Memoria Técnica del Programa de Actividad Investigadora

CONSOLIDER-INGENIO 2010
CONVOCATORIA 2007

1 RESUMEN DE LA PROPUESTA (Debe rellenarse también en inglés)

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TITULO DEL PROYECTO: CENTRO NACIONAL DE FÍSICA DE PARTÍCULAS, ASTROPARTÍCULAS Y NUCLEAR

RESUMEN (debe ser breve y preciso, exponiendo sólo los aspectos más relevantes y los objetivos propuestos):

Este proyecto CONSOLIDER pretende promover activamente la participación coordinada de los grupos científicos españoles en las investigaciones punteras en Física de Partículas, Astropartículas y Nuclear. Esta propuesta quiere potenciar la visibilidad de nuestros grupos, reforzar su competitividad internacional y garantizar una masa crítica, optimizando al mismo tiempo los recursos disponibles. Los objetivos que se detallan en esta propuesta han sido elegidos siguiendo una estrategia científica clara y bien definida.

El principal objetivo de esta propuesta es la creación de una nueva institución con carácter permanente, el Centro Nacional de Física de Partículas, Astropartículas y Nuclear, que consolidaría y garantizaría, principalmente mediante la contratación de personal técnico y científico, las actuaciones detalladas en la memoria.

El Centro Nacional concentrará de manera prioritaria sus recursos en un conjunto de líneas de investigación perfectamente alineadas con las hojas de ruta establecidas por el CERN, ApPEC y NuPECC, que se detallan en esta memoria, y con el Espacio Europeo de Investigación.

La investigación en esos ámbitos se desarrolla en un entorno de estrecha colaboración internacional, normalmente en grandes instalaciones y laboratorios de primer nivel mundial y con participación de un gran número de personas e instituciones. La coordinación nacional a través del Centro Nacional de Física de Partículas, Astropartículas y Nuclear permitirá un mayor peso específico de los grupos españoles, y se traducirá en mayores retornos científicos y tecnológicos para nuestro pais.

El Centro Nacional coordinará las actividades de los grupos participantes y podrá representarlos en los grandes proyectos e iniciativas internacionales. Promoverá y facilitará la participación en proyectos del Séptimo Programa Marco y otras iniciativas europeas. Contribuirá a proveer el personal técnico y el 'know-how' necesarios para abordar de manera competitiva en el entorno científico internacional los desarrollos de hardware necesarios para los futuros experimentos, tanto los ya aprobados (como el LHC, FAIR, MAGIC, Auger South ..), los que están en fase de I+D (como ILC, CTA, Auger North o EURISOL, por ejemplo), o aquellos otros que en un futuro se requiera.

Finalmente el Centro Nacional permitirá promocionar actividades de I+D no accesibles a grupos individuales, apoyar la excelencia de los grupos con la incorporación de jóvenes científicos y personal técnico, asegurar la correspondiente transferencia de conocimiento tecnológico a empresas y potenciar las actividades de formación y difusión científica.

PROJECT TITLE: NATIONAL CENTRE FOR PARTICLE, ASTROPARTICLE AND NUCLEAR PHYSICS

SUMMARY:

This CONSOLIDER project intends to promote a coordinated participation of the Spanish scientific groups in forefront research in Particle, Astroparticle and Nuclear Physics. The proposal is targeted to optimize the visibility of our groups, reinforce their international competitiveness and guarantee their critical mass while optimizing the resources made available to them. The objectives outlined in this project have been chosen with a well defined scientific strategy and timely and clear objectives.

The main aim of this proposal is the creation of a permanent new institute, the National Centre for Particle, Astroparticle and Nuclear Physics. This Center will support the participating groups mainly by providing adequate technical and scientific personnel staff to them.

The National Centre will prioritize the use of its resources to support a number of lines of research that are listed in this proposal. They are perfectly aligned with the road maps established by CERN, ApPEC and NuPECC, and with the European Research Area.

Research in these fields is carried out in an international environment, usually the experiments taking place in large scientific infrastructures and world class laboratories, within international collaborations involving a large number of persons and institutions. The coordination through the National Centre for Particle, Astroparticle and Nuclear Physics will increase the specific weight of the Spanish groups in this competitive environment and will bring to our country larger scientific and technological returns.

The National Center will coordinate the activities of the participating groups and may represent them in the large international projects and initiatives. It will promote and facilitate the participation in projects of the Seventh Framework Programme and other European programs. It will help provide adequate technical staff and expertise to face the challenging technological developments required by future experiments, both for the ones already approved (such as LHC, FAIR, MAGIC, Auger South ...), those in phase of I+D (such as the ILC, CTA, Auger North or EURISOL, for instance) or all those future projects that might require it.

Finally, the National Centre will promote those activities of R&D not accessible to individual groups, support the excellence of the groups with the incorporation of young scientists and technical personnel, assure the corresponding technological transference of "know-how" to Spanish firms and reinforce the training and outreach activities.

2. DESCRIPTION OF THE RESEARCH ACTIVITY PROGRAMME

The main goal of the National Centre for Particle, Astroparticle and Nuclear Physics is to propitiate a significant participation of Spanish science in the important challenges of the XXI Century in these fields. We want to reinforce our competitiveness at the international level, increase our visibility significantly, and allow our research to take a leading position in some areas. At the same time, we want to guarantee an optimal use of the resources made available to us and ensure optimal technology transfer to society. In order to reach these goals, we need to have a planned scientific strategy, an efficient coordination of the activities in our groups, and adequate human resources, in particular those related to the more technological aspects. At present, on all three counts the Spanish scientific community is lacking appropriate instruments.

The groups participating in this proposal work on different subjects, most of them in the frontier of our knowledge in Particle, Astroparticle and Nuclear Physics, such as the origin of elementary particle masses, the nature of dark matter, and dark energy, in our Universe, the matter-antimatter asymmetry in the Universe, the unification of all fundamental interactions, including gravitation, the origin and nature of cosmic radiation, the properties of neutrinos, quark and lepton flavour dynamics, the dynamics of quark confinement, the mass and the structure of hadrons, the structure and limits of existence of atomic nuclei, the origin of chemical elements in stellar nucleo-synthesis, and the nuclear matter state equation and its phase transitions. The research activity in these fields takes place almost exclusively in the framework of international collaborations with the participation of a large number of scientists and institutes of the highest scientific reputation.

On the other hand, the experimental techniques and the technological developments in Particle, Astroparticle and Nuclear Physics have traditionally been of great impact to society at large. Information technologies (such as the web) or many developments in medicine (e.g. cancer therapy) owe their origin to research in particle and nuclear science. Thus progress in these fields has potentially great impact in society. We would like to make sure that Spanish scientists play a role in the technical advances in accelerator physics and detector instrumentation and that these advances are properly transferred.

The instruments and tools that are available today in the Spanish science system are somehow not sufficient if we want to give a leap forward and become part of the countries leading world science. It is a fact that in the fields of Particle, Astroparticle and Nuclear Physics our scientific community is very well positioned in the European research area and that it should be possible to give this big step forward, provided that the needed support and resources are available and, perhaps even more importantly, provided that proper coordination and organization mechanisms are put in place. Since the creation of the “Programa Movilizador en Física de Altas Energías”, 22 years ago, there has been a steady but significant growth of the Spanish community in these fields, which has gone hand by hand with a profound insertion of our scientific community in many of the best international scientific programs. In addition there is an ever increasing industrial and technological component in our area. The history of Particle, Astroparticle and Nuclear Physics in Spain in the last 20 years is, in a sense, a success history, but at the same time the current instruments are showing their limitations. If we want to continue the progression in this field, a new instrument is needed now.

This is why we are proposing the creation of the National Centre for Particle, Astroparticle and Nuclear Physics (CPAN). National coordination through the CPAN will boost the visibility and influence of the Spanish groups in a competitive global environment and provide a better participation in mainstream research lines. The existence of the CPAN will also boost research in fundamental aspects of science in our country and greater scientific and technological returns. It will also optimize our participation in international Organizations or Laboratories.

The special characteristics of the CONSOLIDER program make it particularly adequate to constitute a National Centre to coordinate the activities of the participating research groups. This will provide to our Particle, Astroparticle and Nuclear physics national community an organizational structure of a nature similar to the existing ones in other countries of the European Research Area with whom we collaborate and compete.

The idea behind this proposal is not to dedicate more resources to a specific research field, but, on the contrary, to make use of all the coordination mechanisms that such a National Centre would put in place.

A) Objectives of the proposal

The objectives we consider of highest priority for the next five years are listed below and divided in four groups.

Scientific Objectives

1.- Optimize the Spanish participation in the LHC Particle Physics Program at CERN taking into account not only the scientific aspects, but also the technology and training ones. It is essential to support the Spanish participation in the scientific exploitation of this instrument to take adequate profit of the large investment made in its realization (in accordance with its exceptional scientific interest). We would like LHC to become a turning point in Spanish Physics, exactly as LEP was in its time.

2.- Support and promote experimental activities in the new Underground Laboratory at Canfranc. Besides supporting initiatives still under way that started in the old laboratory, new initiatives should be called for, addressed and evaluated, in order to prepare this laboratory to get to the forefront of underground, low background activities in Particle, Astroparticle and Nuclear Physics.

3.- Stimulate a coordinated action in Astroparticle physics by reinforcing the groups in experiments already under way, notably, Auger South, MAGIC, as well as promoting the participation in future initiatives in a field that is experiencing a large expansion. Spain must defend its scientific interests in this important research field taking advantage from the existence of first class installations in our country, the expertise of the still small but solid community, and also profiting from the presence on an excellent community of astrophysicists.

4.- Coordinate and promote the Spanish participation in the international laboratories of Nuclear Physics, and in particular, in the new Facility for Anti-proton and Ion Research (FAIR), to be built in Germany. FAIR represents the most ambitious scientific project of the international community of Nuclear Physics offering excellent conditions for new physics in this discipline. An adequate Spanish contribution to this project will provide a unique opportunity for giving the required boost to experimental Nuclear Physics in our country.

5.- Promote the participation of Spanish groups in the preparation, at all levels (detection and acceleration techniques, data taking, analysis and scientific results) of the future "International Linear Collider" (ILC), ensuring that our presence has the proper weight and visibility. This initiative should bloom around 2010 and only a coordinated effort will give good chances for success. In this field, there is a very good opportunity to increase significantly R&D in technological activities, with important applications, particularly in accelerator physics.

6.- Favour the implication of Spanish groups in present and future experiments in Neutrino Physics, and help to implement the European Strategy on Particle Physics approved by the CERN Council in Lisbon and the European Policy in the fields of interest to our community.

7.- Develop and implement Information Technologies in Particle, Astroparticle and Nuclear Physics.

8.- Support the continuous development of Theoretical Physics in Spain as well as the scientific exchange between theoreticians and experimentalists of all the areas.

Scientific Policy Objectives

1.- Create a CONSOLIDER Centre, with the name National Centre of Particle, Astroparticle and Nuclear Physics, of a distributed nature, with the features that will be described in this document. The CPAN will provide a forum to debate strategies and priorities, at medium and long term, and will coordinate the activities of the different groups. It will help to implement the policies of the Particle Physics National Program. The CPAN will coordinate the Spanish participation in large European and international projects. It will stimulate the participation in the Seventh European Framework Program and in other European Programs.

2.- Establish a program of recruitment of well qualified technicians and engineers, posted in the groups participating in this project, in order to pursue activities along the priority lines that have been already listed. This program will, in due time, be coordinated by the National Centre.

3.- Provide support to the excellence of the groups participating in this project, by easing the incorporation of young scientists, and ensuring a proper generational renewal.

4.- Foster the development of R&D activities not accessible to separate independent groups.

Technology Transfer Objectives

Particle and Nuclear Physics are disciplines which have always been associated to relevant technological developments with important beneficial effects for the progress of our society. CERN (and other Institutions such as IN2P3 in France or INFN in Italy) established long ago a Department to take care of technology transfer.

1.- Facilitate the transfer to the Spanish industry of technological know-how on electronics, light and particle detectors, radiofrequency, superconducting magnets, power supplies, high precision mechanical engineering,

cryogenics, ultra vacuum technologies, information technologies, special materials, etc. High level technical experts will help in technology transfer activities in collaboration with CDTI, OTRI's, etc.

2.- Give support to new initiatives in technological applications. The development of new technologies, produced as a consequence of R&D activities of any group participating in this project should be promoted.

3.- Promote training in the new technologies, both for personnel associated to the participant groups, and for personnel coming from industries with interests in this sector.

Scientific Training and Outreach Objectives

1.- Support and collaboration with Master and Doctoral Programs corresponding to the scientic scope of CPAN.

2.- Provide support and coordination to the organization of specialized workshops and meetings.

3.- Support the implementation of outreach activities by setting up a special group inside CPAN.

B) Current status of the field in Spain

Experimental particle physics

The participation in the European LEP accelerator after the reincorporation of Spain to CERN resulted in important contributions of several Spanish groups to three large experiments: IFAE group to the ALEPH experiment, IFCA, UO and IFIC groups to DELPHI, and CIEMAT to L3. In addition, Spain participates also in other relevant international projects: the UAM group in ZEUS, in the HERA accelerator at DESY, CIEMAT, IFAE and IFCA groups at CDF in the Tevatron, at Fermilab, UB group in HERA-B, and the IFGAE group in the SMC and DIRAC experiments at CERN. All these activities in large international projects have increased the visibility of the Spanish groups, that currently have a relevant contribution in the experiments being prepared at the next CERN accelerator, the Large Hadron Collider (LHC): ATLAS (with participation of the IFAE, IFIC and UAM experimental groups), CMS (CIEMAT, IFCA, UO, UAM), LHCb (UB, IGFAE/USC), and ALICE (CIEMAT, IGFAE/USC), as well as in the associated grid computing project, WLCG. Spanish groups also take part, in the neutrino physics program, in the experiments NOMAD, HARP (IFIC), ICARUS (UGR), K2K (IFAE, IFIC), Double-Chooz (CIEMAT) and T2K (IFIC, IFAE). There is also a small, but significant, presence in the BABAR experiment (UB, IFIC) at SLAC.

However the community has not yet reached the critical size needed, according to European standards. So, it is important to keep a continued effort of training and it is urgent to establish a program to define and sustain an adequate technical personnel work force.

Astroparticle Physics

Astroparticle Physics is an emerging field of fundamental research at the crossroad between particle physics, astrophysics, space science and cosmology. It addresses some of the hottest open questions in fundamental physics and high energy astrophysics by studying in a new domain the different particles coming from the heavens, such as cosmic rays, gamma-rays, neutrinos, gravitational waves and dark matter candidates. Its goal is twofold: on the one hand using particles to study cosmic accelerators, the most violent and energetic phenomena in the universe, and on the other hand, using the particles produced in these cosmic accelerators to perform fundamental physics studies beyond the reach of man-made accelerators. This allows a very rich program of theoretical activities in which a handful of groups of theoretical physicists and astrophysicists work in Spain since the late eighties.

In Spain the experimental activity in this field started more than a decade ago with pioneering experiments at the "Roque de los Muchachos Observatory" in the Canary island of La Palma and in the Canfranc tunnel under the Pyrenees, and has flourished during the last decade with the creation of small groups which are participating in many of the most important experiments in the field: AMS, Auger, CAST, LIGO-GEO, LISA, MAGIC, etc. An important milestone has been the recent creation of the LSC (Laboratorio Subterraneo de Canfranc), a Consortium between the Spanish Ministry of Science, the Regional Government of Aragón and the University of Zaragoza, one of the few European installations for underground low-background physics experiments. A handful of small experiments already placed visibly the Canfranc tunnel in the international map in this field, and the new installation has the capability of accommodating now first-class, large international experiments in the fields of Particle, Astroparticle and Nuclear underground physics.

Most of these experiments, in spite of their success, are just precursors of even larger scientific installations which are already in the phase of design study, in some cases with support from the European Union. The present participation of the Spanish community in most of the important initiatives and even a position of leadership in some of them should not jeopardize the fact that the participation in these large initiatives will require a decisive boost in the Spanish Astroparticle physics community to allow a scientific and technological return at least similar to the one in other neighbouring fields of research.

Nuclear Physics

Recent technological developments providing intense beams of exotic nuclei, anti-protons or relativistic heavy ions offer exciting possibilities for new physics during this new century in the field of Nuclear Physics. Spain has well established activities in both, theoretical and experimental Nuclear Physics, with a reputed international recognition and increasing competitiveness. The research teams are spread all over the country, involving universities and public research agencies. Experimental research groups are present at CIEMAT, CSIC (IEM, IFIC), and at the universities of Huelva, Madrid (UAM, UCM), Politécnica de Cataluña, Salamanca, Santiago, Sevilla and Valencia. Research in Nuclear Theory is conducted at the universities of Barcelona (UB, UAB, IEEC), Cantabria, Granada, Huelva, Madrid (UAM, UCM), Salamanca, Sevilla, Valencia and CSIC (IEM, IFIC).

The experimental nuclear physics research is focused mainly on the study of the structure and dynamics of the atomic nucleus. Other important activities are related to nuclear astrophysics, nucleus-nucleus collisions or hadronic physics. The experiments are carried out mostly at European facilities, such as ISOLDE and n_TOF at CERN, GSI (Germany), GANIL (France), LNL (Italy), CRC (Belgium) and JYFL (Finland). These laboratories support the Spanish activities due to the scientific excellence of the Spanish projects and researchers although Spain is not contributing to the installation maintenance, except for the case of the ISOLDE Facility at CERN, where it contributes since 2003, and RISING (GSI) since this year. During the last years the Spanish groups have made a coordinated effort to contribute effectively to the experiments R^3B, HISPEC/DESPEC, ELISe and PANDA at FAIR. Synergies with the Spiral2 project are considered in order to prepare for the future EURISOL project.

The theoretical activities cover most of the fields of Nuclear Physics, from nuclear structure and reactions of stable and exotic nuclei to hadronic physics and astrophysical applications. The researchers are well integrated in the international context, being remarkable the participation of our country in the ECT* (Italy) that coordinates the European Nuclear Theory activities. Moreover the theoretical nuclear physics community has an increasing degree of integration with the experimental and applied nuclear physics communities.

Unfortunately the number of scientists and the size of the groups involved in experimental activities in Spain are well below the European standards. An increase of the financial support for scientific and technical human resources as well as infrastructures is required to enhance the visibility and leading role of the Spanish groups in the international context and to benefit from the technological spin off of the scientific activity. The Spanish participation in FAIR, represents a unique opportunity to boost the activities in experimental nuclear physics. For the theory groups, an adequate policy of human resources in terms of pre-doctoral fellowships and postdoctoral contracts is required, in order to maintain and increase the high quality level of research, and to assure the generational renewal.

Theoretical Physics

From the decade of the seventies, the Spanish scientific community has maintained an important international presence in theoretical particle physics, both in the more phenomenological and in the more fundamental mathematical aspects, reaching levels of excellence above those that would correspond to the scarce contributions to R&D in Spain. At present, very competitive groups exist in the majority of large universities and research centres in our country: IFAE, IFIC, IFT, IGFAE/USC, IMAFF, UB, UCM, UGR, UM, UPV, UZ. Nevertheless, there exists a serious problem of aging and generational renewal. Theoretical physics in Spain has at this moment an excellent generation of young researchers at the highest international level, whose assimilation and stabilization in the R&D system is turning out to be excessively problematic. The consequent "brain drain" to other countries is worrying, in a moment in which a significant number of retirements is foreseen in the next few years. The strong Spanish implication in the LHC and the foreseeable participation in projects at world level indicate that the effort in particle physics phenomenology should be promoted, and the collaboration with the experimental groups encouraged. The nonexistence of theoretical physicists in institutes with very important experimental activity is anomalous.

R&D in accelerators and detectors

Accelerator physics has been traditionally underdeveloped in our country. Universities in Spain have been lacking the technological infrastructure, and have been unable of providing the technical support, required by this kind of research. For a long time, only one research center, CIEMAT, had the capability to promote a modest activity in this field. However during the last decade, some important progress has been achieved and the superconductivity group at CIEMAT was able to design, make prototypes and test some quadrupole magnets, which were accepted to be used in the LHC. The final series fabrication of these magnets was made in a Spanish industry. This group has also developed superconducting magnets for TESLA 500, with the potential to be used in XFEL. At present, they are involved in an ambitious project for the construction of the CLIC Test Facility 3 at CERN, which includes developments in radio frequency that represent a new line of R&D in Spain, in collaboration with other groups at IFIC and UPC. The CIEMAT group also coordinates the Spanish contribution to the accelerators of the FAIR project, in particular the design and construction of the ring NESR.

The last decade has seen the installation in Spain of accelerator facilities. The Centro Nacional de Aceleradores (CNA) in Sevilla has three accelerators: A 3 MV tandem, a 1 MV tandem and a cyclotron which produces 18 MeV protons. The CMAM in Madrid has a 5 MV Tandem. Another project which will have an important impact on the development of accelerator physics in Spain is the construction of the ALBA Synchrotron in Barcelona.

In the field of Particle and Astroparticle Physics, R&D in detectors has also experienced a very important progress since Spain rejoined CERN, although as in the case of accelerators, we are not still at the level of other advanced European countries. However, it should be said that the participation, first in LEP, and now in the LHC, of all the experimental groups has been excellent at the detector construction level, in spite of the high technological complexity of the projects. Good examples are the CIEMAT contribution to the Muon detectors of L3 and CMS, the hadronic calorimeters made at IFAE and IFIC for ATLAS, the electronic calorimeter made at the UAM for ATLAS, the contribution to the ATLAS Silicon Tracker from IFIC, the global alignment system of CMS by IFCA, UO and CIEMAT and the contribution to the LHCb Silicon Tracker and Calorimeter systems from IGFAE/USC and UB. This has had very positive effects in the hardware contribution of the groups to other activities, and experiments, in which they have progressively become involved. We could mention the Antares photomultiplier systems which have to operate deep in the sea, the cameras of the MAGIC telescope, the leading participation of IGFAE/USC in the TOF and GEM detectors for DIRAC spectrometer, the contribution of IFCA to the TOF detector at CDF, the design and construction of the RICH detector for AMS at CIEMAT, the developments in the field of silicon detectors and associated electronics at IFIC and IMB-CNM, the progress in the field of optical sensors, the improvement of the precision in metrology and in the machining of mechanical structures, and the development of sophisticated digital readout electronics.

Nuclear Physics groups have also been active in R&D detector projects. As an example, the developments made in the detection of gamma rays with scintillating detectors and of hyper-pure Germanium, in the detection of neutrons and in the design of silicon detectors and their associated electronics for low threshold charged particle detection. The Spanish participation in FAIR will be very helpful to push further these activities. Spanish groups are expected to contribute to the development of gamma ray calorimeters for R3B (IGFAE/USC, IEM, UCM), DESPEC (IFIC, UAM) and PANDA (IFIC) experiments, to the beam tracking and charged particle detectors based on silicon and RPC´s for HISPEC and R3B (UHU,USE), and the detector of neutrons of DESPEC (CIEMAT).

The entity of all these R&D activities, some of them being developed in collaboration with industry, is still small compared to other advanced European countries, but it offers a large potential to grow, and the creation of the National Centre we are proposing in this Consolider Project, should play a fundamental role to achieve this objective.

Particle Astroparticle and Nuclear Physics Applications

Particle, astroparticle and nuclear physics applications to different fields, from energy production to medical therapy passing through semiconductor technology and dating techniques are widely used in our society. Therefore the experimental particle and nuclear physicists have a remarkable spin-off potential related to scientific discoveries and new techniques, and these activities are growing in our country. Some examples are mentioned next.

As an important fraction of the European population suffers at least once cancer, it is important to have groups working in this field. Advanced imaging techniques have been highly developed, and some groups in Spain (IFAE, IFIC, CIEMAT, UCM and IGFAE/USC) are developing new strategies to improve the image quality and the sensitivity and resolution with new sensor devices. The development of a portable positron-electron tomography (PET) Camera for diagnosis, with units sold in Spain, Switzerland and Germany, is a good example of these efforts. On the other hand, PET nuclides are produced with the 18 MeV cyclotron at the CNA and preparation of radiopharmaceuticals is also possible in this facility. Radiotherapy (using gamma rays) is a standard procedure to treat cancer at hospitals, but the most recent advances in Medical Physics point to the use of hadronic therapy because of higher effectiveness in the tumor leaving the surrounding tissue almost undamaged. There is a rather advanced project for the development of such a facility under the IFIC leadership in Spain.

The Carbon-14 technique has allowed measuring samples aged up to 60.000 years causing a big impact on Archeology. At the CNA there is an AMS (Atomic Mass Spectrometry) laboratory providing ^{14}C dating. Application of ^{14}C to marine and atmospheric studies will be also offered at CNA. Nuclear waste can be transmuted in either critical reactors or subcritical accelerator driven systems. New and more accurate data are necessary for the final design of the new reactor cores (neutron cross sections of minor actinides) and the external spallation neutron sources (high energy nuclear cross sections). The experimental nuclear physics groups from CIEMAT, IFIC, IGFAE/USC, US and UPC are measuring such high quality nuclear data in various experiments in the n_TOF facility at CERN and at GSI.

The RBS (Rutherford Back-Scattering) technique used in the ceramic industry allows to do surface lithography and to analyze the composition of materials in surfaces. The PIXE techniques are used in precision microscopy reaching the level of the atomic composition. Also the use of proton accelerators for nanolithography is in development. Some of these applications are now developed at the tandem accelerators of CNA in Seville and CMAM of the UAM.

C) The need of a National Center

The "Programa Movilizador en Física de Altas Energías", was a pioneer program in Spain that introduced modern evaluation methods and new instruments to our R&D system. Due to the remarkable qualitative and quantitative growth in recent years, these instruments are becoming insufficient in some areas. This is particularly the case in Particle, Astroparticle and Nuclear Physics, where there has been a steady significant growth of the Spanish community over this period. This growth has come hand by hand with a relevant involvement of our scientific community in many of the best international scientific programs, a rigorous management and a level of scientific excellence that is recognized by any objective evaluation.

This is why we are proposing the creation of the National Centre for Particle, Astroparticle and Nuclear Physics. Its aim is, basically, to ensure that the role played by our country in these fields of research is in accordance with our socio-economical situation in Europe. In order to reach these goals, we need to have

1. A well defined scientific strategy
2. An efficient coordination of the activity in all groups
3. Adequate human resources, in particular those related to technological aspects, clearly insufficient at present.

It should be clearly stated that the idea behind this proposal is not to dedicate more resources to a specific research field, but rather to make use of all the coordination mechanisms that such a National Centre would put in place, in order to support several lines of research with very precise scientific and technological objectives and the definite will to transfer the benefits of such research to society at large.

The National Center is a key step forward

In 1997 and 2003, when the committee RECFA (Restricted European Committee on Future Accelerators) examined the situation of the field in Spain, considered pertinent to recommend to the Government to create a National Centre with the aim to promote and to coordinate the research in experimental particle, astroparticle and nuclear physics and its applications.[1] A similar recommendation was issued by the nuclear physics board of the European Physical Society to the Spanish scientific authorities after the last meeting held in Spain in 2004:[2]

"The *main reasons are related to the increase of scientific and technological returns due to the membership to CERN, to reach a greater presence at CERN, to obtain an increment of the human and economical resources dedicated to this areas in our Country, as well as to establish the mechanism that allow a coordinated participation of the Spanish research teams in FAIR.*

A second reason comes from the characteristics of the projects of the research projects in these fields. In particular, its long time period and highly technological complexity and its development in a totally international framework require a very good coordination at national and international level.

As a consequence of the technological complexity of the experiments in particle physics that requires to involve in the same working team personnel of different competences: Scientific, technicians and engineers. In the environment in which the research develops at present in Spain, this task turns out to be extremely difficult, particularly due to the deficit of technicians in the university groups.

The establishment of a national institute, to some extent similar to INFN in Italy or IN2P3 in France, would have outstations at each university and the senior staff would have joint appointments involving the normal range of teaching and other duties. Such an institute would also result in better inter-group collaboration, and improve the strategic planning of experimental physics in Spain. It would also be able to provide the infrastructure and technical posts necessary to carry out the experiments, which cannot be provided by the universities. Care must be taken that such a structure be loose enough not to jeopardize the excellent collaboration between the experimental groups and the Spanish regional governments, which is one of the strengths of the current system."

The recommendation from RECFA is, therefore, the creation of a National Centre devoted to Particle, Astroparticle and Nuclear Physics and that this centre should have a 'distributed nature', that is to say, without own fixed headquarters. And it should be associated to the existing research teams and centres or to the ones that can be created in the future. It is also implicit that this National Centre should not add a further layer of bureaucracy.

[1] Letter of the Chairman of RECFA to the Minister of Science and Technology of 22 April 2003.

[2] Letter sent by the "chairman" of the "Nuclear one Physics Board" of the EPS to the Minister of Education and Science in June of 2004

Any research field in good scientific health should always look forward. The investment in R&D in new techniques of acceleration and detection is a key investment. The advanced nations invest in the study of future projects and techniques a reasonable part of their resources. With the present structures in Spain this is unthinkable. Similarly, technology transfer to industry should be assured, and the mechanisms reverting to the companies the developments and innovations that are produced in this competitive field, should be identified.

Last but not least, the field should be well coordinated in order to profit from the scientifically incipient structures that are getting commissioned in our country. Among them we should mention the Underground Laboratory of Canfranc, the telescope MAGIC at the Roque de los Muchachos, PIC (Puerto de Información Científica), the synchrotron ALBA, the CNA, or the large installation for medical physics and the ESS, still under consideration. It is obvious that in order to profit from all these investments it is necessary to create adequate structures of coordination, planning and the necessary human and material support.

What the Plan Nacional I+D+i 2004-2007 says about the National Centre

"Existen varios motivos para la creación de un Centro Nacional de Física de Partículas de ámbito estatal. Están principalmente relacionados con el aumento de los retornos científicos y tecnológicos de la pertenencia al CERN

a) El primero es el aprovechamiento óptimo de las importantes oportunidades científicas, académicas, tecnológicas e industriales que se derivan de la pertenencia de España al CERN: aumentar el número de físicos experimentales y técnicos españoles en el CERN, ayudando a conseguir mayores retornos, explotar la capacidad de formación del CERN y, en definitiva, alcanzar una mayor presencia en el CERN.

b) El segundo se deriva de las características de los proyectos de investigación en física de partículas; en concreto su larga duración y alta complejidad tecnológica y su desarrollo en un marco totalmente internacional exigen que sea necesaria una coordinación nacional e internacional.

c) El tercero es también consecuencia de la complejidad tecnológica de los experimentos en física de partículas que requiere involucrar en un mismo grupo de trabajo a personal de distintas competencias: Científicos, ingenieros superiores y técnicos. En el ámbito en que se desarrolla actualmente la investigación en España, esta tarea resulta sumamente difícil. En particular por el déficit de tecnólogos en los grupos universitarios."

The CONSOLIDER Project as a means to launch the National Centre and its activities

There have been in the past several attempts to create a National Centre with the characteristics proposed here; all but one were unsuccessful. The main reason for it was the lack of a sufficiently clear roadmap from the Ministry's side, and also, probably, by misconceptions from the particle and nuclear physicist's side. The one attempt that was 'successful' led to the creation of the so-called CEFAE, a proto-institute that legally came to life in 1995 as a semi-autonomous institute within CSIC. Unfortunately, this Centre, for whatever reasons, never had any real activities, budget or personnel.

The Spanish science needs now in several fields with a strong international component, and where frontier science and high level technology go together, to create a coordinating Centre. With the Call for Proposals for "Consolider Projects/Centres" the situation has changed. It is now the Ministry itself who has established an official pathway leading to the creation of National Scientific Centres like the one we propose here.

Following the terms of the Call, a complete functional structure has been designed and the protocols for decision taking, and renovation of Committee members, established. A well-defined structure of departments/committees to cover all the different areas of interest (scientific, technological and outreach) has been put in place. Steps to constitute the National Centre, as well as a possible chronogram for them have been considered. Last but not least, a minimal administrative team has also been defined. We thus believe that this proposal is both consistent and realistic. If the CONSOLIDER committee chooses to finance this initiative, and the political support to the National Centre is present, we believe that its positive effects in Spanish basic research and technology will be visible at medium term. We also believe that this success may show the way for analogous initiatives in other fields that may need them.

Who is signing this proposal?

The researchers signing this CONSOLIDER proposal are in one of the following situations: either he/she is presently a Principal Investigator (IPs) of a project approved and funded by the National Program (2004-2007), or of a project in the Sixth European Framework Program, or he/she is acting as an IP of new Project request in the present call for requests in the National Program (2004-2007), or he/she is in a Management position in one of the affiliated institutes. This ensures that this initiative is well vertebrated within the Spanish communities of particle, astroparticle, and nuclear physics.

D) Detailed description of the goals of the National Centre

The main objective of the Project is to undertake strategic initiatives in Particle, Astroparticle and Nuclear Physics with the aim to have a substantial leap forward in the Spanish research in this field. This is clearly a medium and long-term enterprise and therefore it is only achievable if a permanent entity as the National Centre is firmly established. The creation of the National Centre is therefore the pivotal object of this Project.

We can divide the five years period spanned by the Consolider Project in two sub-periods: a first one where the Consolider Group will pursue both the scientific goals and the creation of the National Centre, and a final one where the National Centre will be fully operational and will have taken over from the structure developed by the Consolider Group to accomplish its objectives. The objectives, which were summarized in part A) of this section, are described in more detail below. They are goals of both the Consolider Group (for the first part of the 5 years spanned by the Consolider Project) and the National Centre (second part and, eventually, long term).

Scientific goals (Please refer to the topics list in part A of this section)

LHC Particle Physics

- To provide support to the coordination of the physics analysis by the Spanish groups. Identify aspects where the Spanish participation could be visible and decisive.
- To facilitate and promote the collaboration between theoretical and experimental groups in the analysis and the interpretation of the LHC data, proposals of new analysis techniques and the identification of new signals.
- To establish a network concerning phenomenology of the LHC results.
- To provide a forum for the discussion and coordination of the Spanish position in the relevant decisions to be taken by CMS, ATLAS, LHCb and ALICE collaborations, in connection to CERN and LHC scientific policy aspects.
- To facilitate a smooth operation of Spanish centres participating in the WLCG computing GRID project, and the cooperation between these centres and the experimental groups.
- To guarantee a significant Spanish participation in the working groups of the LHC upgrading, and the corresponding efforts in R&D, in particular for the high luminosity option.

Astroparticle Physics

- To facilitate the Spanish participation in the experiments at Canfranc, thus contributing to the success of this important installation. It is essential for our groups a significant participation in experiments that may lead to concluding results in the case of double beta decay searches (SuperNEMO) and dark matter searches.
- To reinforce the Spanish contribution to the large and relevant experiments in this field using particle messengers to explore astrophysical and cosmological sources, such as MAGIC, AUGER or LIGO-GEO.
- To prepare Spain for the new challenges in Astroparticle Physics such as CTA, Auger North and KM3, as well as others that surely will turn up, supporting developments in the field that will allow sensible choices following ApPEC recommendations and adjusting to our national preferences.
- To favour the collaboration between Astroparticle, Astrophysics and Space Science groups by organizing common meetings and helping setting out specific joint projects transversal to the existing National Programs.
- To stimulate the participation of Spanish groups in the observational facilities at Roque de los Muchachos, Calar Alto, and others, so that Astroparticle and Astrophysics groups work together.

Nuclear Physics

- To facilitate that Spanish groups can join the different experiments which will take place in FAIR.
- To encourage the coordination among the nuclear physics groups in Spain, some of a very small size, so that Spanish participation becomes visible and in accordance with the participation in the construction of this large installation.
- To coordinate and optimize the scientific and technological activity in FAIR with that one taking place in other Nuclear Physics experimental installations (ISOLDE, SPIRAL II, etc.)
- To integrate the experimental and theoretical nuclear physics communities in our country, thus facilitating their collaboration.

Accelerator and detector R&D

- To promote the participation of Spanish groups in the preparation, at all levels (detection and acceleration techniques, data taking, analysis and scientific results) of the future "International Linear Collider". We are actually participating in the CTF3 CLIC facility (mostly through CIEMAT), a project with a strong technological component, and it would be very convenient to have a strong presence in the ILC initiative too, not only from the scientific point of view, but also strategically and even industrially. Therefore, only a coordinated effort will give good chances for success. There exists already a national network devoted to this purpose, but it should be further developed and extended.

Neutrino Physics

- To stimulate the collaboration between theoretical and experimental groups in neutrino physics.
- To promote an adequate participation of Spanish groups in the new generation of experiments using accelerators, like for instance T2K or NOvA, as well as an increase of our participation in relevant experiments without accelerators (e.g. DoubleCHOOZ), decisive to improve our knowledge on the elements of the leptonic mixing matrix.
- To follow up the European initiatives in this field, in order to be ready to contribute to the decision making process in order to support those scientific proposals who are of special interest for our country. In particular the proposals for neutrino beams produced at CERN by means of a Neutrino Factory, or a Beta-Beam, directed to the Canary Islands or Canfranc, for instance.
- To coordinate the Spanish participation in other international initiatives. CERN has recently defined the European Strategy in particle physics, with important implications in the field for the next decades. The National Centre should participate in the decision taking process at the international level and push for the scientific, technological and industrial interests of Spain.The National Centre should also participate in the implementation of these decisions at the national level.

Information Technologies

- The National Centre should support the implementation of the WLCG Project for GRID computation in the LHC experiments: in particular, it should care for the coordination of distributed Tier1 and Tier2 activities, the obtaining of additional resources, the strengthening of international links, and the optimization of the scientific exploitation, in good connection with the experimental groups.
- Support should also be given to fulfil the intensive numerical computation needs of the theoretical groups in Particle and Nuclear Physics.

Scientific Policy objectives

The National Centre should help in:

- Defining the strategies and priority lines of research, at medium and long term.
- Coordinating the research activities of the different groups participating in this Project.
- Giving technical and administrative support to the activity of the Particle Physics National Program.
- Providing advise, in the topics covered by the groups participating in this Project, to the Particle Physics National Program, and to the Administration, if required to do so.
- Representing the researchers of the field at the national and international levels, and defending their scientific interests.
- Coordinating the Spanish participation in large European and international projects.
- Promoting and stimulating the participation in the Seventh European Framework Program and in other European Programs.

In addition to this, other goals are:

- To incorporate technicians and engineers to the participating groups in order to work on activities which have been considered as strategic and high priority, and which are coordinated by the CONSOLIDER Project and, in due time, by the CPAN.
- To incorporate temporary high level technicians and engineers from some other institutions, in order to facilitate the transfer of the relevant "know how", mainly in aspects associated to accelerator or detector hardware.
- To facilitate the establishment of a competitive program of post-doc contracts, which will take properly into

account the merits of the candidates. It will complement, and extend, the existing programs. These contracts will be allocated to the different groups working on the strategic and high priority fields, coordinated by the CONSOLIDER project and, in due time, by the CPAN.

- To contribute to the incorporation of young scientists, giving priority to the experimental and technology transfer areas. Again, the merits of the candidates should be the basis of the selection procedures.
- Foster the development of R&D activities not accessible to separate independent groups by helping to set common projects, endowed with personnel from the Consolider project/National Centre.

Technology transfer

Spanish industry has taken advantage, at the level of advanced technology transfer, of having been connected to the activities in some of our groups, in the fields of Particle, Astroparticle or Nuclear Physics. In this sense, we could mention a few particular examples, like the vacuum technology transferred to some industries (INGOVI, TELSTAR, Duro–Felguera), the construction of complex equipment (Equipos Nucleares, Duro–Felguera, SENER, Norte Mecánica), and several contracts to relatively small industries associated to special electronics. However we believe that this is well under the real possibilities and an Institute like CPAN is necessary to push this aspect of the field. It should be mentioned that CERN, and other Institutions like IN2P3 in France, or INFN in Italy, have established long ago a Department to take care of technology transfer. At the end, it has been shown that relevant technological achievements produce important beneficial effects for the progress of our society. We consider important goals of the CPAN, in this line, the following ones:

- To facilitate the transfer to the Spanish industry of knowledge related to experimental particle and nuclear physics technologies like for example Electronics (systems, micro-electronics and opto-electronics), Light and Particle Detectors, Radiofrequency, High performance magnets (normal and superconducting), Power supplies, Very high precision mechanical engineering, Cryogenics, Ultra vacuum technologies, Information technologies (data bases, GRID) and Special materials.
- To provide support to new initiatives in technological applications from the Particle, Astroparticle and Nuclear Physics fields, which can be applied in, for example, Medical Physics, E-science and Space sciences
- To promote the development of new technologies, whenever possible, when produced as a consequence of R&D activities of any group participating in the National Centre.
- To create, and make available to Spanish industry, a database with the different possibilities of technology transfer, the name of a contact person in each case, and a description of possible ways to collaborate.
- To encourage the training of specialists in the new technologies, both in the case of personnel associated to the Centre and of the participating groups. Follow up of the technology fellowship program in international organizations.
- To incorporate, according to available resources, high level technical experts, to help in the technology transfer activity, in collaboration with CDTI, OTRI's, and other similar organizations.

Scientific training and outreach objectives

- To support the "High Energy Workshop" (Taller de Altas Energías, TAE) and the Inter-University Master of Nuclear Physics to promote them in Postgraduate Schools at the National level. Coordination with masters and doctorate programs.
- To provide support and coordination to the organization of special workshops like the "Internacional Winter Meeting", "Encuentros de Física Nuclear", "Centro de Ciencias de Benasque", "Jornadas de Altas Energías de la RSEF", "Workshop on Heavy Ions" and other scientific Congresses of the field.
- To support the implementation of outreach activities inside our society (seminars and talks, articles in newspapers, special exhibitions, like for instance during the "Science Week", etc.), and to improve the knowledge of students, in secondary schools and in universities, about particle, astroparticle and nuclear physics. Coordinated actions with the RSEF will be established.
- To promote the setting up of a special group inside CPAN responsible of outreach activities.

E) Struture and organization of the proposed National Centre

From a practical point of view, it is essential that this centre has its own legal identity, or a very large degree of autonomy. This requires either adopting the legal structure of a Consortium, or its integration within an existing Public Research Organization with an appropriate financial autonomy. This Centre should be an institute without "walls" or "headquarters" (with the exception of central administrative services) whose members are posted as researchers or technicians in the different affiliated groups. That is, it would be a distributed Centre, reproducing in good measure the examples of INFN or IN2P3. A legally viable possibility would be to adopt the legal structure of a consortium with participation of MEC, CSIC, CIEMAT and the different Universities and Institutes (or the Autonomous Communities in representation thereof).

The structure of the centre should consider a Governing Board of Trustees or Patronage, including the representatives of the participating institutions (Secretario de Estado, President of CSIC, Director General of CIEMAT, etc.), an Executive Committee in charge of the management, and a Scientific Committee with relevant scientists in the area:

- A Scientific Director that should be responsible of the execution of the scientific policy at mid term, and elected in an open, competitive and public process.

- An Executive Committee with the maximum government responsibilities of the centre. This collegiate body will be integrated by the Scientific Director, representatives of the different scientific lines (theoretical physics, experimental particle physics, astroparticle and nuclear physics), and Vice directors in charge of the supervision of specific tasks (like relations with national facilities, relations with international labs, etc.) and a General Manager.

- A Scientific Strategy Council integrated by the local representatives of the different research groups in Spain in the areas of interest for CPAN, with the following missions:
    - Propose new strategic initiatives to the Executive Committee
    - Provide advice to the Board of Trustees on topics related to scientific policy.
    - Propose candidates for the Executive Committee to the Board of Trustees

- An Advisory Scientific Committee, external to the CPAN, integrated by relevant scientists of each speciality at the international level, to advise and periodically to evaluate the activities of the CPAN.

- A professional management including a person responsible for management, which should be highly efficient and evaluated according to objectives. The General Manager will be responsible of the Support Office.

- A Support Office, including staff personnel devoted to administrative tasks and informatics support, technology transfer, diffusion and administrative relations with the national facilities and international laboratories and organizations.

- A kernel of contracted personnel (researchers and technicians), either temporal or staff, distributed among the different research groups of the area according to the strategic priorities of the CPAN. The selection process for permanent scientific positions will be based on a public open procedure with international diffusion. The salaries will include incentives according to the fulfilment of objectives.

The general function scheme in annual cycles will include:

- At least two annual meetings of the Strategy Scientific Council, where the status in the different areas and globally will be revised and new strategic initiatives will be discussed.
- Fortnight meetings of the Executive Committee, at least one of them in site each three months.
- An annual meeting of the Board of Trustees, where the Scientific Director will report on the current status and present new initiatives.

The mandate for the Executive Committee is three years that can be exceptionally renewed for another maximum period of three years.

3 FUNCTIONAL STRUCTURE OF THE RESEARCH GROUP

The CPAN-Consolider collaboration is composed by 26 research groups from several Institutes and Universities: IFIC, CIEMAT, CNA, ICE, IEM, IFAE, IFCA, IFT, IGFAE/USC, IMAFF, IMB, UAH, UAM, UB, UCM, UGR, UH, UIB, UM, UO, UPC, UPV, URL, US, USAL y UZ. Eight of those (IFIC, CNA, ICE, IEM, IFCA, IFT, IMAFF, IMB) belong to CSIC, the Institution managing the present application.

To guarantee an efficient and flexible performance, the CPAN-Consolider Collaboration will adopt the following functional structure:

- The Coordinating Investigator, Antonio Pich Zardoya, will assume the scientific coordination of the team and the functions assigned to him in the official Call of the Consolider Program, the Research Activity Programme and the Management Agreement. He will be assisted by Marcos Cerrada Canales, who will assume the functions of the co-coordinator.

- The Principal Investigators of the groups integrating the team will form the Council of Scientific Strategy. This Council is the maximum body of Government of the project, and has the mission to provide advise and support to the Coordinating Investigator, acting in addition as a consultative board. The decisions will be taken with the majority of the votes of the members, weighted in each case with the number of senior[3] doctors represented by these members.

- The Executive Committee will be formed by the Coordinator, the Co-Coordinator and four investigators. The Executive Committee will have, among other attributions, the responsibility of proposing the distribution of the budgetary allocations to the different groups of the Consolider project. It is also a fundamental mission of this Executive Committee to impel all the targets of the Consolider project, and in particular the discussion in the scientific community at large of the design of the future National Centre, and to assure all the steps necessary for its creation. The constituent Executive Committee will be composed by the coordinator, co-coordinator, and the investigators Dr. María José García Borge, Dr. Teresa Rodrigo, Dr. Manel Martínez and Dr. Luís Ibáñez. Dr. Joaquín Gómez Camacho, Dr. Lluis Garrido, Dr. Enrique Zas, and Dr. Francisco del Águila will be their deputies, respectively. The composition of the Executive Committee should be ratified by the Council of Scientific Strategy, once the Consolider Project is approved, and will be reconsidered annually.

- The Executive Committee will be provided with a Support Office, dedicated to administrative tasks, computer support, transference of technology, outreach and administrative relations with the national facilities and with the international laboratories and organizations. The Support Office will have his head office in the Managing Institution.

- Special attention will be paid in order to reach an adequate balance of genres, geographical areas and scientific competences in the composition of the Executive Committee. Moreover, proper mechanisms will be established to guarantee an adequate renovation of the Executive Committee members and Group Representatives.

The Executive Committee will meet every two weeks; physical attendance to the meeting should be mandatory at least once every three months. The Council of Scientific Strategy will meet at least two times a year, one of them with physical attendance.

[3] This number includes staff doctors and those with contracts from the MEC “Ramón y Cajal” or equivalent senior programmes

4. SCIENTIFIC RELATIONS BETWEEN THE DIFFERENT RESEARCH GROUPS AND THE SCIENTIFIC ACHIEVEMENT OF THE RESEARCH TEAM ON THE RESEARCH TOPIC.

Previous scientific relations

The way in which experimental nuclear and particle physicists work has propitiated that the Spanish research groups get integrated inside international collaborations, thus facilitating the cooperation between them. In addition, the Particle Physics National Program has also acted as a catalyst of the coordination of the Spanish research groups inside the big international collaborations. Nevertheless, the current R&D system was not providing till now mechanisms favouring a major cooperation between groups working at different experiments, and even less between groups corresponding to different areas, like in this case particle, astroparticle and nuclear physics.

The CPAN Consolider Project proposes to create a coordinating structure that will allow defining a scientific policy based on strategic actions of clear interest and scientific impact, and at the same time to encourage cooperation between areas by means of the strengthening of horizontal actions, thus allowing to exploit synergies and complementarities between these areas. These horizontal actions will reinforce the technical research (detectors, accelerators, information and data processing technologies, etc.) and therefore the applied research and the technology transfer. The above mentioned actions are clear examples of the added value that the cooperation in particle physics, astropartícle physics and nuclear physics can provide to the Spanish R&D System.

Many of the research groups integrating this Consolider project have been for many years coordinating their efforts, not only in their research projects, but also sharing the use of infrastructures, and at the level of outreach activities, training programs, and even management. In fact, the launching of the Plan Movilizador of High Energy Physics, in 1983, made possible that the experimental and theoretical groups would initiate coordinating activities. It is necessary to emphasize, in this sense, the first creation of a Network of Communications, the network FAENET, which was pioneering in Spain and became the seed of the current RedIRIS. The establishment of the above mentioned network allowed the groups to work, in a competitive way, inside big international collaborations and to take part in developments of hyper-languages that would lead to the current WWW. This was made by CERN teams with participation of Spanish researchers. At present the above mentioned collaboration continues and has spread to the development of GRID applications to confront the challenges of the massive storage of information.

This coordination also has had influence in the participation in big international experiments, favouring an increase of the visibility of the Spanish contribution. The above mentioned collaboration has been a constant in the past and continues in the present. A clear example of the participation coordinated in these collaborations is the contribution of the experimental particle physics groups in the different LEP experiments, and later in those of LHC. In this sense it is necessary to mention the joint participation of IFIC, IFCA and UO in the construction of the TOF and of the electromagnetic calorimeter of the experiment DELPHI, and the coordinated Spanish participation in the ATLAS (IFAE, IFIC and UAM), CMS (CIEMAT, IFCA, UO and UAM) and LHCb (IGFAE/USC and UB) experiments.

In nuclear physics the coordination of all the Spanish theoretical and experimental groups is very outstanding and it has allowed acquiring an international competitiveness thanks to the union and coordination of efforts. Throughout the years they have taken part jointly in experiments performed in different European facilities of Nuclear Physics, like in ISOLDE and n-ToF at CERN, GSI (Germany), Ganil (France), JYFL (Finland) and CRC (Belgium) emphasizing the recent coordination established concerning the project FAIR in Germany. Well aware that the advance in science requires developments of detection systems and training of personnel, these groups have promoted the use of national facilities such as CNA-Seville and CMAM-UAM, designed for applications in material science or in medical physics.

In Astroparticle physics, the experiment MAGIC is performed by an international collaboration, and three Spanish groups are involved (UCM, IFAE, UAB) and collaborate. A Spanish physicist has been the Spokesperson of the MAGIC international collaboration already for few years. In the experiment Auger there are also three Spanish coordinated groups (IGFAE/USC, UCM, UAH), which has given an important weight to the Spanish participation.

IFIC and UPV collaborate in ANTARES and in the design studies for the KM3 neutrino telescope. IFIC and IFAE collaborate in the neutrino experiments K2K and T2K and in a project in preparation in the new Laboratory of Canfranc. In the AMS experiment, the Spanish participation includes CIEMAT and IAC (Instituto Astrofísico de Canarias) working in close collaboration. It can be concluded that there are important networks of collaboration between the groups in this field.

Scientific achievements

A summary of the main experimental collaborations, present and past, as well as the main fields of expertise/excellence is provided in section 2, part B).

The research team has an excellent record in all the research fields under consideration. This is demonstrated by the scientific production and its impact in the context of the Scientific International Community of Particle Physics, Nuclear Physics and Astroparticle Physics.

As recent objective indicators we could mention that a recent CERN survey shows that Spanish authorship share in particle physics amounts to a 2.8% of the world total (very close to France's figures: 3.2%). It should also be added that the strength lies particularly in theoretical physics and phenomenology, while experiment and R&D lag somewhat behind. It is also appropriate to remember that a recent ISI study shows physics in Spain being at a solid 20% level above world average. Nuclear, Astoparticle and Particle Physics have traditionally ranked above average within the whole field of Physics in Spain. In fact a recent study shows that they are the areas where university professors get consistently the best research assessments in Spain.

This proposal encompasses the most representative researchers in the field and thus their scientific excellence is in exact correspondence with the previous figures.

As a summary it should be said that the Team has published more than 2.500 scientific articles in the last 5 years, with a total number of quotations close to 40.000. And some of the results obtained with a relevant contribution of the researchers of the team, are being incorporated to the teaching books in the university as significant results in basic science of the last years: the precision measurements of the parameters of the Standard Model, like for example the mass and couplings of the Z and W bosons, or the discovery of the quark top that completes the scheme of generations of elementary particles, already limited by the previous result on the number of generations of neutrinos; the advances on the nature of the neutrinos from the study of their oscillations, or the recent confirmation of the hadronic matter-antimatter oscillations and their impact in the comprehension of the matter-antimatter asymmetry in the Universe. The list of the excellent publications associated with these scientific results makes clear the very significant contributions of the members of this Team.

5. EVALUATION SCHEME, SPECIFIC FOR THE RESEARCH ACTIVITY PROGRAMME AND THE PROJECT.

As described in the Report, the CPAN-Consolider team has several objectives of scientific and technological character, as well as of scientific policy and of education and outreach, which translate in specific Lines of Action. The participants already carry out actions that touch all these targets, but the existence of the CPAN would on the one hand give them a larger cohesion and on the other improve them both quantitatively and qualitatively. This explains the emphasis on the words promotion and coordination all throughout the Report.

In the following Table we propose an evaluation scheme that could be objective and quantitative. For each of the objectives of the proposal the principal Strategical Actions (AE) are identified, as well as the Horizontal Actions (AH), the ones to be shared and develop in common. For each of these Lines concrete Actions are specified (that do not appear in the Table for lack of space but that will be described in the stage-2 Report) and for each of them the possible Indicators that would allow their evaluation. For each of the Actions there would be a Target for the period under evaluation. Each Target has a Degree of Accomplishment which will translate into a numerical figure (e.g. from 0 to 10) such that the output of the evaluation could be a number. The evaluations would take place every 6 months.

Clearly the Degree of Accomplishment will depend on the time. In the end it is the "integral" over the whole period of the project that matters, but the periodic evaluation will allow the identification of where a larger or smaller effort is needed along the project. It should also be understood that the evaluation method will itself evolve, in particular the validity of specific indicators.

Action Lines	Indicators	Target	Degree of Accomplishment
AE1: Coordinated analysis of LHC Physics.	1. Publications 2. Talks in conferences 3. Postdoctoral contracts		
AE2: Experiments in the Canfranc underground laboratory and astroparticles.	1. Postdoctoral contracts 2. Contracts of technicians 3. Creation of thematic network		
AE3: R&D developments for the FAIR project.	1. Postdoctoral contracts 2. Contracts of technicians		
AE4: Neutrino Physics.	1. Creation of thematic network. 2. Postdoctoral contracts 3. Contracts of technicians s		
AE5: Flavour Factories.	1. Creation of thematic network. 2. Postdoctoral contracts 3. Contracts of technicians		
AH1: Training of personnel in R&D activities in acceleration techniques.	1. Postdoctoral contracts 2. Contracts of technicians		
AH2: Data processing and numerical simulations.	1. Creation of infrastructure 2. Contracts of technicians		
AH3: Technology Transfer	1. Creation of office 2. Technological transfers		
AH4: Education and Outreach	1. Creation of office 2. Outreach activities		

6. FINANCIACIÓN PÚBLICA Y PRIVADA (PROYECTOS Y CONTRATOS DE I+D) DE LOS MIEMBROS DEL EQUIPO INVESTIGADOR
Debe indicarse únicamente lo financiado en los últimos cinco años (2001-2006), ya sea de ámbito autonómico, nacional o internacional.
Deben incluirse las solicitudes pendientes de resolución.

PROYECTOS DEL PLAN NACIONAL (2001-2005)				
Referencia	**Investigador Principal**	**Título**	**Financiación concedida (euros)**	**Periodo de vigencia o fecha de la solicitud**
Grupo:	**IFIC**			
FPA2001-0144-C05-02	José Luis Taín	Medida de datos nucleares relevantes para fisica nuclear básica y	10,367,46	28/12/2001 al 27/12/2004
FPA2001-4181-E	José Bernabeu	Participación en HEPP Board	6,000,00	19/06/2002 al 18/06/2003
FPA2001-1910-C03-02	Juan José Gómez	Estudio de fisica de neutrinos	54,091,08	28/12/2001 al 27/12/2003
FPA2001-3031	Antonio Pich	Fenomenologia de particulas: Fisica de color y sabor, su dinamica y la	66,111,33	28/12/2001 al 27/12/2004
FPA2002-00612	Francisco J. Botella	Interacciones fundamentales y sus implicaciones experimentales	202,600,00	01/10/2002 al 30/09/2005
FPA2002-12276-E	José Bernabeu	Presencia de Junta HEPP- EPS	25,000,00	01/10/2002 al 30/09/2003
BFM2002-04031-C02-01	José Navarro Salas	Aspectos cuanticos de agujeros negros	17,020,00	01/10/2002 al 30/09/2005
BFM2001-3563-C02-01	Santiago Noguera	Modelos hadronicos-interacciones fundamentales y fisica nuclear	26,745,02	01/10/2002 al 30/09/2005
BFM2002-03681	José A. Azcarraga	Geometria, grupos, teorias de campos y supersimetia	47,530,00	01/10/2002 al 30/09/2005
FPA2003-03878-C02-01	Carmen García	Participación el la construcción del detector de trazas de silicio de ATLAS	1,776,600,00	01/12/2003 al 30/11/2006

BFM2000-1326	E.Oset	HADRONES A BAJAS ENERGÍAS		2000-2002
BFM2003-00856	E.Oset	HADRONES A BAJAS ENERGÍAS		2002-2005
FPA2002-10857-E	José Luis Taín	Datos nucleares para sistemas nucleares subcriticoscon fuentes de espalación	14,500,00	20/06/2003 al 10/12/2003
FPA2003-09220-C02-01	Emilio Higon	Contribuciones al calorimetro hadronico de TILE- CAL de ATLAS	1,294,240,00	0/12/2003 al 30/11/2006
FPA-2003-06921-C02-01	Juan José Gomez	Estudio de la oscilacion de neutrinos en el experimento K2K	177,040,00	01/12/2003 al 30/11/2006
FPA2003-07581-C02-01	José Diaz	Estudio experimental de las propiedades de hadrones en materia nuclear	230,000,00	01/11/2003 al 30/10/2006
FPA2002-10245-E	Juan José Gomez	Expensionde la participación del gurpo de neutrinos del IFIC en el Esperimento HARP del CERN	22,000,00	2003
FPA2002-11446-E	Angeles Faus	Org. De Scientic and technological opportunities the future synchrotyon of	3,500,00	2/09/2003 al 11/09/2004
FIS2006-03438	Eulogio Oset	FISICA NUCLEAR Y DE HADRONES A ENERGIAS INTERMEDIAS	239.660	01-12-2003 al 30-11-2006
FPA2004-05616-C02-01	Santiago Noguera	Modelos hadronicos, interacciones dundamentales y fisica nuclear	64,300,00	13/12/2004 al 12/12/2007
FPA2004-00996	Antonio Pich	Particulas e interacciones: Fenomenologia de sabor y color	218,020,00	13/12/2004 al 12/12/2007
FPA2002-11468-E	Fernando Martínez	Participación en experimento Babar en el colisionador PEP-II de SALC	23,700,00	08/07/2004 al 07/07/2005

FPA2004-02829	Fernando Martínez	Participación en el Experimento Babar en el colisionador PEP-II SALC. Estudios de	99,290,00	13/12/2004 al 13/12/2007
FPA2002-12324-E	Angeles Faus	Participación en la Joint Universities Accelerator School	4,000,00	13/12/2004 al 13/12/2007
FPA2005-02935	Angeles Faus	Participación Acti I+D diseño colisionador lineal	339,150,00	31/12/2005 al 31/12/2008
FPA2005-23843-E	Carmen García	Exptens. Pord. Modulos del SCT de Atlas en el IFIC	40,000,00	31/12/2005 al 31/12/2006
FPA2005-03993	José Luis Tain	Estudios de estructura nuclear lejos de la estabilidad y experimentos de captura	428,400,00	31/12/2005 al 31/12/2008
FIS2005-02761	José Adolfo Azcarraga	Geometria, gurpos, teorias de campos supersimetria	136,850,00	31/12/2005 al 31/12/2008
FPA2005-01678	Francisco J. Botella	Interacciones fundamentales y sus implicaciones experimentales	385,560,00	31/12/2005 al 31/12/2008
FPA2005-00711	Vicente Gimenez	Estudios perturbaticosy no pertubartivos del modelo estandar y sus extensiones	59,500,00	31/12/2005 al 31/12/2008
FIS2005-05736-C03-03	José Navarro Salas	Aspectos cuanticos de agujeros negros	28,560,00	31/12/2005 al 31/12/2008
FPA2004-20907-E	Fernando Martinez	Participación en el Experimento Babar del colionador PEP-II de Slac(EUU).Estudios	445,060,00	31/12/2005 al 31/12/2008
FPA2004-20907-E	Angeles Faus	Participación en la Joint Universities Accelerator School	4,000,00	03/01/2005 al 31/12/2005
FPA2001-0507	Jorge Velasco González	MEDIDA DE SECCION EFICAZ TOTAL Y LUMINOSIDAD CON EL DETECTOR ATLAS DEL LHC.	10367,46	28/12/2001 al 27/12/2002

DPI2004-04268-c02-01	José Mª Benlloch Baviera	DESARROLLO DE UN SENSOR DE RAYOS GAMMA PARA MAMOGRAFIA PET	69.000,00	24/06/2002 al 26/06/2005
BFM2002-00568	Arcadi Santamaría Luna	ESTUDIOS PERTURBATIVOS Y NO PERTURBATIVOS DEL MODELO STANDARD Y SUS EXTENSIONES	62.445,00	01/10/2002 al 30/09/2005
FPA2002-02143	Jorge Velasco González	Medida de seccion eficaz total y luminosidad con el detector ATLAS en el LHC	50.160,00	01/10/2002 al 30/09/2003
FPA2002-04181-C04-03	Berta Rubio Barroso	Estudios de estructura nuclear a través de la desintegración Beta y las Reacciones de Transferencia	15.640,00	01/12/2003 al 30/11/2004
FPA2003-01425	Jorge Velasco González	MEDIDA DE SECCION EFICAZ TOTAL Y LUMINOSIDAD CON EL DETECTOR ATLAS DEL LHC	199.800,00	01/12/2003 al 30/11/2004
FPA2003-06921-C02-02	Juan José Gómez Cadenas	ESTUDIO DE LA OSCILACION DE NEUTRINOS EN EL EXPERIMENTO K2K	34.520,00	01/12/2003 al 30/11/2006
FPA2004-04266	Angeles Faus Golfe	MEDIDA DE LA SECCION EFICAZ TOTAL Y LUMINOSIDAD CON EL DETECTOR ATLAS DEL LHC	20.700,00	13/12/2004 al 12/12/2007
DPI2004-04268-c02-01	José Mª Benlloch Baviera	DESARROLLO DE UN SENSOR DE RAYOS GAMMA PARA MAMOGRAFIA PET	69.000,00	27/06/2004 al 26/06/2007
FPA2005-24387-E	Juan A. Fuster Verdu	PARTICIPACION EN EL EXPERIMENTO COLLIDER DETECTOR AT FERMILAB (CDF) DEL TEVATRON DE FERMILAB		20/04/2006 al 19/04/2007

FPA2005-05142	Fernando Martínez Vidal	PARTICIPACION EN EL EXPERIMENTO BABAR DEL COLISIONADOR PEP-II DE SLAC (EEUU). ESTUDIOS DE VIOLACION DE CP EN MESONES B Y DE COLISIONES ELECTRON-POSITRON A 10.6 GEV	445.060,00	31/12/2005 al 31/12/2008
FPA2005-07688-C03-01	Salt Cairols, José Francisco	DESARROLLO DE UNA INFRAESTRUCTURA DE TIER-2 DISTRIBUIDO PARA EL EXPERIMENTO ATLAS DEL LHC	478.000,00	15/10/2005 al 14/10/2007
FPA2002-04208-C07-05	Salt Cairols, José Francisco	Desarrollo de una infraestructura de DATAGRID para el análisis de datos de LHC	418.040,00	01/10/2002 al 30/09/2005
Grupo:	**CIEMAT**			
(FPA 2002 - 0829)	Marcos Cerrada	Participación en el experimento CMS	1835480	2002-2005
(FPA 2002 - 10970-E)	Marcos Cerrada	Contribución española a los gastos de Mantenimiento y Operación de CMS	37200	2003
(FPA 2002 - 12089-E)	Marcos Cerrada	Contribución española a los gastos de Mantenimiento y Operación de CMS	88000	2004
(FPA 2005 - 01770)	Marcos Cerrada	Participación en el experimento CMS	790000	2006-2008
(FPA 2005 - 24388-E)	Marcos Cerrada	Contribución española a los gastos de Mantenimiento y	120000	2006

		Operación de CMS		
(FPA 2002 - 04208-C07-01)	Nicanor Colino	Desarrollo de la infraestructura DataGRID para análisis de datos de LHC	424272	2002-2005
(FPA 2001 - 4074-E)	Nicanor Colino	Preparación de la infraestructura local de cálculo para el experimento CMS en el LHC del CERN	85000	2001
(FPA 2005 - 08446-C02-02)	Gonzalo Merino	Implantación del sistema de computación Tier-1 español para el LHC	1257830	2005-2007
(FPA 2005 - 07256-C02-02)	Nicanor Colino	Contribución del CIEMAT al Tier2 español de CMS	476000	2005-2007
(FPA 2002 - 12428-E)	Luciano Romero	Participación en el experimento ICARUS	130000	2004
(FPA 2005-07605-C02-02)	Inés Gil	Detectores de argon líquido para el estudio de física de neutrinos	71000	2005
(FPA 2002 - 0829)	Ines Gil	Participación en el experimento Double Chooz	300000	S:2006
(FPA 2003 - 08430)	Jorge Casaus	Medida de precisión de la vida media del muón con el detector FAST	107000	2003-2005
(FPA 2006)	Juan Pablo Fernández Ramos	Experimento CDF	150000	S:2006-2008
(FPA 2002 - 10229-E)	Juan Alcaraz	Participación en las jornadas y reuniones de la RECFA	6000	2003
(FPA 2005 - 24389-E)	Juan Alcaraz	Participación en las jornadas y reuniones de la RECFA	6000	2006
(FPA 2000 - 0923)	Carlos Mañá	COLABORACIÓN EN EL EXPERIMENTO AMS	531776	2000/2002
CDTI (PNE-003/2000-C)	Javier Berdugo	PARTICIPACIÓN EN EL EXPERIMENTO AMS	2909962	2000/2003

(ESP2003-01111)	Javier Berdugo	PARTICIPACIÓN EN EL EXPERIMENTO AMS	2018250	2003/2006
(ESP2006-13062-C02-00)	Javier Berdugo	PARTICIPACIÓN EN EL EXPERIMENTO AMS	1869571	S:2006
Grupo:	**ICE**			
ESP98-1803-E	Emilio Elizalde	Participación en la Misión PLANCK	65400	Años 2000 y 2001 C
BFM2003-00620	Emilio Elizalde	Gravitación y funciones zeta	130740	Años 2003 a 2006 C
Grupo :	**IEM**			
DGESIC-PB98-0676	E. Moya de Guerra	Teoría Nuclear e Interacciones Electrodébiles con Aplicaciones	42000	1999-2002
BFM22002-03562	P. Sarriguren	Procesos Electrodébiles y Núcleos Exóticos	51750	2002-2005
FIS2005-00640	P. Sarriguren	Estructura y Reacciones con Núcloeos Exóticos	73780	2005-2008
BFM00-1320-C02-02	Jorge Dukelsky	Métodos analíticos y numéricos en Física Nuclear y otros sistemas fuertemente correlacionados.	28320	2001-2003
BFM03-05316-C02-02	Jorge Dukelsky	Analytical and numerical methods in nuclear physics and other strongly correlated systems	43560	2003-2006
FIS2005-05736-C03-02	Guillermo A. Mena Marugán	Gravedad No Perturbativa y Agujeros Negros: Simetrías, Métodos Numéricos y Analogías en Materia Condensada	71400	12/2005-12/2008
FIS2004-01912	Guillermo A. Mena Marugán	Horizontes en Relatividad General: Dinámica, Métodos Numéricos y Analogías en Materia Condensada	6440	5/2005-4/2006

BFM2002-04031-C02	Fernando Barbero González	Agujeros Negros y Ondas Gravitacionales: Aspectos Cuánticos y Semiclásicos	25001	10/2002-9/2005
BFM2001-0213	Guillermo A. Mena Marugán	Longitud Mínima y Holografía: Implicaciones en Cosmología y Analogías en Laboratorio	8294	12/2001-12/2004
AEN99-1046-C02-01	Mª José Gª Borge	Caracterización de núcleos muy ligeros: de las líneas de estabilidad al continuo	190490,79	31.12.99-30.12.02
FPA2002-04181-C04-02	Mª José Gª Borge	Caracterización de núcleos ligeros y medios: su estructura y modos de desintegración	177192	1.10.02-30.09.05
FPA2005-02379	Mª José Gª Borge	Dinámica, estructura y modos de desintegración de núcleos exoticos ligeros. I+D en FAIR	426020	31.12.05-30.12.07
Grupo:	**IFAE/UAB**			
AEN93-1148-E	Matteo Cavalli-Sforza	I+D para detectores del LHC	177.298,57	25/05/1993 - 24/05/1994
AEN94-1282-E	Matteo Cavalli-Sforza	I+D para detectores del LHC	214.561,32	19/05/1994 - 19/05/1995
AEN95-1310-E	Matteo Cavalli-Sforza	Calorimetría hadrónica para la región central del ATLAS	246.414,96	06/07/1995 - 06/07/1996
AEN96-1663	Matteo Cavalli-Sforza	Física de protón-protón en el LHC con el detector ATLAS del CERN	339.571,83	01/08/1996 - 31/07/1997
AEN97-1690	Matteo Cavalli-Sforza	Física de protón-protón en el LHC con el detector ATLAS del CERN	1.411.176,42	01/10/1997 - 30/09/2000
AEN97-1691-E	Manel Martínez Rodríguez	Participación en el I+D para MAGIC : un telescopio de 17 metros de diámetro para la	72.121,45	01/10/1997 - 31/09/1998

		observación de la luz Cherenkov procedente de rayos gamma de alta energía		
AEN98-1426-E	Manel Martínez Rodríguez	Construcción y test de prototipos de píxels para la cámara de MAGIC	120.202,42	26/03/1999 - 25/03/2000
AEN99-0227	Manel Martínez Rodríguez	Participación en la construcción y explotación del telescopio de luz Cherenkov MAGIC	67.313,35	1999 - 2000
FPA2000-1693	Matteo Cavalli-Sforza	Física de protón-protón en el LHC con el detector ATLAS del CERN	1.078.816,73	18/12/2000 - 17/12/2003
FPA2000-2843-E	Manel Martínez Rodríguez	Construcción del edificio de control del telescopio MAGIC	150.253,03	2000 - 2002
FPA2000-0990	Manel Martínez Rodríguez	Estudio de rayos gamma cósmicos con el telescopio MAGIC	693.327,56	2000 - 2003
HPRN-CT-2002-00292	Matteo Cavalli-Sforza	Probe for new Physics	91.000,00	01/09/ - 30/08/2006
FPA2001-1910-C03-01	Federico Sánchez Nieto	Neutrinos	384.500,00	01/12/2003 - 30/11/2006
FPA2003-00417	Manel Martínez Rodríguez	MAGIC	737.100,00	01/12/2003 - 30/11/2005
FPA2003-00407	Martine Bosman	ATLAS	1.550.500,00	01/12/2003 - 30/11/2006
FPA2002-11922-E	Mario Martínez Pérez	Participación en el run II de CDF en el Tevatron	55.00,00	08/07/2002 - 07/07/2003
FPA2004-00769	Mario Martínez Pérez	Estudio de las colisiones protón-antiprotón con el detector CDF	378.000,00	13/12/2004 - 12/12/2005
FPA2005-02204	Manel Martínez Rodríguez	Participación en la fase II de MAGIC	350.000,00	2005 - 2006

Grupo :	**IFCA**			
FPA-2005-08140-C02-01	T. Rodrigo	Participación en los experimentos CDF y CMS	630000	C Dic.2005-Dic.2008
FPA-2005-07256-C02-01	F. Matorras	Proyecto Tier-2 para CMS en España	491000	C Dic.2005-Dic.2007
AEN99-0571	T. Rodrigo	Participación en el experimento CMS (LHC-CERN)	474200	C 1999-2002
AEN99-0950	J. Marco	Proyecto para la participación en el experimento DELPHI (LEP) y CDF (Fermilab)	464500	C 1999-2002
FPA2002-01678	T. Rodrigo	Proyecto para la participación en el experimento CMS (LHC) y CDF (Fermilab)	857676	C 2002-2005
FPA2002-04208-C07-06	J. Marco	Desarrollo de Infraestructura DATAGRID para Analisis de Datos de LHC	360000	C Oct. 2002-Sep.2005
FPA2002-10007-E	J. Marco	Part. en la Iniciativa de Comp. Distrib. de Datos del Tevatron al P.E.CROSSGRID	60000	C Oct. 2002-Sep.2003
FPA2000-3267-E	J. Marco	Preparación de Infraest. Local de Comp. para el Exp. CMS del Acel. LHC del CERN	87150	C 2001-2002
FPA2000-3173-E	J. Marco	Organización de la CERN School of Computing	11420	C 2001-2002
FPA2000-2487	T. Rodrigo	Participación en los Experimentos CDF, CMS y Delphi	48000	C 2002-2002
Grupo :	**IFT**			
FPA2001-1806	Alberto Casas Gonzalez	Fenomenologia mas alla del modelo estandar e implicaciones experimentales	124.409,00	C 28-12-2001 al 27-12-2004

FPA2003-04597	Carlos Muñoz	Analisis teorico del modelo estándar y de la fisica de particulas mas allá y sus implicaciones experimentales	334.900,00	C:01-12-2003 al 30-11-2006
FPA2003-03801	Antonio Gonzalez-Arroyo España	Metodos no perturbativos de teoria de campos y su aplicacion a la fisica de particulas y la cosmologia	80.500,00	C:01-12-2003 al 30-11-2006
FPA2003-02877	Cesar Gomez Lopez	Fenomenologia, dinamica de teorias gauge y teoria de cuerdas	69.000,00	C:01-12-2003 al 30-11-2006
FPA2004-02015	Jose Ramon Espinosa Sedano	Fenomenologia mas alla del modelo estandar e implicaciones experimentales	127.820,00	C:13-12/2004 al 12/12/2007
BFM2003-05316-C02-01	German Sierra Rodero	Metodos analiticos y numericos exactos en materia condensada	63.800,00	C:01-12-2003 al 30-11-2006
BFM2003-01090	Tomas Ortin Miguel	Gravitacion y teoria de supercuerdas	32.900,00	C:01-12-2003 al 30-11-2006
FPA2000-0980	Luis E. Ibañez Santiago	El modelo estandar y mas alla	222.135,00	C:01-12-2000 al 30-11-2003
FPA2000-1584	Cesar Gomez Lopez	Aspectos no perturbativos de las interacciones fundamentales	52.504,00	C: 18-12-2000 al 17-12-2003
FPA2000-2167	María Jose Herrero Solans	Jornadas cientificas en honor del Profesor Francisco Yndurain	6.000,00	C: 2000-2003
BFM2000-1320-C02-01	German Sierra Rodero	Metodos analiticos y numericos en materia condensada y particulas elementales	28.945,00	C: 2000-2003
Grupo :	**IGFAE**			
AEN99-0589-C02-02	Joaquín Sánchez Guillén	Intersección entre teoría y fenomenología perturbativa y no perturbativa con aceleradores y astrofísica	42240,71	1999-2002

		de partículas		
FPA2002-01161	Carlos Pajares Vales	Intersección de Aspectos no-perturbativos y Perturbativos en Física de Solitones y Materia de alta Densidadd y Fenomenología de Astropartículas	192760	2002-2005
FPA2005-01963	Joaquín Sánchez Guillén	Métodos perturbativos y no perturbativos en teoría y fenomenología de partículas, núcleos y rayos cósmicos a altas energías	226100	2005-2008
AEN99-0488	Bernardo Adeva Andany	Desarrollo del experimento DIRAC e I+D para el detector ITR de LHC-b	42743,81	2000-2002
FPA2002-04208-C07-02	Juan José Saborido Silva	Desarrollo de infraestructura DATAGRID para análisis de datos de LHC	196880	2002-2005
FPA2002-00732	Bernardo Adeva Andany	Contribución a la construcción del detector ITR del experimento LHC-b del CERN	645760	2002-2005
FPA2005-07761-C02-02	Juan José Saborido Silva	Desarrollo de los centros españoles de segundo y tercer nivel (Tier-2 y Tier-3) para el procesado de datos del experimento LHCb.	174500	2005-2007
FPA2005-06441	Bernardo Adeva Andany	Contribución a la construcción e instalación del Silicon Tracker del experimento	731850	2005-2008
FPA2001-3837	Enrique Zas Arregui	Participación en el Proyecto Pierre Auger	218148,78	2001-2004
FPA2004-01198	Enrique Zas Arregui	Colaboración en el Observatorio Pierre Auger	552600	2004-2007

FPA2003-07581-C02-02	Juan A. Garzón Heydt	Estudio de propiedades de hadrones en materia nuclear	171500	2003-2006
FPA2005-00188	Alfonso Vázquez Ramallo	Cuerdas, branas e integrabilidad	176120	2005-2008
BMF2002-03881	Alfonso Vázquez Ramallo	Teoría de cuerdas y sistemas integrables	108080	2002-2005
PB96-0960	José M. Fernández de Labastida	Teorías cuánticas de campos Topológicos, sistemas integrables y dualidad	132223	1998-2002
FPA2005-00732	José Benlliure	Estudio de reacciones inducidas …	397460	2005-2007
FPA2002-04181-C04-01	José Benlliure	Estudios de estructura nuclear con núcleos exóticos ricos en neutrones	137080	2002-2005
FPA2001-0144-C05-4	Ignacio Durán	Medidas de datos nucleares relevantes para la física nuclear básicas y la transmutación de residuos radiactivos	54000	2001-2004
Grupo :	**IMAFF**			
PB97-1256	Alfredo Tiemblo	Gravitación, Tratamiento Hamiltoniano,Simetrías y Cuerdas	29570	1-12-1998 1l 30-11-2001
BFM2002-03610	Beatriz Gato	Teorías de Campos Conformes, Supercuerdas y Branas	17250	1-10-2002 al 30-9-2005
FPA2005-05046	Beatriz Gato	Teorías de Campos Conformes, Supercuerdas y Branas	8330	31-12-2005 al 30-12-2008
Grupo:	**IMB**			

TIC99-0846	Enric Cabruja	Encapsulado de microsistemas en formato MCM-D	99960	C (ene 2000 - dic 2001)
FPA2000-1560-C02-02	Manuel Lozano	SCTESP: Participación en la construcción del detector de trazas de silicio de ATLAS	316372	C (ene 2001 - dic 2003)
TIC01-0821	Enric Cabruja	MICROBGA	214952	C (ene 2002 - dic 2003)
FIS (PI020924)	Miguel Ullán	XBEM: Desarrollo de un sistema digital de rayos X para biopsia estereotáxica de mama en tiempo real	104650	C (Nov 2002 - Nov 2005)
SAF2001-5341-E	Manuel Lozano	DearMama: Detection of Early Markers in Mammography	60000	C (dic 2002 - dic 2005)
TIC2002-10697-E	Manuel Lozano	CDE2003: Conferencia de Dispositivos Electrónicos	6000	C (feb 2002 - feb 2003)
FPA2001-5367-E	Manuel Lozano	FANINS: Contrato de Producción de Fanins para el CERN, elaboración de una preserie	29450	C (ene 2003 - dic 2003)
PIR2003-00049	Enric Cabruja	Acción especial adquisición instrumentación	24123	C (ene 2003 - dic 2003)
TIC2002-11865-E	Enric Cabruja	Preparación de una NOE para el VI programa marco	10900	C (ene 2003 - dic 2003)
FPA2003-03878-C02-02	Manuel Lozano	SCTESP2: Participación en la construcción del detector de trazas de silicio de ATLAS	280000	C (dic 2004 a dic 2007)
FPA2005-08049	Miguel Ullán	PATHS: Primeras aproximaciones tecnológicas hacia el upgrade de ATLAS en el marco del Super-LHC	101150	C (dic 2005 - dic 2006)
Grupo :	**U. Alcalá**			

BXX2000-0784	Luis Del Peral Gochicoa	ESTADOS DE IONIZACION DE IONES ENERGETICOS SOMETIDOS A MECANISMOS DE ACELERACION EN PLASMAS ASTROFISICOS	22213	2000-2004
FPA2003-08733-C02-02	Luis Del Peral Gochicoa	CONTRIBUCION AL OBSERVATORIO DE RAYOS COSMICOS PIERRE AUGER	156000	2003-2006
Grupo :	**UAM**			
FPA2000-3172-E	Jorge Fernández de Trocóniz	Integración en el experimento CMS del acelerador LHC del CERN	15000	C 2001-2002
FPA2002-02552	Jorge Fernández de Trocóniz	Desarrollo del sistema de trigger de muones en el experimento CMS	175000	C 2002-2005
FPA2005-00780	Jorge Fernández de Trocóniz	Desarrollo del sistema de trigger de muones en el experimento CMS	295000	C 2006-2008
AEN99-0385	Fernando Barreiro Alonso	Construccion del calorimetro electromagnetico de argon liquido de ATLAS	601012	C 1999-2002
FPA2002-01008	Fernando Barreiro Alonso	Construccion del calorimetro electromagnetico de argon liquido de ATLAS	863376	C 2002-2005
FPA2005-03010	Fernando Barreiro Alonso	Construccion del calorimetro electromagnetico de argon liquido de ATLAS	702100	C 2005-2008
AEN99-0384	Luis Labarga Echeverria	Estudio de la dispersion electron proton con ZEUS en HERA	272859	C 1999-2002
FPA2002-00915	Luis Labarga Echeverria	Estudio de la dispersion electron proton con ZEUS en HERA	255660	C 2002-2005

FPA2002-04208-C07-03	Jose del Peso Malagon	Desarrollo de infraestructura de DataGrid para analisis de datos de LHC	233040	C 2002-2005
FPA2005-07688-C03-03	Jose del Peso Malagon	Desarrollo de infraestructura de Tier-2 distribuido para el experimento ATLAS del LHC	199000	C 20005-2007
FPA2005-02272	Juan Terron Cuadrado	Estudio de la dispersion electron proton con ZEUS en HERA	343910	C 2005-2008
BFM2000-30	Alfredo Poves Paredes	Estructura nuclear teorica; retos actuales	19232	C 2000-2003
BFM20003-1153	Alfredo Poves Paredes	El modelo de capas esferico: Hacia una descripcion unificada del nucleo	22500	C 2003-2006
PB97/0023	Jose-Luis Egido de los Rios	Propiedades nucleares en condiciones extremas	36030	C 1998-2001
BFM2001-0184	Jose-Luis Egido de los Rios	Estudios de Fisica Nuclear con teorias correlacionadas	38014	C 2001-2004
FIS2004-06697	Jose-Luis Egido de los Rios	Teorias de muchos cuerpos de fenomenos colectivos en sistemas mesoscopicos	34040	C 2004-2007
FPA2005-00696	Andrea Jungclaus	Estudios de nucleos exoticos mediante la espectroscopia gamma y desarrollo de un nuevo espectrometro gamma dentro del proyecto FAIR	102340	C 2005-2007
Grupo :	**U.Barcelona**			

AEN98-0431	R. Tarrach/ J. Gomis	Teorías Cuánticas Efectivas y Fundamentales	191121,85	1998-2001
AEN99-0483-E	Ll. Garrido	Estudio de la violación CP con los detectores HERA-B i LHCb	504,185	1999-2002
FPA2000-3258-E	Ll. Garrido	Preparación de Infraestructura Local de Cálculo para el Experimento LHCb en el Acelerador LHC del CERN	29449,59	2001-2002
FPA2001-3598	J. Gomis	Teorías Cuánticas Efectivas y Fundamentales	312333,99	2001-2004
FPA2002-04452-C02-2	Ll. Garrido	Estudio de la violación CP con el detectores LHCb	654800	2002-2005
FPA-2002-04208-C07-07	R. Graciani	Desarrollo de infraestructura DataGRID para análisis de datos de LHC	127880	1oct2002-30sep2005
FPA 2004-04582	J. Gomis	Teorías Cuánticas Efectivas y Fundamentales	548940	2004-2007
FPA2002-11461-E	E. Graugés	Participación en el experimento BABAR de violación CP	12000	2004-2005
FPA2005-06889-C02-1	Ll.Garrido	Estudio de la violación de CP con el detector LHCb	913920	2005-2008
FPA2004-02829-E	E.Graugés (UB), F.Martínez-Vela (UV)	Participación en el experimento BaBar del colisionador PEP-II de SLAC (EEUU). Estudios de violación de CP en mesones B y procesos radiactivos (ISR) e+e- f+f-	99290	2004-2005
FPA2004-21048-E	Ll. Garrido	Acción complementaria: Organización LHCb week	9000	01/05/2005-01/12/2005

FPA2002-10000-E	D. Espriu	Participación en el Comité ECFA		2003-2004
HI2003-0362	J. Soto	Spectrum, decays and production of heavy quarkonium		2004-2005
HB1999-0033	D. Espriu	Comportamiento vitreo en modelos gonihedricos de spin		2000-2001
HI2003-0141	J. Soto	La dinámica del sistema top-antitop cerca del umbral de producción		2004-2005
FPA2005-23844-E	J. Solà	International Conference IRGAC 2006 (Quantum Theory, Gravity and Cosmology		2005-2006
FPA2002-10000-E	D.Espriu	Participacion en las actividades del comite europeo del acelerador lineal		2005
Grupo :	**UCM**			
AEN99-0414	F. Arqueros	GRAAL: Búsqueda de fuentes cósmicas de rayos gamma de alta energía	44500	12 / 1999 - 12 / 2002
FPA 01-5312-E	F. Arqueros	GRAAL y AUGER	18000	04 / 2003 - 04 / 2004
FPA 03-8733-C02-01	F. Arqueros	Contribución al Observatorio de rayos cósmicos Pierre Auger	253000	12 / 2003 - 12 / 2006
FPA2005-02327	A.Dobado	APLICACIONES DE TEORIAS EFECTIVAS EN FÍSICA DE PARTÍCULAS	90000	12/2005-11/2007
BFM2002-01003	A.Dobado	TEORIAS EFECTIVAS Y SUS APLICACIONES	34500	2002-2005
PB98-0782	A.Dobado	NUEVAS APLICACIONES DE LAS TEORIAS EFECTIVAS	18000	1999-2002
FPA00-0956	R. Fernandez Alvarez-Estrada	Teoría Cuántica de Campos y Apicaciones a	112689	12 / 00 - 12 / 04

		la Física de Altas Energías		
FPA04-02602	R. Fernandez Alvarez-Estrada	Teoría Cuántica de Campos y Apicaciones a la Física de Altas Energías	118000	12 / 04 - 12 / 07
FPA2000-1802-C02-01	M.V. Fonseca	Experimentos HEGRA y MAGIC	213855	18/12/2000 - 17/12/2003
FPA2003-09543-C02-01	M.V. Fonseca	Astrofísica de altas energías con MAGIC	263500	1/12/2003 - 30/11/2005
FPA 2005-07041--C02-01	M.V. Fonseca	MAGIC	178500	1-12-2005 - 31-12-2006
FTN2000-0963-C02-01	J.M.G. Gómez	Estudio estadístico de fluctuaciones y estructura fractal en plasmas de fusión	11500	C 18-12-2000 a 18-12-2003
FTN2003-08337-C04-04	J.M.G. Gómez	Fluctuaciones y estructura fractal en plasmas de fusión nuclear"	18000	C 01-12-2003 a 31-12-2006
BFM2000-0600	Joaquín Retamosa Granado	Temas selectos de física nuclear y astropartículas	40000	C 18-12-2000 a 18-12-2003
BFM2003-04147-C02-01	Joaquín Retamosa Granado	Temas selectos de caos cuántico, fractales y física nuclear	57000	C 01-12-2003 a 31-12-2006
FIS2005-02309	F. Ruiz Ruiz	Campos cuánticos no conmutativos	42840	31/12/05 a 30/12/08
BFM2002-00950	F. Ruiz Ruiz	Campos cuánticos no conmutativos	39376	01/10/02 a 30/09/05
PB98-0842	F. Ruiz Ruiz	Estudio de las propiedades críticas de modelos estadísticos dinámicos y estáticos mediante métodos perturbativos, numéricos y geométricos no	27045	30/12/99 a 30/12/02

		conmutativos		
FPA	José Manuel Udías Moinelo	EXPERIMENTOS CON HACES DE NÚCLEOS EXÓTICOS. I+D PARA FAIR: R3B, EXL Y ELISE	48000	Dic. 2005 (S)
Grupo :	**UGR**			
FPA2003-09298-C02-01	Francisco del Águila Giménez	Fenomenología del modelo estándar y sus extensiones en colisionadores de partículas	174620	01/12/2003-30/11/2006
FIS2004-06823	Mar Bastero Gil	Teorias efectivas de gravitación inspiradas en teorías de cuerdas: implicacines cosmológicas y predicciones fenomenológicas	17020	13/12/2004- 12/12/2007
FPA2002-01835	Antonio Bueno Villar	Fisica de neutrinos masivos	180320	1/10/2002-31/12/2005
FPA2005-07605-C02-01	Sergio Navas Concha	Detectores de Argon Liquido para el Estudio de Fisica Mas Alla del Modelo Estandar	220000	01/01/2006-31/12/2006
FIS2005-03577	Antonio María Lallena Rojo	Colisión de sondas electrodébiles con núcleos y átomos	83300	31/12/2005-31/12/2008
FIS2005-02145	Fernando Arias de Saavedra Alías	Correlaciones dinámicas y propiedades medias en sistemas fermiónicos	40000	31/12/2005-31/12/2008
Grupo :	**U.HUELVA**			
FPA2000-1542-c03-02	I. Martel Bravo	Dispersion de Nucleos Exoticos	108.000	2001-2003 C
FPA2003-05958	I. Martel Bravo	Exóticos	276.000	2004-2006 C
FPA2004-23061-E	I. Martel Bravo	Detector HYDE para FAIR	23.000	2004-2005 C
Grupo :	**UIB**			

FIS2005-02796	Montserrat Casas Ametller	Información cuántica y dinámica electrónica en nanoestructuras	88000	2005-2008
FPA-2004-03666	Carles Bona García	Fuentes de Ondas Gravitacionales	61920	2004-2007
BFM2002-03241	Montserrat Casas Ametller	Dinámica de Nanoestructuras electrónicas y Comunicación Cuántica	67720	2002-2005
BFM 2001-0988	Jaume Carot Giner	Radiación Gravitatoria en Sistemas Relativistas Axialmente Simétricos: un estudio analítico-numérico	27600	2001-2004
PB98-0124	Montserrat Casas Ametller	Sistemas Cuánticos de muchos cuerpos: Fermiones y Bosones	24000	1999-2002
Grupo :	**U. Murcia**			
FPA2004-03470	José Antonio Oller Berbel	Extensión de los límites de la teoría quiral de perturbaciones ante la presencia de estados ligados y a densidad finita. Física de quarks pesados.	33900	13/12/2004 al 13/12/2007
FPA2002-03265	José Anotnio Oller Berbel	Extensión de los límites de la teoría quiral de perturbaciones ante la presencia de estados ligados y a densidad finita. Física de quarks pesados.	11960	1/10/2002 al 30/09/2004
FPA2004-5227	Emilio Torrente Luján			
Grupo :	**U. Oviedo**			
DGI (BFM2000-0357)	J. Díaz Alonso	La Materia a muy Alta Energía, Alta Densidad y Temperatura Finita	39516,55	C 20/12/2000-20/12/2003
DGI (BFM2003-	M.A. Ramos Osorio	La Materia en Condiciones Extremas:	75600	C 21/12/2003-30/11/2006

00313)		Alta Energía, Temperatura Finita y Densidades Criticas		
FPA-2005-08140-C02-02	F. Javier Cuevas	Participacion en los experimentos CDF y CMS	300000	C 15/10/2005-15/10/2008
FPA-2002-01678	T. Rodrigo	Proyecto para la participacion en el experimento CMS(LHC) y CDF(Tevatron)	857656	C 1/09/2002-1/09/2005
AEN99-0950	J. Marco	Proyecto para la participacion en el experimento DELPHI (LEP) y CDF(Fermilab)	464460	C 1999-2002
AEN99-0571	T. Rodrigo	Participacion en el experimento CMS(LHC-CERN)	474200	1999-2001
Grupo :	**UPC**			
FPA2000-0269-C05-05	F. Calviño	MEDIDA DE DATOS NUCLEARES RELEVANTES PARA FISICA NUCLEAR BASICA Y TRANSMUTACIONS DE RESIDUOS RADIACTIVOS	6.731	2001
FPA2001-0144-C05-05	F. Calviño	MEDIDA DE DATOS NUCLEARES RELEVANTES PARA FISICA NUCLEAR BASICA Y TRANSMUTACIONS DE RESIDUOS NUCLEARES	48.381	2002-2004
FPA2005-06918-C03-02	F. Calviño	MEDIDA DE DATOS NUCLEARES RELEVANTES PARA FISICA NUCLEAR BASICA Y TRANSMUTACIONS DE RESIDUOS NUCLEARES	143.990	2006-2008

Grupo:	**UPV-EHU**			
FPA2005-04823	J. L. Mañes	Física no perturbativa, Efectos térmicos y Teorías efectivas de campos y cuerdas	46000	31-12-05 a 31-12 08-C
FPA2002-02037	J. L. Mañes	Gravedad cuántica, geometría no conmutativa y efectos térmicos en teorías de campos y cuerdas	46000	2002-2005-C
Grupo:	**Universitat Ramon Llull**			
FPA2002-04452-c02-01	Xavier Vilasis Cardona	Estudio de la violación de CP con el detector LHCb. (LHCb-SDP-BCN)	256680	C oct 2002-dic 2005
FPA2005-06689-c02-02	Xavier Vilasis Cardona	Estudio de la violación de CP con el detector LHCb	199920	C dic 2005 - dic 2008
Grupo :	**U. Salamanca**			
BFM-2001-3563-c02-02	Francisco Fernandez Gonzalez	Modelos hadronicos, Interacciones fundamentales y Fisica nuclear	23289,21	28.12.2001 a 27.12.2004
FPA2004-05616-C02-02	Francisco Fernandez Gonzalez	Modelos hadronicos, Interacciones fundamentales y Fisica nuclear	59680	13.12.2004 a 13.12.2007
Grupo :	**U. Sevilla**			
FPA2005-04460	Joaquín Gómez Camacho	Dispersión de núcleos exóticos	101150	31-12-2005 31-12-2006
FIS2005-01105	José Miguel Arias Carrasco	Teoría de muchos cuerpos para sistemas de fermiones fuertemente correlacionados	78540	31-12-2005 30-12-2008

FPA2001-0144-C05-03	José Manuel Quesada Molina	Determinación de datos nucleares relevantes para física nuclear básica y transmutación de residuos radiactivos	48381,49	28-12-2001 27-12-2004
FPA2002-04181-C04-04	Joaquín Gómez Camacho	Dispersión y estructura de núcleos exóticos	88320	01-10-2002 30-09-2005
BFM2002-03315	José Miguel Arias Carrasco	Teoría de muchos cuerpos para sistemas de fermiones correlacionados	94050	01-10-2002 30-09-2005
FPA2001-4960-E	José Manuel Quesada Molina	Datos nucleares para sistemas ADS	12000	01-01-2003 30-12-2003
DIF2003-10431-E	Manuel Lozano Leyva	Programa Nacional de difusión y divulgación: supernovas	22000	23-12-200322-12-2004
Grupo :	**U. Zaragoza**			
AEN99-1033	Ángel Morales Villasevil	Neutrino properties, double beta decay and dark matter searches. Experimental program at teh Canfranc Underground Laboratory	240.180,00 €	C 01/12/99-30/11/01
FPA2001-2437	Ángel Morales Villasevil / José Ángel Villar	Búsqueda por detección directa de partículas de materia oscura en el Laboratorio Subterráneo de Canfranc	359.405,24 €	C 28/12/01-27/12/04
FPA2004-00974	José Ángel Villar Rivacoba	Programa experimental de materia oscura y física de neutrinos en el Laboratorio Subterráneo	484.800,00 €	C 13/12/04-13/12/07

		de Canfranc		
FPA2001-1767	Julio Morales Villasevil	El Telescopio de axiones solares del CERN. Experimento CAST	158.967,71 €	C 28/12/01-27/12/04
FPA2004-00973	Julio Morales Villasevil	El Telescopio de axiones solares del CERN. Experimento CAST, Fase II	217.420,00 €	C 13/12/04-13/12/07
FPA2000-1252	JOSE LUIS CORTES AZCOITI	FISICA CUANTICA DE CAMPOS NO PERTURBATIVA	141.358,00 €	18-12-00/17-12-03
FPA2003-02948	JOSE LUIS CORTES AZCOITI	FISICA CUANTICA DE CAMPOS NO PERTURBATIVA	233.400,00 €	1-12-03/30-11-06
BFM2000-1057	Julio Abad Antoñanzas	SOLUCIONES EXACTAS Y NO-PERTUBATIVAS EN SISTEMAS UNIDIMENSIONALES...	34666,38	18-12-00/19-12-03
BFM2003-01300	Julio Abad Antoñanzas	METODOS EXACTOS Y NO PERTURBATIVOS EN SISTEMAS FISICOS EN TEORIA DE CAMPOS Y MATERIA CONDENSADA	79.000,00 €	01-12-03/20-11-06
	Total		55038776,88	

PROYECTOS DEL PLAN NACIONAL solicitados en 2006

FPA2006-07393	Jose Manuel UDIAS	EXPERIMENTOS CON HACES DE NUCLEOS EXOTICOS. I+D PARA FAIR: R3B, EXL Y ELISE. FISICA NUCLEAR EN ISOLDE Y JLAB	42.761
FPA2006-12431	Begoña QUINTANA	DETECTORES DE GE PARA DESPEC	173.030
FPA2006-13807-C02-01	Joaquin GOMEZ	DISPERSION, ESTRUCTURA Y TRACKING PARA NUCLEOS EXOTICOS	622.267
FPA2006-13807-C02-02	Ismael MARTEL	FISICA E INSTRUMENTACION DE NUCLEOS RADIACTIVOS	769.763
FPA2006-01105	Gustavo YEPES	ASTROPARTICULAS EN EL UNIVERSO: MATERIA OSCURA, NEUTRINOS Y RAYOS COSMICOS	395.126
FPA2006-02315	José Luis CORTÉS	FISICA CUANTICA DE CAMPOS Y SUS APLICACIONES EN FISICA DE ALTAS ENERGIAS	303.831
FPA2006-05294	Francisco DEL AGUILA	FENOMENOLOGIA DEL MODELO ESTANDAR DE LAS INTERACCIONES ELECTRODEBILES Y FUERTES, Y DE SUS EXTENSIONES EN COLISIONADORES DE GRAN LUMINOSIDAD Y/O ENERGIA	423.767

FPA2006-05423	Maria Jose HERRERO	ESTUDIO DE NUEVA FISICA EN LOS SECTORES DESCONOCIDOS DEL MODELO ESTANDAR, SUS EXTENSIONES Y TEORIAS CON DIMENSIONES EXTRAS	776.034
FPA2006-05485	Jose Luis FERNANDEZ	TEORIAS DE CAMPOS Y CUERDAS: ASPECTOS TEORICOS Y FENOMENOLOGICOS	427.312
FPA2006-05807	Juan GARCIA-BELLIDO	METODOS COMPUTACIONALES APLICADOS A LA FISICA DE PARTICULAS Y LA COSMOLOGIA	476.216
FPA2006-06033	Emilio TORRENTE	NEUTRINOS Y FISICA DE ASTROPARTICULAS EN EL SM Y MAS ALLA: EL PROBLEMA DE LA MASA DEL NEUTRINO	50.578
FPA2006-09199	Agustin NIETO	LAS TEORIAS FUNDAMENTALES Y SU APLICACION A LA FISICA DE PARTICULAS EN CONDICIONES EXTREMAS	181.927
FPA2006-13825	Jose RODRIGUEZ	EFECTOS NO PERTURBATIVOS EN COLISIONADORES DE ALTA ENERGIA Y APLICACIONES COSMOLOGICAS DEL MODELO ESTANDAR Y SUS EXTENSIONES	93.896
FPA2006-03267	Ines GIL	PARTICIPACION EN EL EXPERIMENTO DOUBLE-CHOOZ	300.322
FPA2006-04093	Jorge CASAUS	MEDIDA DE PRECISION DE LA VIDA MEDIA DEL MUON CON EL	86.999

		DETECTOR FAST	
FPA2006-03081	Eduardo ROS	DESARROLLO DE UNA INFRAESTRUCTURA DE TIER3 Y PREPARACION DEL ANALISIS DE DATOS DEL EXPERIMENTO ATLAS EN EL IFIC	713.900
FPA2006-11594	Martine BOSMAN	FISICA PROTON-PROTON EN EL LHC CON EL DETECTOR ATLAS	1.787.352
FPA2006-12672-C02-01	Juan Antonio VALLS	CONTRIBUCIONES AL CALORIMETRO HADRONICO TILECAL DE ATLAS	898.352
PA2006-12672-C02-02	Vicente GONZALEZ	DESARROLLO E INSTALACION DEL SISTEMA PREROD DEL CALORIMETRO TILECAL DE EXPERIMENTO ATLAS DEL CERN	136.331
FPA2006-13238-C02-01	Maria del Carmen GARCIA	PARTICIPACION EN EL DETECTOR DE TRAZAS DE ATLAS	1.545.291
FPA2006-13238-C02-02	Miguel ULLAN	PARTICIPACION EN EL DETECTOR DE TRAZAS DE ATLAS	859.887
FPA2006-00684	Antonio BUENO	PARTICIPACION EN EXPERIMENTOS DE FISICA DE ASTROPARTICULAS: ESTUDIOS DE RAYOS COSMICOS Y BUSQUEDA DE MATERIA OSCURA	945.022
FPA2006-01931	Juan CORTINA	PARTICIPACION EN MAGIC-II	1.600.830
FPA2006-12120-C03-	Juan Jose GOMEZ	PARTICIPACION EN LOS EXPERIMENTOS T2K Y	1.153.082

01		NEMO/SUPER-NEMO	
FPA2006-12120-C03-02	Jose DIAZ	INVESTIGACION Y DESARROLLO EN LOS CALORIMETROS DE LOS DETECTORES PANDA Y SUPERNEMO	1.149.170
FPA2006-12120-C03-03	Federico SANCHEZ	PARTICIPACION EN LOS EXPERIMENTOS T2K Y NEMO/SUPERNEMO.	974.550
FPA2006-12184-C02-01	Fernando ARQUEROS	CONTRIBUCION AL OBSERVATORIO DE RAYOS COSMICOS PIERRE AUGER	540.814
FPA2006-12184-C02-02	Luis DEL PERAL	CONTRIBUCION AL OBSERVATORIO DE RAYOS COSMICOS PIERRE AUGER (UAH)	530.585
FPA2006-12383-C02-01	Maria Victoria FONSECA	ASTROFISICA DE ALTAS ENERGIAS CON MAGIC	969.694
FPA2006-12383-C02-02	Carmen BAIXERAS	ASTROFISICA DE ALTAS ENERGIAS CON MAGIC	627.385
FPA2006-08579	Ivan VILA	I+D PARA DETECTORES DE PARTICULAS PARA EL FUTURO COLISIONADOR LINEAL	660.358
FPA2006-09154	Juan A. GARZON	DESARROLLO DE RPCS PARA FISICA NUCLEAR Y ASTROPARTICULAS	393.290
FPA2006-12066	Francesc SALVAT	SIMULACION MONTE CARLO CON PENELOPE: DESARROLLO DE MODELOS DE INTERACCION, CARACTERIZACION DE HACES DE RADIACION, Y APLICACIONES EN	122.392

		FISICA MEDICA	
FPA2006-14006-C02-02	Enric CABRUJA	MATRICES EXTENSAS Y SIN PERDIDAS DE PIXELES ACTIVOS DETECTORES PARA APLICACIONES EN FISICA DE PARTICULAS	414.244

PROYECTOS EUROPEOS / INTERNACIONALES (2001-2005)

Título del proyecto	Investigador Principal	IP local	Financiación concedida (euros)	Financiación para el grupo (euros)	Entidad financiadora Referencia del proyecto	Periodo de vigencia o fecha de la solicitud (*)
Grupo:	**IFIC**					
Entering the high-precision era of flavour physics through the alliance of lattice simulations, effective field theories and experiment (FLAVIAnet)	Antonio Pich	Antonio Pich	3.134.225	558.015	MRTN-CT-2006-035482	1/10/2006 – 30/9/2010
Extraction of weak matrix elements from QCD sum rules and direct comparison lattice results	Antonio Pich	Antonio Pich	112508	112508	CE, HPMF-CT-2001-01128	31/10/2001 - 30/10/2003
The 3 generations as a probe ror new physics: experimental and technological approach	A. Savoy-Navarro	Juan Fuster	1263200	97,000,00	CE; TRN2-2001-00450	01/09/2002 - 31/08/2006
European Invest. On Daphne and other intern. Collider Experiments (EURIDICE)	G. Panchieri	Antonio Pich	1350000	130,000,00	CE; RTN2-2001-00199	01/09/2002 - 31/08/2006
Coordinated acceleratos research in Europe (CARE)	R. Aleksan	Angeles Faus	152000	57365	CE; RII3-CT-2004-503369	01/01/2004 - 31/12/2008
EUROTRANS	J.U. Knebel	José Luis Taín	426264,12	40510	CE	01/04/2005 - 31/03/2009
Neutrinos as a probe to physics beyond the standard model of particle physics	Juan José Gómez	Juan José Gómez	63,242,00	63,242,00	CE;PI6-1/05-25-076	2005
EURODAPHNE	G. Panchieri	Antonio Pich	1350000	102000	CE;ERBFMRX-CT98-0169	01/04/1998 - 31/03/2002
Crossgrid		J. Salt		210000	IST-2001-32243	2002-2005

Mammography with Molecular Imaging (MAMMI)	José Mª Benlloch	José Mª Benlloch	2700000	350000	LIFESCI/STREP/02/0684	1/1/2007-31/12/2010
Enabling GRID Computing fo e-Science in Europe	Enabling GRID Computing fo e-Science in Europe	J. Salt		613.500	EU-508833	1/04/2004-31/03/2006
Development of GRID environment for Interactive Applications	M. Turala	J. Marco		455.000	Unión Europea	
	CIEMAT					
EGEE-II	R. Jones	F. Castejón	36971365	153600	CE, FP6-2005-Infrastructures-7, Project Nr. 031688	C: 2006 - 2007
EELA	J. Casado	J. Casado	1700000		CE, IST2005-026409	C: 2006 - 2007
nTOF-ND-ADS	P. Pavlopoulos	E. González Romero	2400000	165000	CE, FIKW-CT2000-00107	2000 - 2004
MUSE	R. Soule	E. González Romero	2130000	146000	CE; FIKW-CT-2000-0063	2000 - 2003
PDS-XADS	B. Carluec	E. González Romero	6970000	78753	CE; FIKW-CT-2001-00179	2001 - 2004
ADOPT Network	P. D'Hont	E. González Romero	414000	10369	CE, FIKW-CT-2001- -20178	2001 - 2004
IP-EUROTRANS	E. González Romero	E. González Romero	23000000	500000	CE, FI6W-CT-2004-516520	2005 - 2008
REDIMPACT	W. Gudowski	E. González Romero	20000000	83000	CE, FI6W-CT-2004-002408	2003 - 2006
Grupo :	**IEM**					

Selected topics in Nuclear Structure	L. Zamick	E. Moya de Guerra		12094	NATO Grant PST CLG 978158	2001-2003
European Network on Theoretical Astroparticle Physics(ENTApP-ILIAS N6)	A. Faessler	E. Moya de Guerra		np	EU-VI Programa Marco, RI3 (ENTApP-ILIAS N6)	2005-2008
Optimized release from ISOL Targets (TARGISOL)	U. Koester	O. Tengblad		156.045	EU- HPRI-2001-500063	2001-2005
EUROpean Nuclear Structure Integrated Infrastructure iniciative (EURONS),	A. Mueller	O.Tengblad		254.000	EU-VI programa marco-RI3 EU Contract nº 506065	2005-2008
Grupo:	**IFAE/UAB**					
Training and mobility of researchers		Manel Martínez Rodríguez	88,616,00	58.736,00	UE (ERBFMBICT-983503)	28/02/2002 - 28/02/2004 (C)
Improving the human research potential		Jaume Garriga	112.408,00	90.808	UE (HPMF-CT-2001-01495)	01/03/1999 - 28/02/2002 (C)
OPTICON		Manel Martínez Rodríguez			UE (RII3-CT-2004-001566)	
Probe for News Physics		Matteo Cavalli-Sforza	91.000,00	75.834,00	UE (HPRNCT-2002-00292)	01/09/2002 - 31/08/2006 (C)
Grupo :	**IFCA**					
EUDET Detector R&D towards the International Linear Collider	J. Mnich	I. Vila	7000000	176167	CE FP6-2004-Infrastructures-5 026126-EUDET	C 1-4-2006 al 31-3-2010
PCMSATLHC (ERG Marie Curie)	J. Marco	J. Marco	40000	40000	CE, ERG-30542-PCMSATLHC	C 1-4-2006 al 31-3-2008
Red Europea The 3rd Generation as a Probe for New Physics	A. Savoy	A. Ruiz	1500000	92000	CE, HPRN-CT-2002-00292	C 1-9-2002 al 31-8-2006
int.eu.grid (Interactive European Grid)	J. Marco	J. Marco	1986000	228000	CE, 031857	C 1-5-2006 al 30-4-2008
EGEE-2	J. Salt	J. Marco	36000000	150000	CE, 6PM	C 1-4-2006 al 31-3-2008
EELA (Extending EGEE to Latin America)	J. Casado	J. Marco	2000000	80000	CE, FP6-2004-Infrastructures-6 026409–EELA	C 1-1-2006 al 31-12-2007
Enabling grids for e-science	F. Gagliardi	J. Marco	31867000	613500	CE RI-2002-508833	C 1-4-2004 al 31-3-2006

Development of GRID Environment for Interactive Applications	M. Turala	J. Marco	4860001	455000	CE, CROSSGRID, IST-2001-312243	C 1-3-2002 al 28-2-2005
Grupo :	**IFT**					
Constituents, Fundamental Forces and Symmetries of the Universe	Dieter Luest	Cesar Gomez	4.894.338,00	221.339,00	EU-(RTN/02/0377)	C. 2004/2008
Quest for Unification	Ignatios Antoniadis	Luis Ibañez	2.094.868,00	155.663,00	EU-(MRTN-CT-2004-503369)	C: 2004/2008
Supersymetry and the early universe	Subir Sarkar	Mariano Quiros			EU- (HPRN-CT-2000-00152)	C: 2000/2004
Probing the origin of mass	Ignatios Antoniadis	Luis Ibañez	1.500.000,00	140.000,00	EU-(HPRN-CT-2000-00148)	C: 2000/2004
Integrated large infrastructures for astroparticle science	Gilles Gerbier	Carlos Muñoz	7.500.000,00	500.000,00	EU-(RII3-CT-2004-506222)	C: 2004/2009
The origin of matter in the universe		Juan Garcia-Bellido		18.344,00	NATO International Linkage Grant (CLG-975389)	C: 1999/2001
Grupo :	**IGFAE**					
Baryon Photoproduction in H1 Experiment and Quark-Gluon String Model		Carlos Merino Gayoso	6.000,00	np	OTAN	2004-2006 (C)
Parton Saturation in Soft and Hard Strong Interaction Phenomena at LHC Energies		Carlos Pajares Vales	12.000,00	np	OTAN	2003-2005(C)
Interplay of perturbative and non-perturbative approaches in the Theorical analysis of strong interactions at LHC energies		Carlos Pajares Vales	9.915,79	np	OTAN	2000-2001 (C)
Neutrino Astrophysics	J.W. Furtado del Valle	Enrique Zas Arregui			European Science Foundation ESF- Scientic Network: N-86	2000-2004 (C)
Red Latinoamericana-Europea de Fisica de Altas Energías (HELEN)	L. Maiani	Enrique Zas Arregui	2.853.677, 25		C. Europea (Programa ALPHA)	
Hadron Physics	C. Guaraldo	Juan A. Garzón	17400000	46.000,00	C. Europea-FP6 RII3-CT2004-506078	2004-2006 (C)

Construction Stage 1 of the International Accelerator Facility, Darmstadt Ion Research and Antiproton Centre (DIRAC)		Juan A. Garzón	1700000	226.000,00	C. Europea -CNI Cont/Num 515876	2005-2009 (C)
Integrable models and applications: from strings to condensed matter (EUCLID)	Ed. Corrigan (U. York)	José L. Miramontes Antas	1.499.760,00	119.400,00	C. Europea (FP5 RTN network) HPRN-CT-2002-0035	2002-2006 (C)
Integrable structures in quantum field theory	F. Ravanini (U. Bolonia)	José L. Miramontes Antas	10.000,00	sin asignar	OTAN PST.CLG.980424	2004-2006 (C)
Constituents, fundamental forces and symmetries of the Universe (ForcesUniverse)	D. Luest	A. Vázquez Ramallo		0,00	C. Europea (FP6 RTN network) MRTN-CT-2004-005104	2004-2008 (C)
European Isotope separation On-Line radioactive ion beam facility	G. Fortuna	J. Benlliure	16.448.900,00	93.400,00	C. Europea 515768 (RIDS)	2005-2009 (C)
EUROpean Reseach Programme for the TRANSmutation of high-level nuclear waste in accelerator-driven systems	J. Knebel	J. Benlliure	6.136.500,00	49.770,00	C. Europea FI6W-CT-2004-516520	2005-2010 (C)
European Nuclear Structure Integrated Infrastructure Initiative	A. Mueller	D. Cortina	14.000.056,00	127.215,36	C. Europea RII3-CT-2004-506065	2005-2008 (C)
High and Intermediate Energy Nuclear Data for Accelerator-Driven Systems	J.P. Meulders	J. Benlliure	2.100.000,00	85.000,00	C. Europea FIS5-1999-00150	2000-2003 (C)
Reaction Studies with Relativistic Radioactive Nuclear Beams	T. Aumann	J. Benlliure	800.000,00	100.000,00	C. Europea HPRI-CT-1999-50010	2000-2002 (C)
n_TOF: Nuclear Data for ADS	A. Mengoni	I. Durán	2.400.000,00	63.000,00	C. Europea FIKW-CT-00-00107	2000-2003 (C)
Grupo :	**IMAFF**					
Conformal Field Theory for Open Strings	A.N. Schellekens		116818		FOM 97MF02 (Paises Bajos)	1-1-1998 31-12-2006
String Theory and Quantum Gravity	R. Dijkgraaf		3636363		FOM FP57 (Paises Bajos)	1-1-2002 31-12-1009

Grupo:	**IMB**					
DearMama: Detection of Early Markers in Mammography	Mokhtar Chmeissani	Manuel Lozano	1813119	276683	CE, QLRT-2000-01318	dic 2001 - mar 2006
CIRRUS: Chip interconnect with Reduction of Real estate	Philips	Enric Cabruja	2580000	315000	CE, IST-1999-10023	Ene 2000 - Dic 2003
RADSIMOS (Radiation Effects Study for Development of Radiation-Hard Silicon Detectors and CMOS Devices)	Joan Marc Rafi	Joan Marc Rafi	40000	40000	CE, MERG-CT-2004-513476	Mar 2005 - Feb 2006
Totem strip edgeless radiation hard detectors (TOSTER)	Gennaro Ruggiero	Giulio Pellegrini	150000	10000	CE, nº: 05-103-7533	Ene 2006 - dic 2008
Grupo :	**UAM**					
Develpment of the Muon Trigger at the CMS Experiment	J. Fernández de Trocóniz / C. Wulz	J. Fernández de Trocóniz		11000	MEC/ÖAD, HU-2003-0012	C 2004-2005
Silicon development and data analysis with the collider detector at Fermilab	Luis Labarga	Luis Labarga	61825		D.O.E.EEUU-Univ. Purdue	C 2000-2002
Modelo de capas y estructura nuclear	A. Poves/F. Nowacki	A. Poves	32880	16440	IN2P3-CICyT	C 2001-2005
Grupo :	**U.Barcelona**					
Entanglement in Quantum Information Processing and Communication (EQUIP)	Martin Wilkens	R. Tarrach/J.I. Latorre	1.444.700,00	60704	Programa IST-FET de la UE	1998-2002
EURODAPHNE: High precision elementary particles at the PhiFactor DAPHNE	Giuglia Panchieri	D. Espriu (coordinador: A. Bramon, UAB)	1350000	52500	CE, (FMRX-CT-98-0169)	1998-2001
EUROGRID: Discrete random geometries: from solid state Physics to quantum gravity	Desmond Johnston	D. Espriu	1491000	102500	CE, (HPRN-CT-1999-00161)	2000-2002 (2000-2004)(2000-2003)
EURIDICE: European investigations on DAFNE and other international collider experiments using effective theories of colors and flavours from the Phi to the Upsiolon	Giulia Pancheri	J. Soto (nodo Barcelona: A. Bramon)		37000	CE, (HPRN-CT2002-00311)(RTN2-2001-00199)	2000-2006 (2002-2006)
The quantum structure of space-time and the geometric	A. Van Proeyen	J. Gomis		16000	EC (HPRN-CT-2000-00131)	2002-2004

nature of fundamental interactions						
Constituents, Fundamenal Forces and Symmetries of the Universe	D. Lüst	J. Gomis		87177,62	European Community Human Potential Programme - Research Training Networks (MRTN-CT-2004-005104)	2004-2008
ENRAGE: European Network on Random Geometries	R. Loll	D. Espriu	2930727	150000	CE, (MRTN-CT-2004-005616)	2004-2008
High Energy Latinamerica-Europe Network	Luciano Maiani	D.Espriu	3804000	150000	CE, (AML/19.0902/97/0666/II-0485-FC-FA-FCD-FI)	2005-2007
Grupo :	**UCM**					
Detection of atmospheric Cherenkov radiation using the heliostat field of a solar Power Plant for the search of cosmic gamma-rays	F. Arqueros/T. Tümer (U of Ca /Riverside)	F. Arqueros	13782	6891	New "del Amo" program	09 / 2001 - 09 / 2002
Phase Transitions in the Early Universe	T.W. Kibble	R. Fernandez Alvarez-Estrada	300000	53692	CE, ERBCHRXCT 940423	01 / 95 -12 / 97
Electron Scattering in a Storage Ring (eA collider) ELISe	Haik Simon (GSI)	J.M. Udias	94700	4000	GSI-INTAS 03-54-6545	1-01-2004/31-12-2005 C
Grupo :	**UGR**					
Tools and Precision Calculations for Physics Discoveries at Colliders (HEPTOOLS)	Costas Papadopoulos	Francisco del Águila Giménez			MRTN-CT-2006-035505	2006-2010
Particle physics phenomenology at high energy colliders	Francisco del Águila Giménez	Francisco del Águila Giménez	1498732	111980	CE, HPRN-CT-2000-00149	01/08/2000-31/01/2005
High precision elementary particle physics at the phi-factory	Giulia Pancheri (INFN-LNF)	Albert Bramón Planas (UAB)		120000	CE, FMRXCT980169	01/04/1998-31/08/2002
European investigations of Dafne and other international collider experiments using effective theories of colors	Giulia Pancheri (INFN-LNF)	Albert Bramón Planas (UAB)	1350000	130000	CE, HPRN-CT-2002-00311	01/09/2002-31/08/2006

and flavours from the phi to the upsilon						
Structure and Dynamics of Hadrons	Carlos Guaraldo (INFN, Italia)	Angels Ramos (U. Barcelona)		122000	CE, RII3-CT-2004-506078	2004-2006
Grupo :	**U.HUELVA**					
EURONS	Dr. Klaus-Dieter GROSS	I. Martel/C. Gallego			CE, 506065	S 2005-
Grupo :	**UIB**					
Theoretical Foundations of Sources for Gravitational Wave Astronomy of the Next Century: Synergy between Supercomputer Simulations and Approximation Techniques.	Edward Seidel	Carles Bona garcía	1499998		CE, HPRN-CT-2000-00137	2000-2003
ILIAS: Integrated Large Infrastructures for Astroparticle Science.	Bijan Saghai	Alicia Maria Sintes Olives	7480000	150000	CE, RII3-CT-2004-506222	2004-2009
Quantum Noise in Nanoelectronics	Ramon Aguado	Rosa Lopez	124800	5000	European Science Foundation/MEC	2006-2009 (*)
Grupo :	**U. Murcia**					
EURIDICE	G.Panchieri	A. Pich			HPRN-CT2002-00311	9/2002 al 9/2006
HADRON INICIATIVE	UlG.Meissner	E.Oset	17400000	110000	RII3-CT-2004-506078	10/2004 al 10/2008
Grupo :	**U. Oviedo**					
Constituents, Fundamental Forces and Symmetries of the Universe	Dieter Lüst	Yolanda Lozano / M.A.R. Osorio			CE, (MRTN-CT-2004-005104)	2003-2006
Proyecto Red Europea The 3rd Generation as a Probe for	A. Savoy Navarro	J. Cuevas	92000	4000	CE, HPRN-CT-2002-00292	2002-2006

New Physics						
Grupo :	**UPC**					
N-TOF-ADS - ADS NUCLEAR DATA	P. Pavlopoulos	F. Calviño	2400000	38.347	FIKW-CT-2000-00107	2000-2004
Grupo:	**UPV-EHU**					
COSLAB- Cosmology in the Laboratory	T.W.B. Kibble, G. Volovik	A. Achúcarro Jiménez	350000	np	ESF Programme COSLAB	2001-2005 C
	Des Johnston	M. A. Vázquez-Mozo	80000	10000	EFS Network 82	2000-2003 C
	R.A.W. Gregory, A. Achúcarro.	A. Achúcarro.	12900	np	The Royal Society Joint Project Grant	2000-2003 (C)
	Des Johnston	M. A. Vázquez-Mozo	1492000	10000	CE, HPRN-CT-1999-00161	2000-2002 (C)
Grupo :	**U. Salamanca**					
Many Body Description of Hadrons and Nuclei	A. Faessler	F. Fernandez		15500	CE, ERB-4061-PL-97-0124 (FMRX980167)	3 años
Grupo :	**U. Sevilla**					
ADS nuclear data (n-TOF-ND-ADS)		José M. Quesada Molina	2339951	38397	CE, (FIKW-CT2000-00107)	01-11-2000 31-12-2004
EURONS N08-TNET	I.J. Thompson	Joaquín Gómez Camacho	20310	nd	CE, 506065	1-1-2005 – 1-1-2009
Grupo:	**U. ZARAGOZA**					
Network of eight european groups working on cryogenic detectors to be used in nuclear and subnuclear physics and astrophysics with applications to solid state physics and material science	Ettore Fiorini	Ángel Morales Villasevil	1497000	157000	CE, ERB-4061-PL-97-0124 (FMRX980167)	C 01/04/98-31/03/02
Frontier applications of	Ettore Fiorini	Ángel Morales Villasevil /	1500000	135000	CE, HPRN-CT-2002-	C 01/11/02-31/10/06

cryogenic detectors to astroparticle physics, material sciences, semiconductor industries, X-ray fluorescente analysis, macromolecule mass spectroscopy, nuclear-subnuclear physic		José Ángel Villar Rivacoba			00322	
Integrated Large Infrastructures for Astroparticle Science	Gilles Gerbier	Julio Morales Villasevil	7480000	858900	CE, RII3-CT-2004-506222	C 01/04/04 - 30/03/09
FISICA CUANTICA DE CAMPOS NO PERTURBATIVA	J.L.CORTES/J.GAMBOA	J.L.CORTES	12000	6000	MAAEE-AECI	C 2002-2003
NUEVOS METODOS NUMERICOS …	V. AZCOITI	V. AZCOITI	56000	30000	INFN - CICYT	C 2001-2005
FUNDAMENTAL ASPECTS OF QUANTUM FIELD THEORY	M.ASOREY/G.MARMO	M. ASOREY	122000	60222	INFN - CICYT	C 2002-2006
RED TRANSPIRENAICA DE TEORIA CUANTICA DE CAMPOS	M.ASOREY/A.NEVEU/J. LATORRE	M.ASOREY		36000	CPT	C 2003-2004
VIOLACION DE INVARIANCIA LORENTZ Y TEORIA CUANTICA DE CAMPOS	J.L.CORTES/J.GAMBOA	J.L.CORTES	7500	3000	MAAEE-AECI	C 2005.
	TOTAL		332937000,9	12641899,22		