

Report on ApPEC and ASPERA

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representing CHIPP and SNF

Outline

Astroparticle physics (ApP) in Europe

ApPEC: the issues

ASPERA EU network: issues for Swiss researchers

ASPERA-2 with support from CHIPP?

Astroparticle Physics in Europe

- **Infrastructures:**

 - Underground labs: **Gran Sasso, ...**

 - “Observatories” or “telescopes” on earth: **MAGIC, IceCube, ...**

 - Space-Based detectors: **AMS, ...**

- **In 2006, about 2300 European scientists, 50 laboratories, 80 programs, annual funding 186 M €**

- **In Switzerland, about 50 FTE’s researchers, about 5 MCHF/y.**

- **Coordination of the different projects at the European level has become necessity (no CERN or ECFA).**

ApPEC Steering Committee

Membership: FR, G, I, Neth, UK, Sp ,B ,Port ,Gr, Pol, Ru, and CH

Topics under discussion:

- **A European Astroparticle Physics Strategic Roadmap**
- **Creation of a common peer review process and common funding for ApP projects**
- **Relationships of ApP with CERN:** organization of new R&D support, views of ApPEC on Recognized Experiments, participation in Strategy group, participation in Council
- **Global Science Forum of OECD:** toward a review of astroparticle physics

ASPERA ERA-Net

A network of 17 national government agencies funding ApP (SNF,...): 2006-2009

ASPERA IN EUROPE



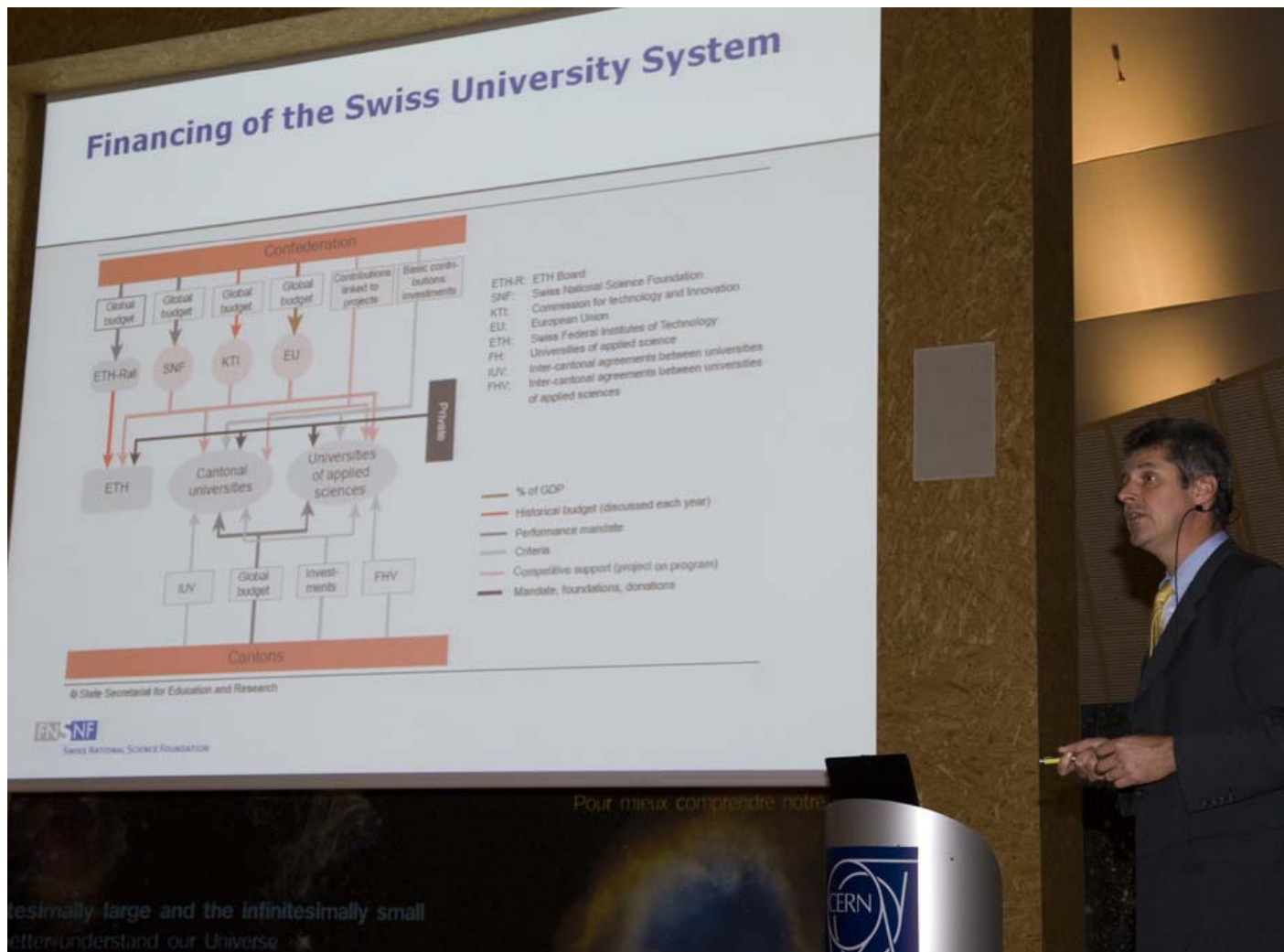
Participating to ASPERA

A survey of the present ApP activities across Europe

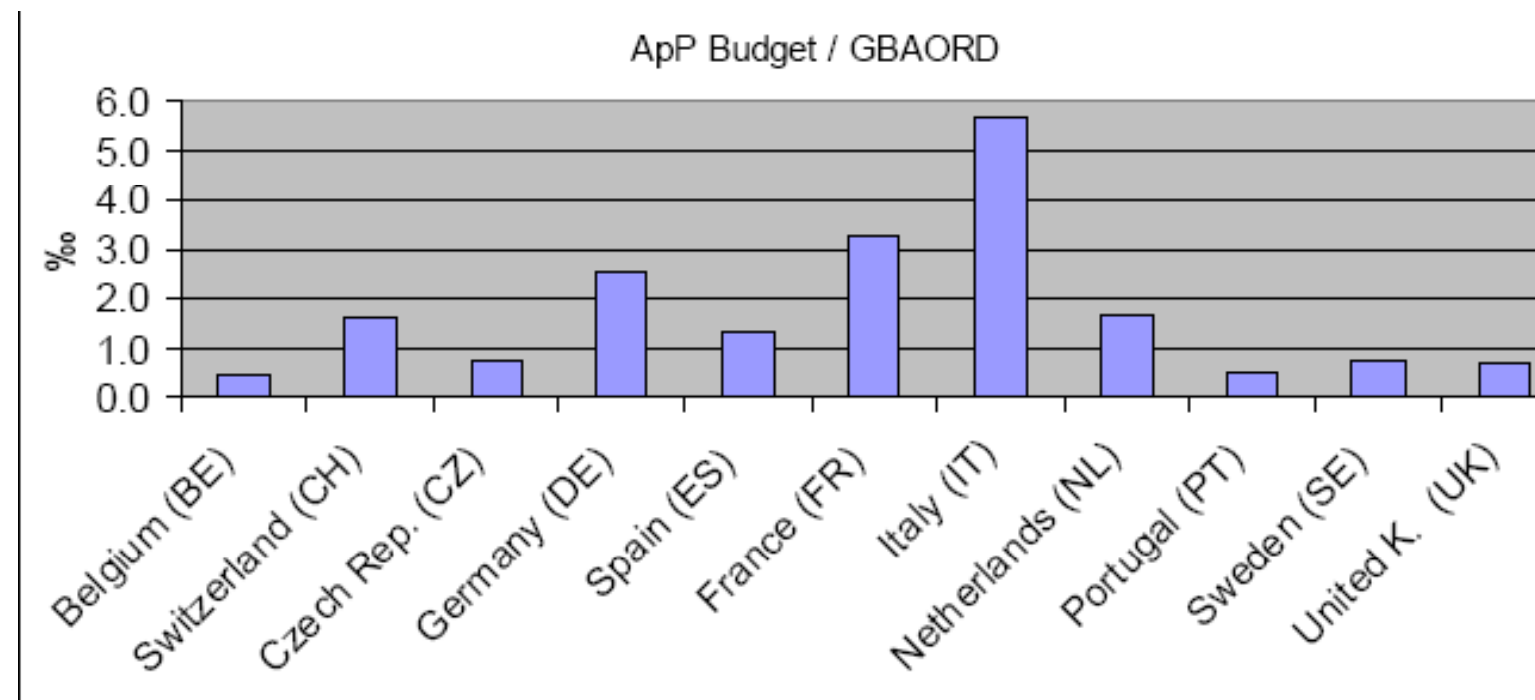
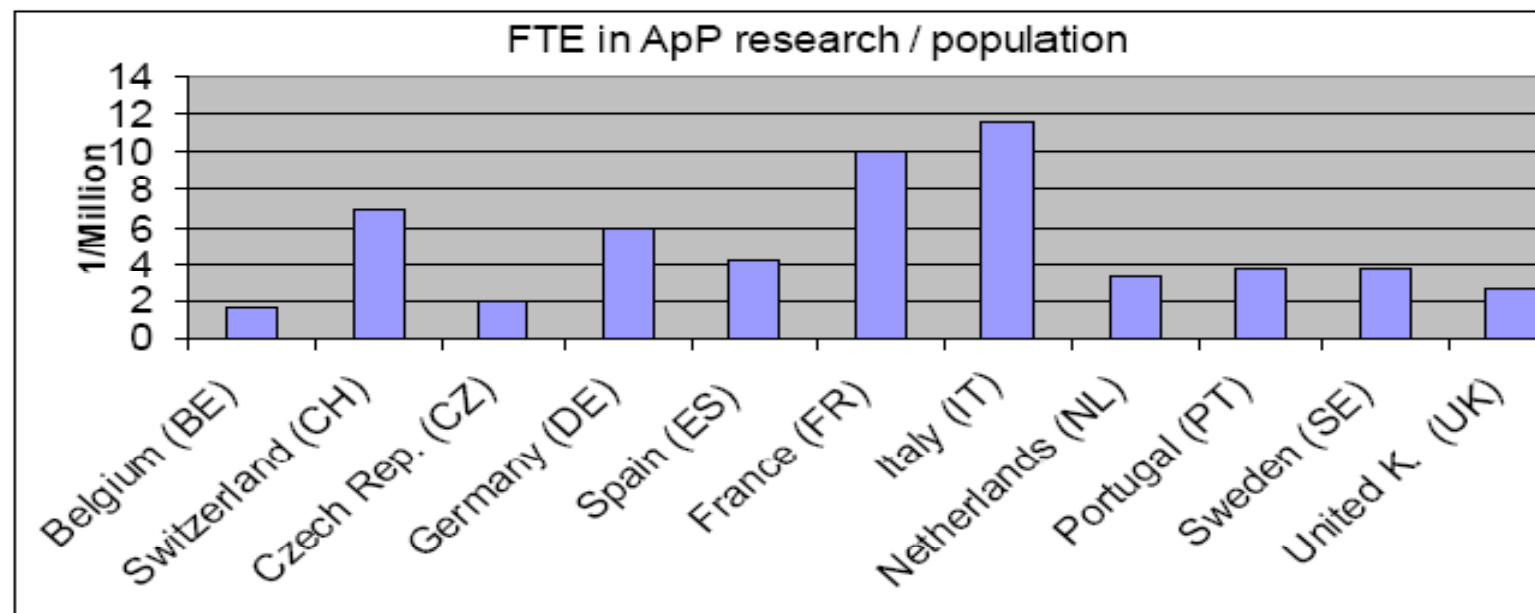
the Swiss National Day
held at the Globe of Science
and Innovation at CERN on
September 3, 2007 with the
participation of Prof. Ch.
Buschmann, president of SNF
Division II

Forum where members of
the Swiss ApP community
could directly share their
views with representatives
of the funding agencies.

Support available on CHIPP



A survey of the present ApP activities across Europe



...ing methodology of
...arch in astroparticle
...ics in Europe

PERA D1.1)

Study on the emergence of ApP in Europe (Dr. Bernard R)

The goal is to place this history in the institutional, political, and social context. We are able to quantify the evolution of the community, which took place mainly from 1990 to 2008, and to demonstrate that the large majority of the scientists presently active in ApP come from the **particle and nuclear physics** communities.

This confirms that ApP is, in great part, a **redeployment of particle and nuclear physics** activities in a context of post cold war mutation of research and development policies.

Organization of public conferences with leading figures : a historian, a physicist, a lawyer, an engineer and a politician (Prof. J. M. Gago, professor of physics and minister of science, technology and higher education of Portugal, a key figure of the European R&D policy).

Some activities of ASPERA

study on **benchmarking, compilation of evaluation, and funding rules for large projects in ApP.**

Common database of evaluation experts

List of scientific experts, working in Europe, has been prepared.

Study of legal and financial barriers

demonstrates that a number of hindering problems exist. The introduction of a legal framework for European science projects (ERI) is expected to be beneficial for future projects.

Some activities of ASPERA

the organization of conferences and workshops on **R&D**, on the **management** of large experiments, and on the presentation of the **roadmap**

Report on **R&D strategy for ApP in Europe** in preparation

- Presented to CHIPP during R&D workshop
- Still expecting critical comments
- ASPERA workshop in Amsterdam October 2008, including SME's

three step **ApP Roadmap** listing projects for next 10 years

- Science vision (roadmap committee and public workshops)
- Key projects scheduled and budgeted
- Priorities defined

Outreach activities

▶ A monthly ASPERA newsletter

▶ ASPERA website (www.aspera-eu.org)

▶ A video conferencing application

▶ A light traveling exhibition

▶ Extended press relationships.



ASPERA this month

May 2008

This month	
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Spotlight on... Gravitational waves: coming soon?	3 - 4 - 5
The community Prague welcomed the 6 th ASPERA National Day	5 - 6

Next meetings

- ASPERA Sweden National Day**
2 June 2008 - Stockholm
- Third Roadmap workshop**
29-30 September - Brussels
- R&D meeting**
20 October 2008 - Amsterdam

PICTURE OF THE MONTH

Dark Matter search: DAMA hammers it in

Physicists have been looking for 75 years to find evidence of the existence of the hypothetical dark matter particles. The DAMA collaboration published new results claiming a detection, confirming its previously published studies. Discrepancies with other experimental searches, which could very well be due to the properties of these particles, have to be resolved before convincing the whole community.



Glove box on the top of the shield containing the source for the on-line calibrations of the DAMA detectors. All operations involving crystals and photomultipliers are made inside a nitrogen atmosphere. (Credit: DAMA-INFN)

In April, at a conference in Venice, the physicists from the LUNA/LAB experiment of the Italian National Institute of Nuclear Physics (INFN) announced the observation of an annual modulation in its detectors, which could be evidence for dark matter particles coming from the galactic halo.

Actually, it is not the first time that the collaboration announced such results. Eight years ago it had already seen a similar annual variation of the light collected in its detectors with a smaller experiment, DAMA/NaI, detecting a larger amount of light flashes in June instead of in Decem-

ber, from 1996 to 2003. Such a modulation would be a consequence of the yearly revolution around the Sun. Thus, there would be a smaller dark matter particle detection rates when the Earth goes in the same direction as the flux from the galactic halo than when it goes against it. This is similar to when you are running in the rain, you are less wet if you have the wind behind you than if you are going against it!

The current DAMA/LIBRA Experiment has been taking data at the Gran Sasso Laboratory in Italy since March 2008. It is located at a depth of almost 1.1 kilometers, shielded >

ASPERA Governing Board

comprises high level representatives from ASPERA partner councils with responsibility for ApP funding.

responsible for all management decisions of the network.

next decision: a set of recommendations to be included in two reports (*State of ApP in Europe* and *ApP the European Strategy*), to be discussed in a workshop in Brussels September 29-30, 2008, (www.aspera.org) together with representatives from other continents..

ASPERA Recommendations (summary 1)

Direct Dark Matter Search

Recommend the construction and operation of one – possibly two complementary – detectors on the ton scale or beyond with low background, capable of reaching a 10^{-10} pb sensitivity.

Neutrino Mass

Depending on the outcome of the present generation of double beta experiments being prepared, we recommend the eventual construction and operation of one or two double beta experiments on the ton-scale, capable of exploring the inverted-mass region

Proton Decay and Low Energy Neutrino Astrophysics

Recommend supporting the work towards a large infrastructure for proton decay and low energy neutrino astrophysics

Gamma Astrophysics

A priority project for VHE gamma astrophysics is the Cherenkov Telescope

ASPERA Recommendations (summary 2)

Charged Cosmic Rays

The priority project for high energy cosmic ray physics is Auger. We encourage agencies in different continents to work towards a common path for Auger with.

Neutrino telescopes

The priority project for high energy neutrino astronomy is KM3NeT

Gravitational Waves

The long-term priority of ground-based detectors is the Einstein Telescope. The short term priority is the upgrade of the present generation of GW detectors.

Also supported:

with and space based missions to explore the phenomenon of “**Dark Energy**” described in the ASTRONET roadmap

concept of a **cooperative network** of deep underground laboratories

Preparation of common calls for ApP projects

- A centralised peer review process will be organised(**based on the report *common evaluation scheme for future joint activities (ASPERA D 1.3)***).
- Common calls will be launched for proposals on specific large common research projects and smaller ones, such as design studies and R&D projects (**Draft D 2.4**), starting in 2009.
- Projects will be funded through a virtual, rather than actual, common pot

Switzerland and ASPERA

the ERA-Net: an opportunity for the Swiss astroparticle physics research

clear turning point in the European construction in the sense that the ERA-Net are based on **voluntary collaboration of national organizations** aiming at setting up common action in social and R&D domains and do not have the constraining and regulating aspects of the construction of the common market and the European legislation.

Swiss contributions to the ASPERA activities

represent and defend the position of the SNF and the Swiss ApP community.
contribute to strengthen the links between CERN and the ApP community.

New ERA-NET proposal submitted to EC: ASPERA-2

- **Establish joint European activities as the preferred way of funding R&D programmes and large projects. .**
- **Create a sustainable structure for European Coordination in Astroparticle Physics**
- **Extend the network to all European countries with interest in Astroparticle Physics and to neighboring regions**
- **Increase the efforts towards global inter-regional coordination**
- **Increase synergy with environmental sciences.**

The participation of SNE depends upon support of CHIPP

Additional slides

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ERA-Net

- Tool implemented within the FP to achieve the goals of the Lisbon agenda.
- The participation of national funding agencies and the implementation of the output of the ERA-Net on a voluntary basis.
- Lines of actions:
 - systematic exchange of information and best practices
 - strategic activities
 - implementation of joint activities
 - transnational research activities.

Recommendations by Roadmap Committee 1

Direct Dark Matter Search

We recommend the construction and operation of one – possibly two complementary – detectors on a large scale or beyond with low background, capable of reaching a 10^{-10} pb sensitivity. We recommend a European lead role or shared equally with non-European partners. We recommend a focus on direct detection via 100 kg detectors, as present underway, and a prioritisation between different technologies around 2010. We urge convergence of parallel worldwide efforts.

Neutrino Mass

Depending on the outcome of the present generation of double beta experiments being prepared, we recommend the eventual construction and operation of one or two double beta experiments on a large scale, capable of exploring the inverted-mass region, with a European lead role or shared with non-European partners. A decision on the construction could be taken around 2013.

Proton Decay and Low Energy Neutrino Astronomy

We recommend supporting the work towards a large infrastructure for proton decay and low energy neutrino astronomy, possibly also accelerator neutrinos in long baseline experiments, in a worldwide context. Results of a current FP7 design study (LAGUNA) are expected around 2010 and followed by work towards a technical design report. Depending on technology, site and world sharing, construction could start between 2012 and 2015.

Gamma Astronomy

A high priority project for VHE gamma astrophysics is the Cherenkov Telescope Array. We recommend design and prototyping of CTA, the selection of sites, and proceeding rapidly

Recommendations by Roadmap Committee

High Energy Cosmic Rays

A high energy cosmic ray physics is Auger. We encourage the agencies in different countries to work towards a common path for Auger-North. We recommend the construction of Auger-North as worldwide agreements allow.

Neutrino telescopes

A high energy neutrino astronomy is KM3NeT. Encouraged by the significant technological progress of recent years, the support for working towards KM3NeT is confirmed. Resources for the Mediterranean detector should be pooled into a single optimised design for a large research infrastructure under construction starting in 2012. The sensitivity of KM3NeT must substantially exceed that of all existing neutrino detectors including IceCube.

Gravitational Waves

A long-term priority of ground-based detectors is the Einstein Telescope, E.T., a large underground gravitational wave detector. We recommend support for R&D work towards E.T., with construction starting in 2020. The first discoveries have been made with LIGO/VIRGO/GEO, likely around 2016/17. The short term priority is the upgrade of the present generation of gravitational waves detectors, with a particular recommendation to support a fast upgrade of VIRGO to “advanced VIRGO”.

Also support:

ground and space based missions to explore the phenomenon of “Dark Energy” as described in the Astroparticle Physics Roadmap

the concept of a cooperative network of deep underground laboratories,

a common call for innovative technologies in the field of astroparticle physics,

the formation of a European Centre for Astroparticle Theory.