possible links amongst existing infrastructures** (e.g. gravitational antennas, neutrino telescopes, gamma ray telescopes, space and ground in cosmic ray physics).
- Enable **pan-European collaborations** of the next generation of large scale infrastructures.
- Coordinating an examination of selected translational R&D domains with a view to **developing a model call for R&D proposals**.
- Provide guidance and **possible frameworks for national agencies to align some of their resources** in order to fund large Astroparticle Physics transnational research programmes.

3. Who are the participants?

Role*	No.	Participant name	Short name	Country
CO	1	Centre National de la Recherche Scientifique	CNRS	France
CR	2	Bundesministerium für Bildung und Forschung	BMBF	Germany
CR	3	Commissariat à l'Energie Atomique	CEA	France
CR	4	Centre Européen de Recherche Nucléaire	CERN	International
CR	5	Fundação para a Ciência e a Tecnologia	FCT	Portugal
CR	6	Fonds National de Recherche Scientifique	FNRS	Belgium
CR	7	Stichting voor Fundamenteel Onderzoek der Materie	FOM	Netherlands
CR	8	Fonds voor Wetenschappelijk Onderzoek-Vlaanderen	FWO	Belgium
CR	9	Istituto Nationale di Fisica Nucleare	INFN	Italy
CR	10	Ministerio de Education y Ciencia	MEC	Spain
CR	11	Ministry of Education Youth and Sports	MEYS	Czech Republic
CR	12	Swiss National Science Foundation	SNF	Switzerland
CR	13	National Center for Scientific Research"Demokritos"	DEMOKRITOS	Greece
CR	14	Particle Physics and Astronomy Research Council	PPARC	United Kingdom
CR	15	Projektträger DESY	PT DESY	Germany
CR	16	Fundacion Espanola de Ciencia y Tecnologia	FECYT	Spain
CR	17	Swedish Research Council (Vetenskapsradet)	VR	Sweden

Table 1: Table of participants

*CO = Coordinator
CR = Contractor

4. Which programs will be coordinated?

It is generally difficult to give a closed definition of the scientific content of an interdisciplinary domain as Astroparticle Physics. Nevertheless, six major questions could summarize the content of the domain; they are the following:

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

In the following, we attempt a preliminary description of the national programs, addressing these questions. ASPERA will review the funding mechanisms, put in a roadmap perspective, link these projects and eventually merge some of them in future large infrastructure projects. The agencies participating in ASPERA fund over 95% of these programs and employ or support over 90% of the researchers participating in them. There are, preliminarily, 7 large areas of astroparticle and 10 scientific convergence goals that will be pursued inside this ERANET:

4.1.Neutrinos and neutrino astronomy

A series of violent phenomena in the Universe emit high-energy (multi-GeV) neutrinos. The detection of high energy neutrinos would give important clues for the origin of cosmic rays, a centennial puzzle still unsolved, or could reveal the presence of dark matter. An ambitious program of sub-marine or sub-ice neutrino telescopes for their detection is in progress. Different sub-marine neutrino telescope projects are in advanced prototyping stage in the Mediterranean (ANTARES near Toulon, NEMO in Sicily and NESTOR in the Peloponnese).

I. A km^3 scale detector would be needed to effectively start neutrino astronomy. A km^3 submarine detector in the Mediterranean is complementary (coverage of the full sky) and has advantages (looking towards the very active galactic centre) with respect to an equivalent detector in the Antarctic (ICE-CUBE).

Other experiments, seeking to understand neutrinos, further involve the study of natural radioactivity, specifically the process known as beta-decay. The most sensitive limit comes from the Heidelberg-Moscow Germanium experiment in Gran Sasso. Improvements are expected from the currently running NEMO at Fréjus and CUORICINO-CUORE in Gran Sasso.

II. The next generation of “double-beta decay” experiments will need to use detectors of one ton mass scale of natural radioactivity material, reduce the backgrounds and increase the sensitivity by at least an order of magnitude.

A neutrino accelerator program to test the neutrino properties is in progress both in the US and Europe (CERN to Gran Sasso). A solar neutrino program is also in progress with BOREXINO in Gran Sasso. Historically the experiments that searched for proton decay played a leading role in the discovery of neutrino mass and also in the birth of the domain of astroparticle physics through the discovery of the Supenova 1987a neutrino signals. In the future:

III. A new generation of neutrino supernova and proton decay observatories, from one hundred thousand tons to a megaton, needs European coordination.

4.2.Gravitational waves

Einstein predicted the existence of gravitational waves in his theory of general relativity, but they have not yet been detected. The search for them has been conducted up to now mainly by resonant bar detectors operated at cryogenic temperatures. While the bars are continuously improving their sensitivity the interferometer detectors have recently entered in operation. In Europe the Franco-Italian VIRGO detector, operated by the consortium EGO near Pisa, is in the commissioning phase and the German-UK detector GEO 600, near Hanover has already started to collect scientific data. A completely new antenna in Europe on the horizon of 2010-2015 is under discussion. A tenfold increase in sensitivity increases the possibility of detection by a factor 1000, since this last goes as the volume of the sensitivity reach. Finally, ESA and NASA are planning to fly around 2013 in a shared effort, LISA a 5 million km arm length interferometer to detect gravitational waves at very low frequencies and study in detail gravitational wave signals.

IV. ASPERA will define the European roadmap of upgrades needed by present antennas for the detection of gravitational waves; a detection that could be among the most impressive discoveries of this century. The integration of this program in a world context will be also studied. The complementarity of the ground base program with the ambitious ESA/NASA space program of LISA will be evaluated and accompanied by the proper measures.

4.3.Dark matter and dark energy

Astronomical and cosmological observations indicate that standard (“baryonic”) matter forms only 5% of the matter-energy density of the Universe. There are strong experimental indications that the remaining density consists of some form of non-baryonic non- luminous matter, called "dark matter", which contributes to 25% of the total, while the so-called "dark energy" that accelerates the expansion of the Universe contributes the other 70%.

Searches for the direct detection of dark matter are taking place in a variety of sophisticated experiments using cryogenic detectors or noble gases as targets and detectors, sheltered from cosmic radiation in underground laboratories across Europe. Examples of these are liquid xenon scintillation and ionisation targets (ZEPLIN, XENON, WARP), Germanium or Sodium Iodide detectors (CRESST, EDELWEISS, HDMS, NAIAD, DAMA/LIBRA, IGEX,ROSEBUD, ANAIS, HMDS) in the Gran Sasso (Italy), Fréjus (France) and Camfranc (Spain) tunnel laboratories or the Boulby Mine (UK). Furthermore, another dark matter candidate: “the axion” is actively searched by the CAST experiment at CERN. Indirect searches for dark matter decay products will be performed on ground (neutrino and gamma ray telescopes) and in space (GLAST, Agile, Pamela, AMS-02).

V. The ultimate goal for direct detection dark matter experiments is a ton of bolometric material, exhibiting hopefully a double signature of the interesting events, operating at background levels of the order of 1 background event per ton and per year.

The "dark energy component" will be addressed by systematic searches using both earth based and satellite-borne telescopes, aiming at a high statistics determination of the high redshift Type Ia supernovae distribution, gravitational lensing effects, "baryon oscillation wiggles" and other cosmological effects. These studies are at the border between astroparticle physics and more cosmologically oriented studies. In the context of this ERANET an inter-prioritisation of the studies will be done in collaboration with the astrophysics ERANET (ASTRONET) .

VI. An inter-prioritisation, between the "dark energy" studies and other astroparticle projects will be addressed in view of a coherent European view on the subject.

4.4.High energy gamma-rays

The study of high-energy gamma rays is currently the most promising approach in the search for the origin of cosmic rays. Europe is among the leaders of the field. Based on the experience of the pioneering experiments a new generation of high energy gamma ray telescopes entered or is entering in operation. Among them HESS in Namibia and MAGIC in the Canaries are European lead, and point to complementary parts of the sky. VERITAS and CANGAROO are US and Japan lead respectively. The ARGO Observatory in Tibet is the fruit of collaboration between INFN and several Chinese research centers for the study of cosmic gamma ray sources.

The ground telescopes are complemented by a series of satellite experiments such as the Italian led AGILE (2006) and the US lead, though with strong European participation, GLAST (2007) and AMS02 (2009). The complementarity between space and ground observatories will be exploited in the years to come. The new generation of ground telescopes striving to lower the detection threshold is under study.

VII. The complementarity of the north and south European telescopes, the modes of transnational access turning them to general observatories, their complementarity to space observations and the next generation telescopes will be studied and their implementation prepared.

4.5. Cosmic rays

Over the past three decades, enormously energetic but rare cosmic rays have been detected. The energies of these events are a billion times greater than the highest energies of particles that can be produced at accelerators on Earth. As these extremely energetic cosmic rays are very rare, our understanding of the sources producing them and the way they manage to reach detectors on Earth un-attenuated by the cosmological microwave background radiation is incomplete. The experiment AUGER in the Argentinian pampa is currently dominating the field and many European countries play a leading role in its deployment. In the immediately lower energies, a series of structures in the cosmic ray spectrum ("knee", ankle", etc) are suspected to indicate transitions from cosmic rays of galactic and extragalactic origin. The experiment KASKADE in Kalsruhe and EMMA in Pyhasalmi/Finland are studying this domain.Understanding the propagation of cosmic rays in the galaxy requires precise measurements of the fluxes and composition of many nuclei. This will be provided by the forthcoming space experiments Pamela, CREAM and AMS-02 (on the ISS).

VIII. The answer of AUGER, concerning the puzzle of the very high-energy cosmic rays is expected by mid-2007. Independently of the type of the answer (new physics or astronomy using very high energy particles) the after-AUGER, is in discussion. Complementing the south observatory with a northern one, or a satellite experiment looking down the earth atmosphere is an important infrastructure issue.

4.6.Search for antimatter and other exotic states of matter

The absence of primordial antimatter in the cosmos is a puzzle in our current understanding of the structure of the Universe. It is very likely that the early Universe had matter-antimatter equality, so where is antimatter? Searching for nuclear antimatter in space is done either directly by studying the cosmic ray composition or indirectly by measuring the energy spectrum of the diffuse gamma rays flux. This search is better performed using space detectors, since antimatter cosmic rays quickly annihilate in the atmosphere. During the next five years, two space-borne magnetic spectrometers (Pamela launched in 2006 and AMS-02) will increase by three orders of magnitude the current sensitivity to nuclear antimatter.

The European led satellite INTEGRAL, by detecting nuclear gamma ray excitations is producing a mine of information on nuclear astrophysics processes, greatly increasing the topicality of the field. New very sensitive MeV gamma ray space-born detectors are in preparation. Here again coordination with the neighboring ASTRONET is needed.

IX. The search for antimatter and nuclear gamma ray excitations in space will be supported and coordinated in view of coherent presentations in the programs of ESA and NASA.

4.7.Gamma ray bursts, X-Rays etc.

The multi-wavelength study of gamma-ray bursts, energetic X-rays from tens to a hundred of KeV and other studies of the same sort are at the frontier between astroparticle physics and astrophysics studies proper. Sometimes the same instruments address both astrophysics and astroparticle problems. A coordination with astrophysicists organized in parallel structures (ASTRONET) will help the overall coordination of the field.

X. The contact with the neighboring discipline of astrophysics concerning stellar objects and messengers will be improved, and the equivalent priorities will be taken into account in the astroparticle physics roadmap.

4.8.Theory

Last but not least, it is common knowledge that the vitality of a field depends strongly on the vitality of the theoretical community concerned by its questions, or better still a field is often defined by the very questions that its theoretical community elaborates. This is even more true in astroparticle physics where its theorists need skills in more than one domain (cosmology, astrophysics, particle physics, nuclear physics, hydrodynamics and plasma physics) and very often special computing methods and means. The ERANET will examine the needs of the community and see that the institutional ways that it can be brought together, while of course the scientific convergence on common structuring themes is the task of ILIAS and other astroparticle physics networks that may emerge in the future.

The full spectrum of the proposed new infrastructures for the next ten years would cost of the order of 1 billion Euros. *A strategic plan concerning these infrastructures is urgent. ASPERA will provide the vehicle to implement this European roadmap and common action plan in the area of Astroparticle Physics, working closely with the ESFRI roadmap committee, the Astrophysics ERANET ASTRONET (including ESO), the CERN strategic plan, the ESA Cosmic Vision and other structures preparing the 7th EU programme.*

5. Project Management

Tools of management are:

- the coordinator and the deputy coordinator
- the Governing Board (GB)
- the Joint Secretariat (JS)
- the Peer Review Committee (PRC)

5.1.The ASPERA coordinator

He is responsible for the overall legal, contractual, ethical, financial and administrative management of the consortium, the co-ordination of knowledge management and other innovation-related activities, overseeing the promotion of gender equality in the project and overseeing science and society issues related to the research activities conducted within the project. He will ensure general liaison between the contractors and the Commission. He will submit financial statements, will receive in trust for the consortium all payments from the Commission and will distribute them among the contractors according to their decisions. He will represent the ERA-NET to the public and especially to partner councils inside and outside the EU not yet participating in the network. He will be accountable for keeping all contract commitments, for submitting all reports and financial records required from the Commission, for overlooking the joint secretariat, for supervising the implementation of the decisions of the Governing Board.
He is assisted by the deputy coordinator whose main task is the scientific secretariat of the GB the PRC and the extension of the network to new partners.

5.2.The Governing Board (GB)

The GB comprises high-level representatives from the ASPERA partner councils with responsibility for ASTROPARTICLE funding. It will be responsible for all management decisions of the network and for the approval of all documents results and approaches related to the ASPERA activities. It will have overall responsibility for monitoring the work performed, reviewing the objectives and progress achieved towards sustained co-operation and the specific objectives set and discussing corrective actions where necessary.
The GB will also have a general responsibility for the dissemination of information. A very important task of all GB members will be to ensure that the ASPERA propositions will be observed and implemented by the national grant committees or other bodies in charge of Astroparticule funding.

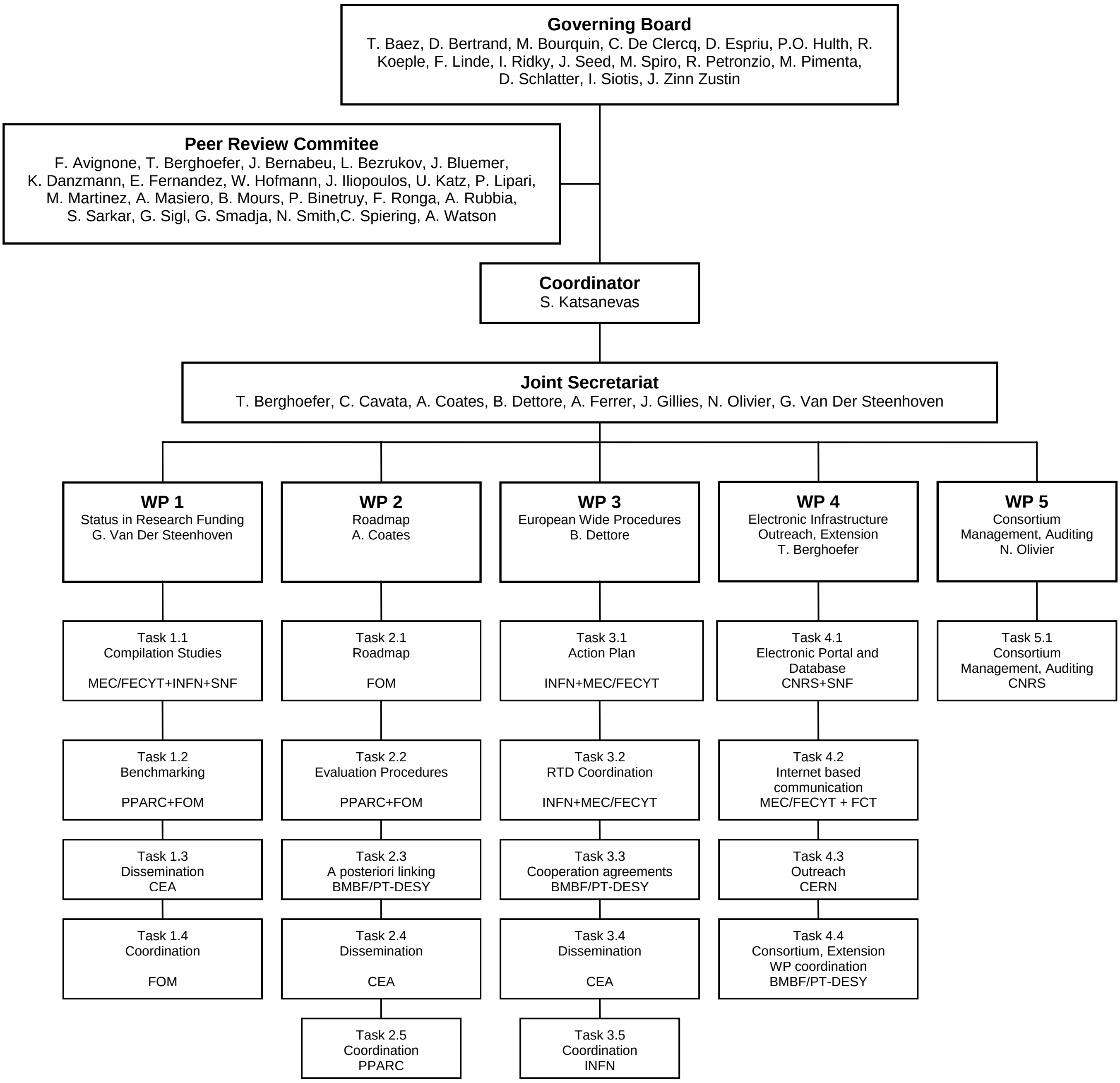
5.3.The Joint Secretariat (JS)

The JS assures the day-to-day follow-up of the program and it is formed by the coordinators, the 4 workpackage leaders plus the administration, outreach and electronic tools responsibles.
He will be responsible for the co-ordination and harmonization of all ASPERA actions (including internet fora, exchanges of program managers, evaluation and program workshops, position and benchmark papers, electronic communication tools), and particularly for the administrative and co-operative support of all transnational research activities The joint secretariat will keep contact with all research councils in Europe, especially also with those

external to the consortium, and with other European bodies. It will follow up all important horizontal issues and will prepare the meetings of the ASPERA consortium: the GB, and the PRC. It will also be responsible for public relation issues and for the contents of the ASPERA website.

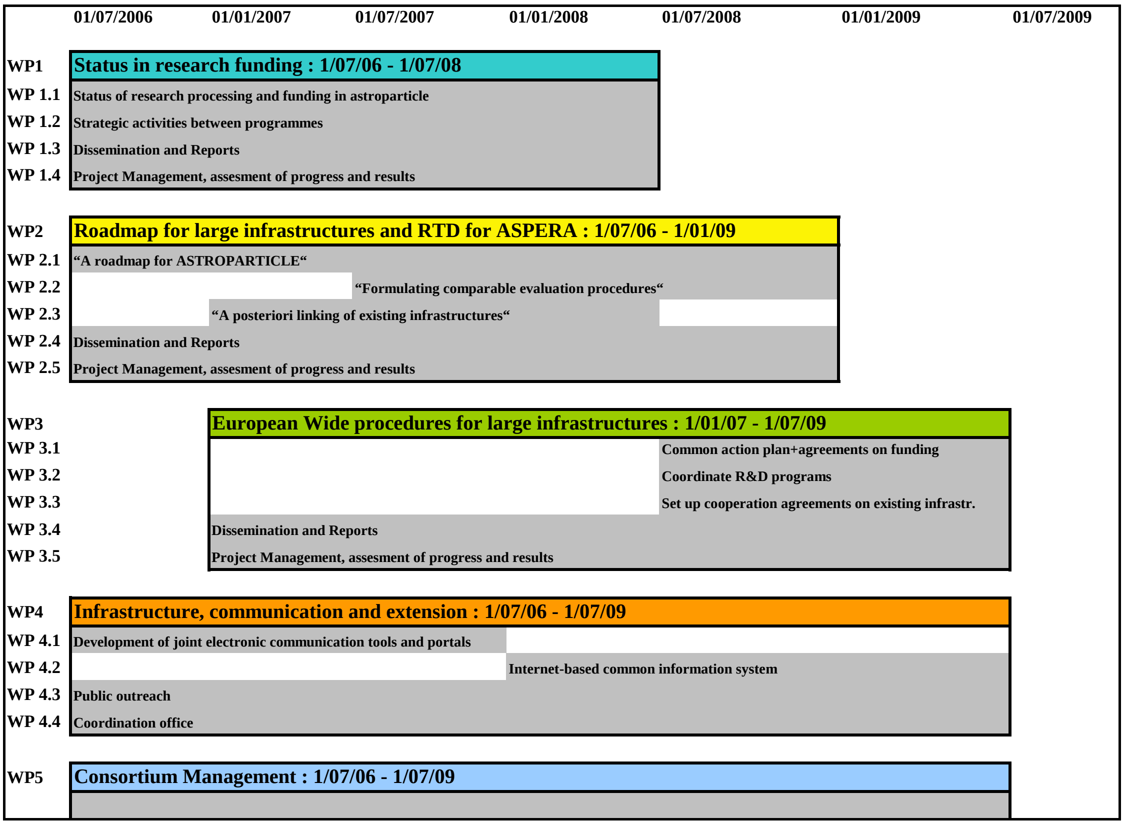
5.4.The Peer Review Committee (PRC)

It will be responsible for the evaluation of the network's activities and strategic advice to the GB. It will be informed on all network activities and decisions to guarantee its high quality involvement.



Picture 1: Structure of management

6. Work planning and timetable



01/07/2006 01/01/2007 01/07/2007 01/01/2008 01/07/2008 01/01/2009 01/07/2009

WP1	Status in research funding : 1/07/06 - 1/07/08
WP 1.1	Status of research processing and funding in astroparticle
WP 1.2	Strategic activities between programmes
WP 1.3	Dissemination and Reports
WP 1.4	Project Management, assesment of progress and results
WP2	Roadmap for large infrastructures and RTD for ASPERA : 1/07/06 - 1/01/09
WP 2.1	“A roadmap for ASTROPARTICLE“
WP 2.2	“Formulating comparable evaluation procedures“
WP 2.3	“A posteriori linking of existing infrastructures“
WP 2.4	Dissemination and Reports
WP 2.5	Project Management, assesment of progress and results
WP3	European Wide procedures for large infrastructures : 1/01/07 - 1/07/09
WP 3.1	Common action plan+agreements on funding
WP 3.2	Coordinate R&D programs
WP 3.3	Set up cooperation agreements on existing infrastr.
WP 3.4	Dissemination and Reports
WP 3.5	Project Management, assesment of progress and results
WP4	Infrastructure, communication and extension : 1/07/06 - 1/07/09
WP 4.1	Development of joint electronic communication tools and portals
WP 4.2	Internet-based common information system
WP 4.3	Public outreach
WP 4.4	Coordination office
WP5	Consortium Management : 1/07/06 - 1/07/09

Table 2: Work planning

6.1.Deliverables

N°	Name	WP	Lead	Nature	Month
D2.6	Peer Review Committee list	WP 2	PPARC	Report	**June 07**
D1.2	Case study for the emergence of ASTROPARTICLE as a new discipline	WP 1	SNF	Report	**July 07**
D2.3	Common database of evaluation experts	WP 2	FOM	Nomination	**July 07**
D4.1	Joint electronic communication tools	WP 4	CNRS	Prototype	**July 07**
D4.2	Professional website	WP 4	MEC/FECYT	Prototype	**July 07**
D1.1	Report on funding methodology of research in ASTROPARTICLE	WP 1	MEC/FECYT	Report	**July 08**
D1.3	Study on benchmarking and compilation of evaluation and funding rules for large projects in ASTROPARTICLE physics	WP 1	PPARC	Report	**July 08**
D1.4	Report on legal and financial barriers hindering pan-european cooperation	WP 1	FOM	Report	**July 08**
D2.1	ASTROPARTICLE physics roadmap	WP 2	PPARC	Report	**July 08**
D2.2	Definition of important fields and areas of European ASTROPARTICLE R&D	WP 2	FOM	Report	**July 08**
D2.5	Reports on a posteriori clustering of large astroparticle projects	WP 2	BMBF	Report	**July 08**
D2.4	Proposal of common evaluation schemes	WP 2	PPARC	Report	**January 09**
D3.1	Common action plan for the funding of new infrastructures	WP 3	INFN	Report	**July 09**
D3.2	Launch of a coordinated R&D program	WP 3	MEC/FECYT	Call	**July 09**
D3.3	Cooperation agreements on large infrastructures in astroparticle	WP 3	BMBF	Agreements	**July 09**

Table 3: Deliverables per workpackages

6.2. Events

Date	Nature	Organizer	Country
16-17 Jan. 2007	National Day 1	CNRS/CEA	F
Apr. 2007	National Day 2	NIKHEF	Nl
7 June 2007	National Day 3	PT-DESY	D
July 2007	National day 4	PPARC	GB
Oct. 2007	National Day 5	INFN	I
Nov. 2007	National Day 6	FECYT	E
Jan. 2008	National Day 7	SNF	Ch
Mar. 2008	National Day 8	FNRS/FWO	B
May. 2008	National Day 9	LIP	P
June 2008	National Day 10	VR	S
Sept. 2008	National Day 11	Demokritos	Gr
Nov. 2008	National Day 12	MEYS	Cz

Table 4:List of National days

Date	Nature	N° WP	Description	Organizer	Country
November 2006	Workshop 1 Start	WP2	Task 2.1	MEC/FECYT	Spain
January 2007	Workshop 1 Start	WP1	Task 1.1 + 1.2	CNRS	France
March 2007	Workshop 1	WP2	Task 2.3		
June 2007	Workshop 2 intermediate	WP2	Task 2.1	NIKHEF	The Netherlands
June 2007	Workshop 1 Start	WP2	Task 2.2		
June 2007	Workshop 2	WP2	Task 2.3		
September 2007	Workshop 2 intermediate	WP2	Task 2.2		
September 2007	Workshop 3	WP2	Task 2.3		
January 2008	Workshop 3 intermediate	WP2	Task 2.2		
January 2008	Workshop 4	WP2	Task 2.3		
June 2008	Workshop 2 Final	WP1	Task 1.1 + 1.2		
June 2008	Workshop 3 Final	WP2	Task 2.1		
June 2008	Workshop 4 intermediate	WP2	Task 2.2		
June 2008	Workshop 5	WP2	Task 2.3		
June 2008	Workshop 1 Start	WP3	Task 3.1		
July 2008	Workshop 1 Start	WP3	Task 3.2 + 3.3		
September 2008	Workshop 2 intermediate	WP3	Task 3.2 + 3.3		
October 2008	Workshop 5 Final	WP2	Task 2.2		
November 2008	Workshop 3 intermediate	WP3	Task 3.2 + 3.3		
January 2009	Workshop 4 intermediate	WP3	Task 3.2 + 3.3		
April 2009	Workshop 2 Final	WP3	Task 3.1		
April 2009	Workshop 5 intermediate	WP3	Task 3.2 + 3.3		
June 2009	Workshop 6 Final	WP3	Task 3.2 + 3.3		

Table 5: List of workshops

WP1 Objectives: Determination of present status of European research funding relating to ASTROPARTICLE (WP leader: FOM)

Description of work:
Managerial information will be exchanged between the partners.

Instruments :

Two workshops, with up to 40 participants (2 per agency): one at the beginning and one at the end of the second year. In the first workshop the agencies will collectively define the criteria of the study and their expectations to the task leader. The last workshop will hear and evaluate the final result. Between the first and the last workshop the major agencies and a few selected representative agencies (e.g. northern or eastern countries) will organise "administrative open days" in their headquarters for the members of the consortium (up to 10 such meetings with up to 16 participants). The administrators will then be exposed, during 2 days, to the activities of the visited partner organisations. They will thus get a deep insight into the daily work of the partner councils. This will include knowledge of programmes, administrative responsibilities and general procedures in science funding (counselling, proposals, peer review, grant decision, financing, contracts, follow up).

Task 1.1: Present status of research processing and funding in astroparticle:
(Task Leader MEC/FECYT, assisted by INFN and SNF)

The administrators' tasks will be to notify the similarities and differences between the home and partner organisation, regarding the general funding philosophy: Which programmes exist? Who can be funded? Individual researchers or laboratories/organisations? Which persons or labs? Which disciplines? What are the funding conditions and prerequisites? Are there any other organisations in the partner's country funding the same clientele? If relevant: how can funds from other private or public sources be matched? The task leader will be responsible that the required information of his forum summing up the status of the research funding in ASTROPARTICLE physics in all the participating partner organisations is collected and processed. Information available on the same subject from European organisations/schemes like CERN, ESO and ESA will also be taken into account. An equally important sub-task is the collection of information on European countries not belonging to the consortium and non-EU European countries.

Task 1.2: Strategic activities between programs :(Task Leader PPARC assisted by FOM)

The task leader will be in close contact to the leader of task 1.1. His/her mission will be to benchmark the results of these tasks and particularly to identify formal and legal barriers that hinder co-operation, but also to define the least common denominator. Pan-european indicators for performance etc. will be compared with available indicators concerning non-European countries (US, Japan, India, China etc). The experience of existing bi-national or international astroparticle programmes in Europe (e.g gravitational antennas VIRGO and GEO, the telescopes HESS and MAGIC, etc.) will be used in order to find the most suitable forms of cooperation consistent with the national systems also identify the national legal and financial barriers that hinder cooperation and the instalment of transnational observatories. The experience of CERN will be also analysed carefully.

Milestone: White paper on Astroparticle methodology (scientific content, evaluation, budget allocation, benchmarking, decision making and follow-up) and suggestions for possible common procedures in Astroparticle physics

WP2 Objectives: Definiton of astroparticle physics roadmap and common actions necessary for the astroparticle ERA (WP leader: Partner PPARC)

Description of work:
Roadmap Workshops whose bases will be to process the information resulting from WP1 in order to contribute towards an European Research Area in Astroparticle Physics. The aim of the Workshops will be to prepare the realization of specified goals:

- roadmap and areas of common RTD
- formulation of a common evaluation policy
- a posteriori linking of existing infrastructures.

An important objective is the prototyping of truly generic co-operation agreements on administration, evaluation and funding of joint programs.

Instruments:
Participants of the thematic *Roadmap Workshops* to be organised in this work package will be a core group of administrators, senior scientists and decision makers responsible for astroparticle physics research in the research funding organisations co-operating in the network, soliciting input from other scientists and administrators as well as external management experts from other national or European bodies like the European Commission, the ESFRI, ESO, ESA, CERN.

Task 2.1: "A roadmap for ASTROPARTICLE": (Task Leader Partner FOM)

An important aim of the series of *Workshops (up to 3)* starting on the second half of the first year will be elaborating and releasing a joint roadmap on infrastructures and R&D necessary and a feasibility analysis of the ERA-NET and beyond the network's funding by the European commission. Central co-ordination activities in this task are to conduct discussions between the participating representatives in the workshops in order to reach the envisaged aims, the development of common review procedures.

Task 2.2: "Formulating comparable evaluation procedures": (Task Leader Partner PPARC, assisted by FOM)

An important aim of the series of *Workshops* starting on the second half of the first year will be the formulation of comparable evaluation procedures concerning large infrastructures in Astroparticle Physics.The main aim of the *Workshops* will be to elaborate and implement new simple and effective common administration and reviewing concepts for individual transnational proposals. Being aware of the difficulties of even a bilateral agreement to realise, the optimal target is the development of procedures accepted by all participating research funding agencies. The workshops already will take into consideration the further integration of other national research councils not yet participating in the network.

Task 2.3: "A posteriori linking of existing infrastructures": (Task Leader Partner BMBF/PTDESY)

Aim of different thematic *Workshops* (up to six) in the second year will be to initiate schemes for new joint funding procedures and programmes in co-operative research concerning existing infrastructures, e. g. transnational centre to centre co-operation (virtual transnational labs) and transnational research training groups.

Milestones : Astroparticle physics roadmap

WP3 Objectives: Implementation of new European-wide procedures for large infrastructures (Work package leader: Partner INFN)

Description of work:

The task leaders in this work package will be responsible for organising special programme defining workshops to discuss and to implement the new transnational procedures developed in WP2. This will be realised by envisaging and earmarking research fields and funding schemes suitable for joint programmes and by testing the suitability of the tools by help of concrete research concepts. ASPERA will provide specific information on actual possibilities of transnational proposals at each workshop and will stimulate discussions on the implementation of joint programs. The work package leader will not only supervise the tasks and co-ordinate the co-operation of the task leaders, but will most notably be responsible for the implementation of joint European programs.

Task 3.1: Coordinate common action plan and prepare agreements on common funding of a large projects: (Task Leader Partner INFN assisted by partner MEC/FECYT)

Based on the results of WP2, two workshops of administrators and senior scientists including the direction of participating agencies will prepare a common action plan for the large infrastructures to be funded in the coming years. The workshops will also prepare the alignment of part of the financial resources of the agencies and councils of the consortium.

Task 3.2: Coordinate R&D programs: (Task Leader Partner INFN assisted by partner MEC/FECYT)

The effort of this task is to identify areas where a common or coordinated call on specific R&D areas can be launched, and take the steps towards the implementation of these calls.

Task 3.3: Setting up cooperation agreements on existing infrastructures: (Task Leader Partner BMBF/PTDESY)

A series of large projects in Europe has developed in parallel: gravitational antennas VIRGO/GEO, cherenkov telescopes HESS/MAGIC, neutrino telescopes ANTARES/NEMO/NESTOR, high energy cosmic rays AUGER/EUSO, Dark matter searches (at least 6 different projects) and double beta decay experiments. This task will try to establish cooperation agreements between the researchers of the corresponding projects, so that complementarity more than competition is put forward, and also establishing unified patterns where this is possible.

Milestones :

- Common action plan for the funding of new infrastructures
- Alignment of part of the financial resources of the networking research councils for transnational Astroparticle -based research programs

WP4 Objectives: Consortium common electronic infrastructures, communication and extension (WP leader: Partner BMBF/PTDESY)

Description of work:

The function of WP4 is to strengthen the “corporate identity” of the consortium through a common electronic infrastructure, opening it, at the same time, to other agencies and communicating the achievements of the field and the consortium itself to the European policy makers, belonging to national structures or transnational organisms (ESO,CERN, ESA) and the EU.

The common electronic infrastructure is the object of two tasks:

- The first task, addressed to the agencies members of the consortium and the corresponding scientists, will establish a common database, common electronic mailing system, common agenda structure, intranet facilities etc.
- The second task, opening ASPERA to the world at large, will establish an internet web site, presenting the findings of the consortium, job opportunities, open calls for R&D, important press communications, transeuropean events of ASPERA, access links to all European infrastructures, where possible helping individual experiments to present uniformly their data. It will also be a tool for electronic submission and evaluation of proposals.

The third and fourth task concern outreach and the extension of the project to other European agencies not belonging in the network. The outreach task concerns mainly the relationships of the network with policy makers, fulfilling mainly the functions of a press office.

Task 4.1: Development of joint electronic communication tools and portals: (Task Leader Partner (CNRS assisted by SNF)

The function of the planned electronic portal would be threefold, and it will help

- the archiving and dissemination of all astroparticle related documents to the researchers
- the follow-up of the progress of projects by European managers and/or evaluators
- the information on open calls and other opportunities for the researchers, or for proposal submission
- the creation of a subscription system the restricted use of the database and email facilities

Task 4.2: Internet-based common information system: (Task Leader Partner MEC/FECYT, assisted by partner FCT)

A professional website is very important as external presentation to political decision makers, to the public, to present the results of the expertise resulting in studies and reports, to enable interested applicants and other bodies to find out any information about ASPERA, its programs and its philosophy and even to process proposals and references. A common administration and evaluation procedure will be made available electronically to all partners. The joint electronic communication tools and portals serve as single entry points in order to facilitate the interchange of information and the dissemination of results and to enable an effective joint processing of proposals and European programs.

Task 4.3: Public outreach: (Task Leader Partner CERN)

The ASPERA efforts on this theme will be mainly addressed to national policy makers and ministry officials. The “national open days” when the network science managers from European agencies to visit each country one by one will be widely publicised. We intend to invite local officials, ministers etc. This is a technique used by ECFA (European Committee for Future Accelerators) and has been an important lever arm increasing the European-wide participation to common programs. ASPERA will organize inaugurations, special pan-European celebrations, visits of infrastructures and launching of satellites for the policy makers. This has been up to now very efficient instruments, promoting the discipline's goals. The task responsible will be the unique entry point for all major European astroparticle projects, concerning announcements of major events and press communiqués to national and European institutions, as well as "global" sites of information (see for instance interactions.org).

The many reports to be compiled in the frame of ASPERA (see deliverables list) will serve as data base for anyone interested. Any publication will be opened for public on the ASPERA web site (see Task 4.2 and 4.3) which will also contain calls for joint transnational proposals and programmes, lists of funded projects as well as final reports of their outcomes, benchmarking studies, statistics, relevant keywords, links to researchers and national and supranational funding organisations etc.

Task 4.4: Coordination office: (Task Leader Partner BMBF)

The task leader is responsible for active contacts and for the transfer of any important information to other non-participating EU member states, EU candidate countries and other European third countries. He/she is the contact point for any new potential ASPERA partner and for any national research council wishing to be associated to the network. He also acts as sub-coordinator of ASPERA.

Milestones : A fully functional electronic portal

WP5 Objectives: Consortium Management (WP leader: Partner CNRS)

Description of work: The ERA-NET administration and management task will be included in this workpackage. The coordinator of ASPERA (CNRS) will assume the overall responsibility. The task leader of the overall management task will organize the overall coordination of the ERANET and the workings of the GB and JS. He will especially coordinate the timely delivery of the "management deliverables" below:

N°	Name	WP	Lead	Nature	Month
D5.1	Short management report on progress of the coordination	WP 5	CNRS	Report	**January 07**
D4.1	Joint electronic communication tools	WP 4	CNRS	Prototype	**July 07**
D4.2	Professional website	WP 4	MEC/FECYT	Prototype	**July 07**
D5.2	Short management report on progress of the coordination	WP 5	CNRS	Report	**July 07**
D5.3	Detailed management report on progress of the coordination	WP 5	CNRS	Report	**January 08**
D5.7	Audit report	WP 5	CNRS	Report	**January 08**
D5.4	Short management report on progress of the coordination	WP 5	CNRS	Report	**July 08**
D5.5	Short management report on progress of the coordination	WP 5	CNRS	Report	**January 09**
D5.6	Detailed management report on progress of the coordination	WP 5	CNRS	Report	**July 09**
D5.8	Audit report	WP 5	CNRS	report	**July 09**

Table 6: Management Deliverables

ASPERA : FP6 ERANet Program

► **Starting date**: 1st of July 2006

► **16 national funding agencies in Europe (12 countries)**, responsible for funding Astroparticle Physics researches, comprising 1 transnational agency:
CNRS, BMBF, CEA, FCT, FNRS, FOM, FWO, INFN, MEC, MEYS, SNF, DEMOKRITOS, PPARC, PTDESY, FECYT, VR

► **2 transnational agencies:** CERN (full participant) and ESA (associated partner)

► **5 workpackages :**

- WP1 : Determination of present status of European research funding relating to Astroparticle
- WP2 : Definiton of astroparticle physics roadmap and common actions necessary for the astroparticle ERA
- WP3 : Implementation of new European-wide procedures for large infrastructures
- WP4 : Consortium common electronic infrastructures, communication and extension
- WP5 : Consortium Management

► **Areas of astroparticle covered**:
Neutrinos and neutrino astronomy, Gravitational waves, Dark matter and dark energy, High energy Gamma-rays, Cosmic Rays, Search for antimatter and other exotic states of matter, Gamma ray bursts, Xrays etc.

► **3 years workplan**

- **Tools of management**: Coordinator and Deputy Coordinator, Governing Board, Joint Secretariat and Peer Review Committee.
- **Worktable** :

Events: 23 workshops, 10 national days

Management Meetings: 18 JS, 6 GB and 6 PRC

Deliverables: 21 reports, Agreements, 1 Call and 2 prototypes

Milestones: 3 reports, 1 Website and 1 Common Call

- White paper on Astroparticle methodology (scientific content, evaluation, budget allocation, benchmarking, decision making and follow-up) and suggestions for possible common procedures in Astroparticle physics (July 2008)
- Astroparticle physics roadmap (July 2008)
- Common action plan for the funding of new infrastructures (January 2009)
- Alignment of part of the financial resources of the networking research councils for transnational Astroparticle -based research programs (July 2009)
- Electronic portal (July 2008)