HELEN (High Energy Physics Latin-American-European Network)
Project submitted to the ALFA Programme
Executive Summary

The **HELEN (High Energy Physics Latin-American-European Network)** project submitted to the ALFA Programme aims at creating an educational-scientific network between Universities and Institutes from Latin America and Europe, involving in addition leading laboratories in Particle physics: CERN, DESY, Laboratori del Gran Sasso and the Pierre Auger Observatory in Argentina. HELEN involves 22 Universities/Research Institutions from 8 Latin American countries (3 from Argentina, 4 from Brazil, 2 from Chile, 4 from Colombia, 1 from Cuba, 4 from Mexico, 2 from Peru and 2 from Venezuela) 16 ones from 6 European countries (3 from France, 1 from Germany, 5 from Italy, 1 from Portugal, 4 from Spain and 1 from the United Kingdom).

The aim of the project is to train young generations of physicists in High Energy Physics, in which Europe is world leader, thereby promoting fundamental physics in Latin American countries and contributing to the modernization of physics education there. CERN, DESY and Gran Sasso facilities, in particular the Large Hadron Collider, HERA and their experiments, as well as the Auger experiment in Argentina are fundamental tools for an advanced training programme. The project aims also to facilitate access of Latin American countries to the technological benefits in the domains of accelerator, detector and information technology (GRID as an example) and it will promote the integration of the European and Latin American Physics communities.

A HEP Teaching Review Committee (TRC) will be formed with professors/tutors, to review undergraduate and graduate teaching of Particle Physics in the Higher Education Institutions of the network. The aim is to establish a common platform and common teaching material in High Energy Physics and Related Technologies, with texts, ppt and video tools etc., to be proposed to the teachers in undergraduate and graduate schools.

The project is centred in:

1. Scientific works leading to PhD's and Master degrees.
2. Mobility of scientific and technological personnel, mainly young graduates and post-docs from Latin-America to European and Latin-American members of the network and European senior and post-doc scientists to Latin-America.
3. The establishment of cooperation agreements between European and Latin American Institutes/Universities and their funding agencies
4. The transfer of best technological and industrial innovation practices in HEP from the European to Latin- American community.
5. The transfer of European educational practices to Latin America, both from the Universities and from the CERN Academic Programme, creating new educational material.
6. The increase of outreach activities both in Europe and Latin America.

The project will last three years. Afterwards it is expected to evolve, on the basis of the long-term scientific programme of CERN, DESY, CNGS and Auger, in a large, coherent and sustainable HEP network between Latin America and Europe that will undoubtedly last for more than a decade. The results will establish best practices for future development of the network, catalyzed by the inter-institutes and inter-funding agencies agreements. Therefore, when the ALFA project will be over, the network will continue and will be surely enlarged. It is expected that more Institutes and Universities from Latin America and Europe will join the network in the coming years.
Long standing results of the programme will be to add a new dimension to the European HEP programme and to orient towards Europe a flux of intellectual resources derived from the enormous potentialities of Latin American countries.

The requested budget is 3'881'575 Euros, about 1/3 for each year of the project, 75% requested from the ALFA Programme, the remaining budget being provided by the Universities and Institutes of the network (with a proportion of 75% from European Institutions and 25% from Latin American ones).
Considering all categories of training (advanced, complementary, short-term training as well as training by research) the mobility flows from Latin America to Europe, Europe to Latin America and inter Latin America amount to 304, 90 and 72 grants, for a total number of man x months equal to 988, 180 and 117, respectively.

Project coordinator is Prof. Luciano MAIANI, Universitá di Roma “La Sapienza”, Italy, theoretical physicist, former President of the Istituto Nazionale di Fisica Nucleare in Italy (1993-1998) and Director General of CERN (1999-2003). The coordinator works in close collaboration with the CERN representative.
An Executive Board, with one representative per participating country, will meet once per year. The works of the EB will be prepared by a Standing Executive Committee, made by the coordinator, the CERN representative and four members elected by the EB, two from Latin American and two from European Institutions, (provisionally from France, Spain, Brazil and Mexico). An Advisory Committee is foreseen, with representatives from LHC, DESY and CNGS experiments, theory, the Education & Technology Transfer CERN Unit and the GRID project.

Note

CERN is the world's largest particle physics centre and one of Europe’s first joint ventures (1954) for research and high-tech activities. The CERN scientific programme is mainly based on the construction and future operation of the Large Hadron Collider (due to start in 2007) and its four experiments: ALICE, ATLAS, CMS and LHCB. CERN is currently building a Long-Baseline neutrino beam, the first in Europe, aimed at the Gran Sasso Laboratory 730 km south of Geneva (CNGS: CERN Neutrino beam to Gran Sasso). Currently, around 500 institutes and universities from all over the world, mainly from the Member States, are involved in the research and technology programme of CERN, in physics and on a wide range of applied disciplines.

DESY is the second largest accelerator laboratory in Europe. The scientific programme is centred on the HERA facility, a high-energy electron-proton collider, and its two experiments ZEUS and H1. Current experiments are probing the internal structure of the

proton to unprecedented precision, setting stringent limits to possible substructures of quarks and leptons and to the production of new particles. DESY is at the forefront of the superconducting technologies for high-energy linear electron accelerators (the TESLA project) and for Free Electron Laser. Physicists from Institutions all over the world participate in DESY experiments.

The Gran Sasso Laboratories of INFN are located besides the tunnel (10.4 km long) on the highway connecting Teramo to Rome (Italia). The underground structure consists of three experimental halls, enclosing a volume in excess of 180,000 m^3. The experimental programme features the study of solar neutrinos, double beta decay, and the search for dark matter. The Laboratory will host two detectors (OPERA, ICARUS) for the CERN Neutrino beam to Gran Sasso (CNGS, extending over a distance of 730 km) built and operated by wide international collaborations.

The Pierre Auger Observatory, in Mendoza (Argentina) is the most ambitious project ever undertaken for the study of the ultra high-energy cosmic rays (with energies above 10^{19} eV). There is no known acceleration mechanism to reach such energies. The PAO is a hybrid detector, combining information from ground-based particle detectors and atmospheric fluorescence detectors.
More than 200 physicists from 55 institutions now collaborate in building the Observatory. There are projects to build a similar installation in the Northern Hemisphere.