

COMUNICARE FISICA 2005

OUT-REACH in HEP @ Portugal

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Frascati, It.
26/X/2005



Summary

- General Outreach in HEP @ Portugal
 - the use of **Detectors to boost HEP** in schools
- Reaching the Schools with Detectors
 - the **Cosmic Rays Telescope** network (in .pt)
- Reaching the Detectors with Schools
 - the **European Masterclasses** (in .pt)
 - the **CRESCERE** Project (in .pt)



[preamble (General Outreach...

■ Outreach and Public Education in Science

happens in Portugal at a very large scale:

- 1 BIG* +11 Interactive **SCIENCE ALIVE** Museums
(*The Knowledge Pavillion, Lisbon, w/ 250K visitors/year)
- 3000 Projects w/ ~10000 schools (~1-1.5 M std)
- 1600 Summer events w/ ~30K persons
- 700 students in 54 Institutes (1-14 days in summer)
- Special one-week events (S&T week, Space w.)
+conf.related events (like @ EPS-HEP'05)

...coordinated by the "**Agência Ciência Viva**"



...is not only in High Energy Physics]

+ ■ Calouste Gulbenkian Foundation

- Exhibitions about science in the WYP'05 (now running "by the light of Einstein")

- Monthly seminars about science since 2003 (Colloquia "Despertar para a Ciência" with our "big stars" on science communication)

- 5 Science museums permanently open

- TV programs (in Open[1.pt weekly] & Cable Channels)

- U. projects (open days, seminars at schools, etc.)

- The Road Shows by "NFIST" (truck w/ expts.)



Outreach in Particle Physics

Regular Activities with High School Teachers/Students:

- **Summer vacations** at LIP, Lisboa, Coimbra and Faro, at CFNUL/FCUL, Lisboa, and at U.Algarve, Faro, integrated in the program of Summer Stays from *Ciência Viva*.
- Local support for the CERN Program HST - **High School Teachers @ CERN** (2 pt T. for 3 weeks)

Particle Physics (incl. Cosmic Rays) Seminars in High-Schools

Forum EPOG - European Particle physics Outreach Group:

a CERN/EPs-HEPP/ECFA forum to exchange ideas with the participation of CERN member states and other observers (DESY,...) + representative from US



CERN - 50th Anniversary

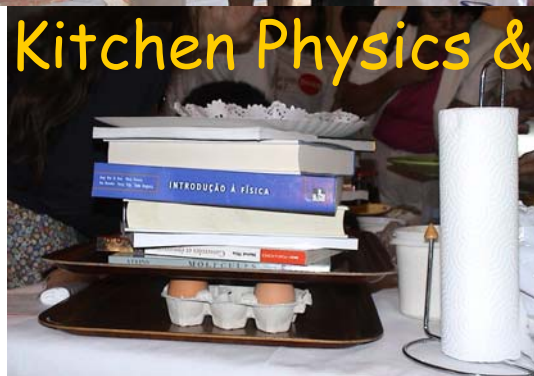
- Many activities performed last end of year
- Series of Public seminars at IST focusing the portuguese participation
- One day Workshop at FCUL
Day full of seminars about different aspects of Portuguese participation in CERN activities
- Autorun Particle physics show prepared
- Visit of 10 students and 2 school teachers to the CERN-50th Open Day (16/X/2004) (with Support from Gulbenkian Foundation)

EPS-HEP '05 in Lisboa

In 2005: EPS High Energy Physics Conference in Lisboa
Strong Outreach activities at the site of the conf.dinner



Scientists explains physics...





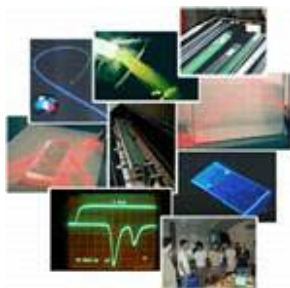
Outreach @ W³EB

Bring HEP Experiments/Challenges to public at large
Educational Movies (by Amélia Maio):

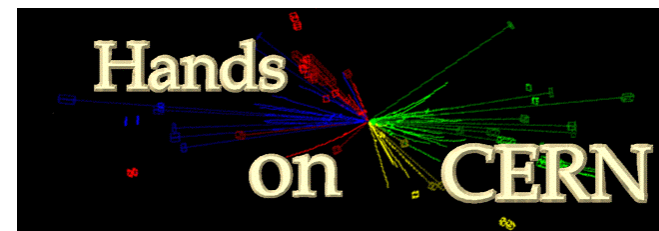
ATLAS O.R.

- "ATLAS/TileCal Fibre aluminization"
- "ATLAS/TileCal Robot for Fibre insertion"
- "ATLAS/TileCal instalation"
- "A Vida média do muão" - The Muon Lifetime

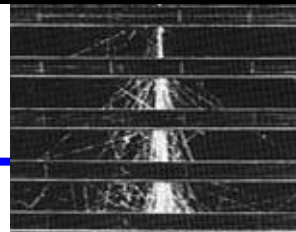
W³Sites in constant preparation:



- Summer stays



- Cosmic Rays Telescope





Reaching Schools w/ Detectors!

Cosmic Rays Telescope Network

- Project "Ciência Viva", in the final installation phase.
- Objectives: place cosmic rays detectors in the roofs of high-schools.
- Promote the outreach of high energy physics and astroparticle physics through the use of a real detection station, with the help of the teachers and students using it.
- 10 High Schools in the game at the moment:
8 in the district of Lisboa, 2 in Beja

➡ Study of Time Correlations at Large Distances ?

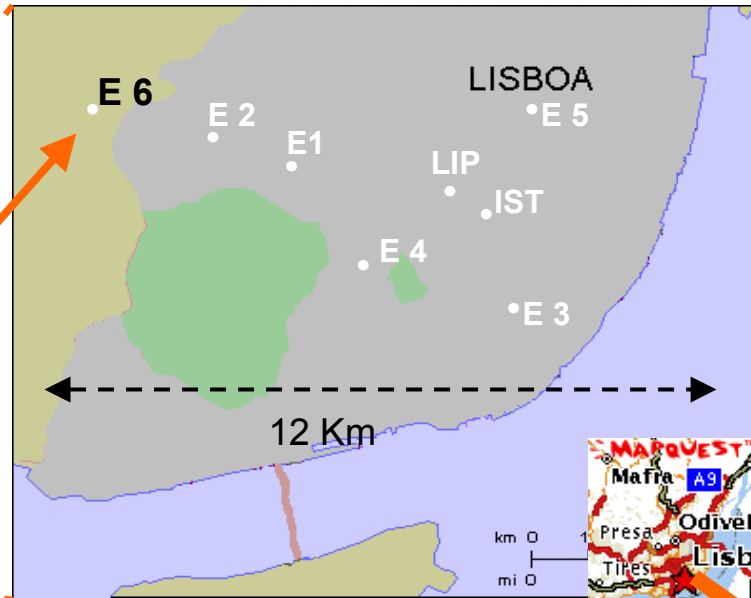
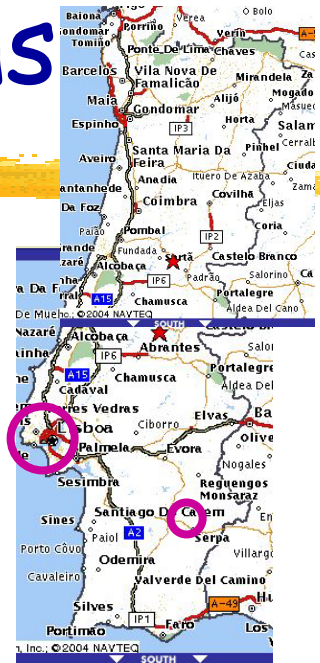


Localization of the Stations

10 stations in high-schools (E#), 1 central at IST

E8

6 stations
inside
Lisboa,



E7 3 in suburbs of Lisboa....



...and 2 in the south
centre of the
country (Beja)

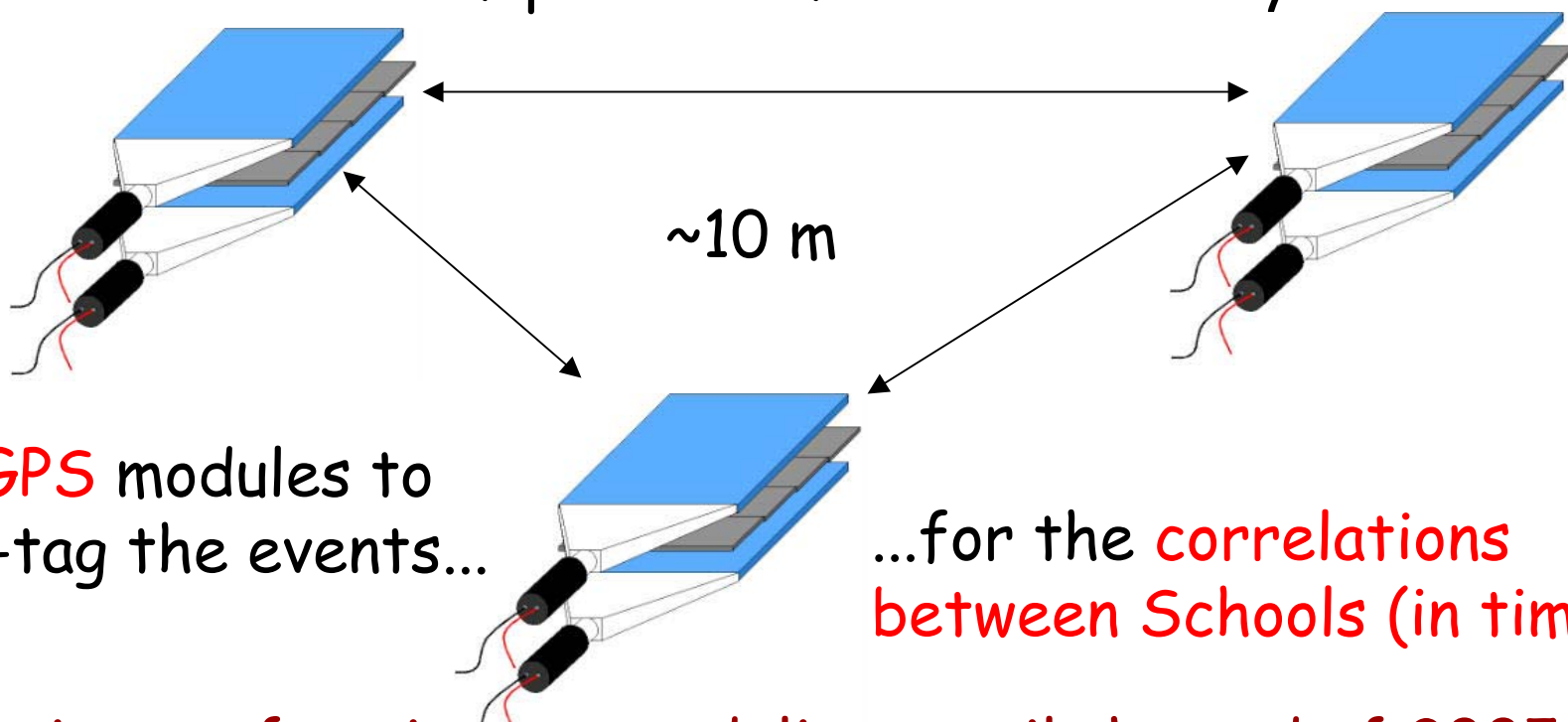
Abreu @ Comunicare



E6 (Amadora)

Station with 3 detectors

The setup in each school (at the roof), consists of 3 detectors in the vertices of a triangle, to detect small showers of particles from Cosmic Rays:



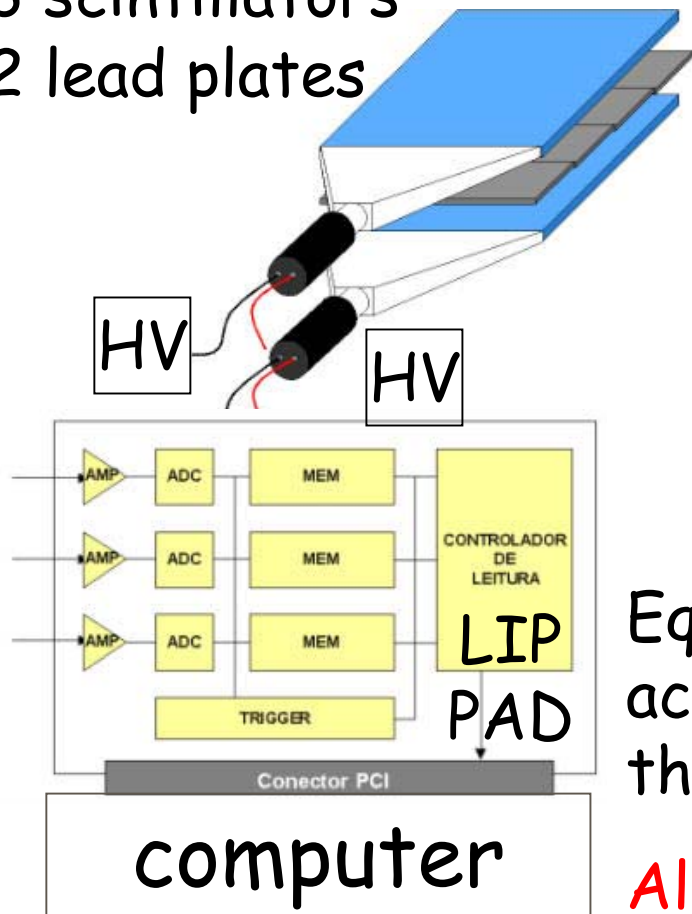
and **GPS** modules to time-tag the events...

...for the **correlations between Schools (in time)**

Last pieces of equipment to deliver until the end of 2005

Components of a Detector

3 scintillators
2 lead plates



- Acquisition software developed in LabView
- Analysis software elaborated in ROOT
- Both user-friendly!



Equipment being installed inside of an acrylic box, to be placed in the roof of the High School..

All equipment professionally mounted at LIP/IST, and installed in the school

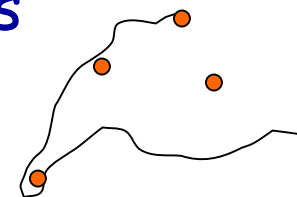


Long Distant Time Correlations

- Profiting of the equipment installed at the high schools (and the human capital of motivation),
- Schools in Lisboa and Beja,
- Plan to repeat the measurement of

"Observation of Time Correlations in Cosmic Rays"

O. Carrell e M. Martin
Dep. Ph. Nuc. Corpusc.
Univ. Genebra, Suíça,
UGVA-DPNC-1994/1-162



"an excess of quadruple hits, within $\Delta t = 0.62 \text{ ms}$, was observed w/ $S = 4.8\sigma$ "

...but we cannot put a detector in every high-school (~600)



Reach Detectors w/ Schools!

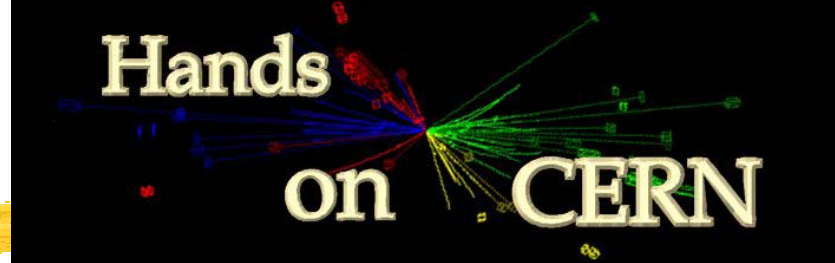
■ EPOG Masterclasses

CERN BIG EXPERIMENTS

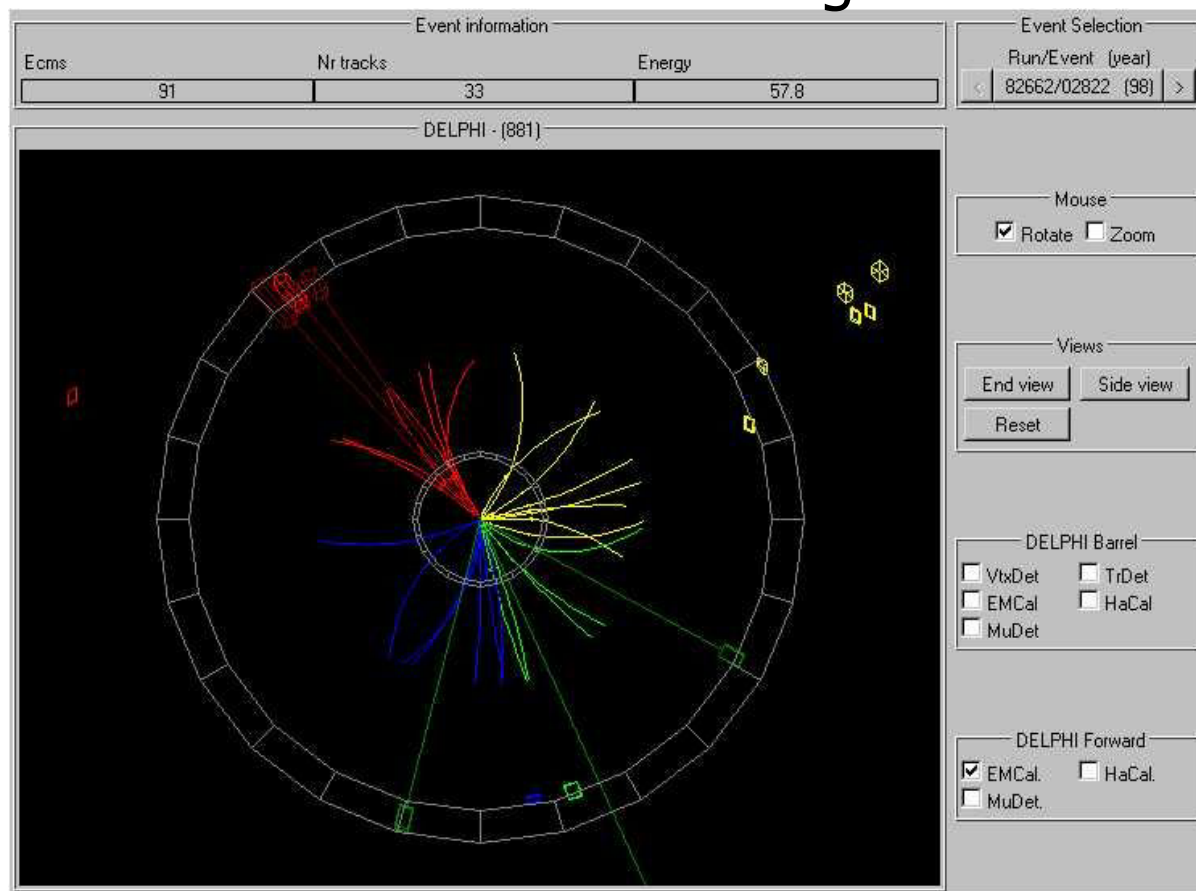
- European wide Masterclasses, following the British famous events
- Students go 1 day to Universities and analyse data from real experiments.
- In .pt, real data was from DELPHI - and based on educational package "**Hands on CERN**"
- ~90 students in Lisboa (LIP (&IST) + FCUL); ~10 students in Coimbra (LIP + FCTUC).
- Report from students very favorable (M.Kobel, CERN Courier, Oct.2005)!



Hands On CERN



- Educational package that implements in Java a web based version of DELGRA - the famous 3D Event Viewing software of the DELPHI Coll.
- Students use this toolkit to view (rotate and zoom) real Z^0 decays that they classify into electrons, muons, taus, or hadrons, according to their criteria, to...
- Measure BR's (Z^0)





Reach Detectors w/ Schools²!

■ The Project **CRESCERE** (.pt, .it, .ro)

Cosmic Rays in the European School Environment: a Remote Experiment

www.scienzapertutti.net

■ LIP (with IST) and FCUL participate in CRESCERE with two **real experiments**:

- The Muon Lifetime (FCUL [<http://crescere.fc.ul.pt/>])
- Rate of Cosmic Rays on the roof of IST, and other properties (by LIP at IST). [<http://crescere.lip.pt>]

■ Experiments are **performed remotely**

■ Data are analysed and results obtained

■ +seminars@schools, tutors@experimental sites



CONCLUSIONS

- Old paradigm of Outreach fully exploited in .pt/HEP
 - Seminars, Web sites (w/ Films,etc), Exhibitions (.pt,CERN)
 - Events associated to big Conferences (EPS-HEP'05,...)
 - EPOG forum to discuss ideas, foster common projects

but...

- What can HEP really offer as NEW in outreach ?
 - Great success with Real Detectors (curiosity explodes)!
 - Integrate School teachers/students in scientific teams!
 - Can't deploy detectors far away ?
Bring Schools to the Lab. (real or virtual)!...

+Interaction w/ detectors, +Interaction w/ scientists !