This month

Next meetings

German National Day
22 June - Hamburg

United Kingdom National Day
23 July - London

Preparatory Roadmap Phase II Workshop
19-20 July 2007 - Paris

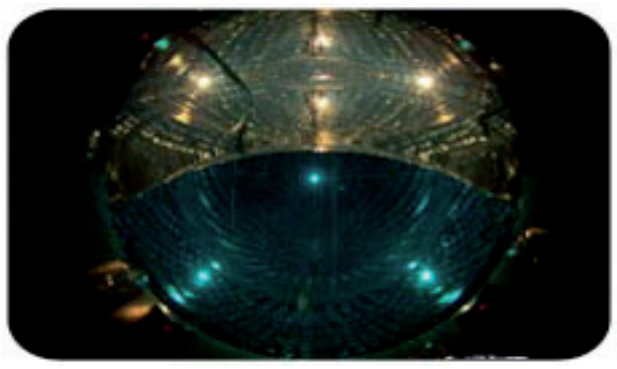
Roadmap Phase II Workshop
20-21 September 2007 - Amsterdam

Picture of the month

Bubbles filled with liquid to detect Sun neutrinos

This is not a picture from the last James Cameron film! It shows the inner sphere of the Borexino detector in Gran Sasso Italy, when it was about half filled with water (bottom) and half with scintillator (top).

The lattice structure visible beyond the liquids is formed by the phototubes and light concentrators mounted on the sphere, which will allow during the data taking the acquisition of the weak scintillation pulses originated by the neutrino interactions in the detector (neutrino + electron -> neutrino + electron).



Crédits: Borexino Collaboration - LNGS/INFN

In the final configuration the water will be fully replaced by the liquidscintillator, which will act as the detection medium for the neutrinos coming from the Sun. The Borexino detector features 1300 tons of scintillator* and 2400 tons of water.

The peculiar optical effects in the picture are due to the light reflection/refraction process at the interface between the water and scintillator*.

BOREXINO is operated by an international collaboration featuring about 70 scientists from Italy, France, Germany, Russia and the United States. It is scheduled for completion this year. Data acquisition should begin in May.

** Scintillator: a scintillator is a material that emits light when it is traversed by a subatomic charged particle, for instance an electron coming from the interaction of a neutrino with the experiment material.*

Borexino website : http://borex.lngs.infn.it/

H.E.S.S experiment wins European Descartes Prize

During a ceremony in Brussels on 7 March 2007, the H.E.S.S collaboration was awarded the prestigious European Descartes prize for Research.

Launched in 2000, the EU Descartes Prize for Research rewards teams of scientists for outstanding scientific or technological results achieved through trans-national research in any field of science. Only three years after the start of taking data, the H.E.S.S collaboration has already published an impressive list of major discoveries, opening a new window on the Universe.

Descartes prize ceremony. From left to right: A. Schavan DR. Minister for Rechearch, S. Katsanevas CNRS, H. Voelk MPG Heidelberg ex-spokesman HESS, M. Punch CNRS deputy spokesman HESS, G. Fontaine CNRS chairman of collaboration board HESS, W. Hofmann MPG Heidelberg spokesman HESS, J. Potocnik Comissary for Science and Research of EU, C. Haigneré chaiperson of the Grand Jury of the Descartes prizes. Crédits : ASPERA, 2007

H.E.S.S. (High Energy Stereoscopic System) is an array of four big "Cherenkov" telescopes in Namibia, South-West Africa. This is a privileged position since it points directly to the center of the galaxy and covers a large proportion the galactic sources. Its location is complementary to that of MAGIC in the Canaries, the other new generation European observatory for high energy gamma rays that has also entered in operation in the recent years. The two collaborations currently operate the most sensitive telescopes in the world for the study of very high-energy gamma rays - which are only emitted in energetic violent processes in the Universe, such as near black holes and in supernovae.

In its first years of operation, H.E.S.S. results have provided a number of breakthroughs in this young field of astronomy, such as the first resolved image of a supernova shock wave acting as a cosmic particle accelerator, the first survey of the central region of our Galaxy revealing a large number of novel gamma-ray sources, the detailed study of high-energy radiation from the centre of our Galaxy, and the discovery of a binary system including what is likely to be a stellar black hole – a "microquasar" – generating high energy gamma rays.

Such a prize is very good news for astroparticle physics and promising for the future of the field. Physicists are already organizing a big European effort towards a next-generation observatory called CTA (Cherenkov Telescope Array), which will boost sensitivity by another order of magnitude. CTA unifies most of the groups working in the field in Europe and is already mentioned as an «Emerging Proposal» in the ESFRI Roadmap for European Research Infrastructures.

The H.E.S.S. project involves about 100 scientists from Germany, France, the UK, Ireland, Poland, the Czech Republic, Armenia, South Africa and Namibia...

Crédits : H.E.S.S collaboration

H.E.S.S experiment wins European Descartes Prize

Three questions to Dr Hofmann, H.E.S.S spokesperson.

Dr Hofmann is the H.E.S.S experiment spokesperson.
He tells us what represents the Descartes prize for him and what he is expecting for the next years.

What does this prize represent for you?

It represents of course a great recognition for the work of my collaborators in H.E.S.S, and we are very proud. Going beyond H.E.S.S the award provides increased visibility for ground-based gamma-ray astronomy and for astroparticle as a whole, which is very welcome in view of the large future European projects in the field.

The first H.E.S.S discoveries are impressive. What are you expecting to discover now?

Many of the easy objects (for H.E.S.S!) are of course explored, after 3 years of operation of the system.
But with deeper exposures we keep finding new exciting objects - such as the new source in the Westerlund
2 stellar cluster - and there are various very interesting classes of objects (e.g. galaxy clusters) which might
be within reach of H.E.S.S deep observations.

What is the next step for H.E.S.S experiment?

We're just starting to install the big H.E.S.S II telescope, with a 28 m dish, which - when completed in a
couple of years - will allow us to further increase sensitivity and to lower the energy threshold of the instrument.
We're pretty sure that you'll keep hearing from H.E.S.S in the next years!

H.E.S.S website : http://www.mpi-hd.mpg.de/hfm/HESS/HESS.html

Astroparticle physics roadmap is on the road

On the 7th and 8th of November 2006, the first Astroparticle Physics Roadmap Workshop took place in Valencia - Spain. More than 100 scientists from all over Europe participated in the event aimed to discuss the first version of a shared roadmap for future facilities in Europe.

The workshop was organized in the Palacio de Congresos of Valencia by ASPERA which intends to consolidate and expand the European research expertise in Astroparticle Physics by improving the coherence and co-ordination between European funding. It followed the Astroparticle European coordination Appec Steering committee that presented the final version of its European Astroparticle roadmap.

By now, the working groups are on the road to finalizing this work. It will be enlarged, consolidating it with the data concerning funding and human resources, project schedules and objectives, R&D needs for each subject. This 2nd phase will be concluded at the second Workshop in Amsterdam on 20 and 21 September 2007, a very important appointment for all astroparticle physicists. The third and final phase of the roadmap process should lead to a full priority list within several budget scenarios. It is planned in July 2008.

Then the first step for ASPERA consists in discussing that work within 7 thematic working groups:

- High Energy Gamma Rays
- Neutrino Mass
- High Energy Cosmic Rays
- High Energy Neutrinos
- Dark matter direct detection
- Gravitational Waves
- Low energy neutrino and proton decay observatories

From left to right: Stavros Katsanevas (the ASPERA coordinator); Domenec Espriu, Richard Wade (Deputy and Chairman of ApPEC respectively) and Antonio Ferrer, the organizer of the Valencia 1st workshop for the Astroparticle Roadmap, that took place the 7 and 8 November 2006. Credit: ASPERA , 2007

Per ASPERA ad astra...

Stavros Katsanevas is the coordinator of the European astroparticle physics network ASPERA. He tells us what his expectations for ASPERA are.

What is astroparticle physics for you?

Astroparticle physics tries to answer three fundamental questions. The first is "What is the Universe made of?" It is addressing a series of sub-questions: What is the nature of dark matter and energy and the mechanism of inflation? How and when did matter prevail over antimatter? What is the cosmological role of the neutrino? Do interactions unify at high energies scales? The second question could be schematically summarized as the question of the origin of the cosmic rays, covering the study of sites of violent or non-thermal phenomena and the propagation and detection of cosmic rays in the most general sense including neutrinos, charged particles, high energy gamma rays and even gravitational waves. Finally the third question concerns the nature of gravity, its detectable effects, its possible extensions and/or its incorporation in a larger theory including quantum mechanics. It is a field of research emerging at the intersection of particle physics, astrophysics and cosmology. Its rapid development has led to the design of new types of infrastructures. In underground laboratories or with specially designed telescopes, antennas and satellite experiments, astroparticle physicists employ new detection methods to observe a wide range of cosmic particles: neutrinos, gamma rays, and cosmic rays at the highest energies, gravitational waves and the as yet hypothetical dark matter particles…

What are the aims of ASPERA?

With about 2000 scientists in some fifty laboratories, Europe is already a leading player in the field. ApPEC, the Astroparticle European Coordination of agencies, at the origin of the ASPERA network, has been working since 2001 to coordinate the efforts of the researchers in the field, through centralized peer-reviewing, incitation for common Integrating Infrastructures Initiatives (e.g; The ILIAS project) and Design Studies (e.g. the KM3 DS in the ESFRI list). The ERANET program ASPERA, including the ApPEC agencies and a few more, 17 in total, is the EU instrument aiming at providing the vehicle to implement the roadmap and common action plan necessary for coordinated funding of the next generation of large infrastructures of Astroparticle Physics in Europe. In the process, we hope to foster a coherent Europe-wide research base, linking the existing observatories in transnational European structures, establishing common evaluation criteria for funding, achieving the synchronism of funding mechanisms and providing common electronic infrastructures and outreach policies. ASPERA also aspires to enlarge its base to all European agencies that have projects in Astroparticle Physics.

What are you expecting from the ASPERA network?

The greatest achievement I expect from ASPERA would be the timely and coordinated funding of the 6 to 7 large astroparticle infrastructures needed for the development of the field. It should be noted that the level of European funding for Astroparticle Physics compares well to this of the US but it will be the first time that this funding will be concentrated by the participating European agencies on commonly agreed targets.

What are the main milestones of ASPERA process?

An important milestone will be the elaboration of a European roadmap associated with a detailed census of the existing budget and human resources available in the participating agencies. The enthusiasm with which the scientific community and the funding agencies embraced the process makes me confident of the outcome. Two other milestones will be our ability to launch common R&D calls in the second and third year and the linking of existing observatories and underground laboratories in European-wide, virtual or more tightly coupled, structures. These are certainly not easy tasks and we will have to advance very carefully achieving the widest consensus at each step. This is what prompted us to name the ERANET "ASPERA", in reference to "Per ASPERA ad astra…"*

**With difficulty to the stars*