

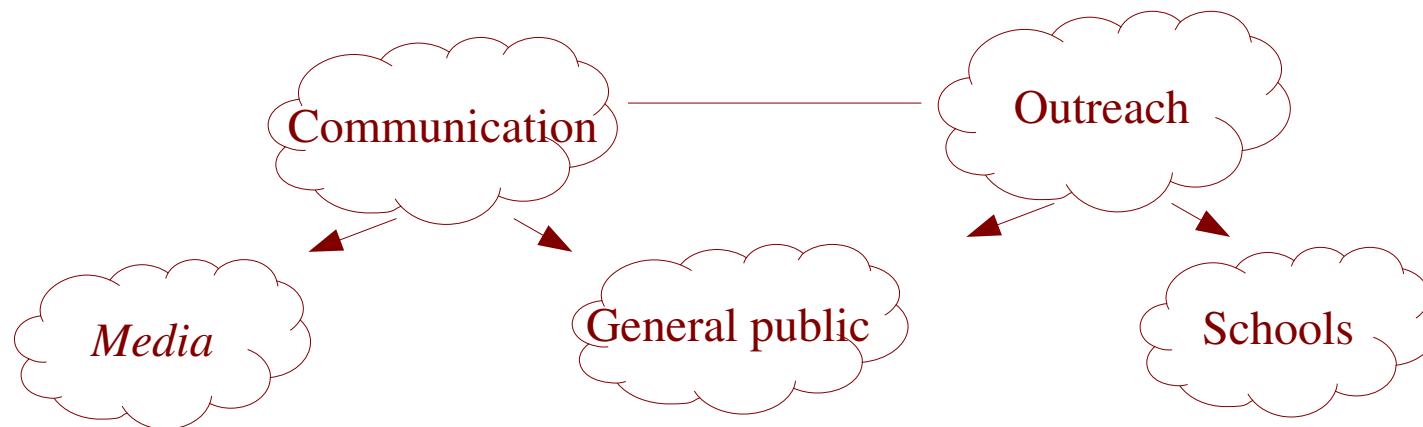
Outreach activities at LIP – present & future –

Catarina Espírito Santo
for the LIP Outreach Team

Introduction

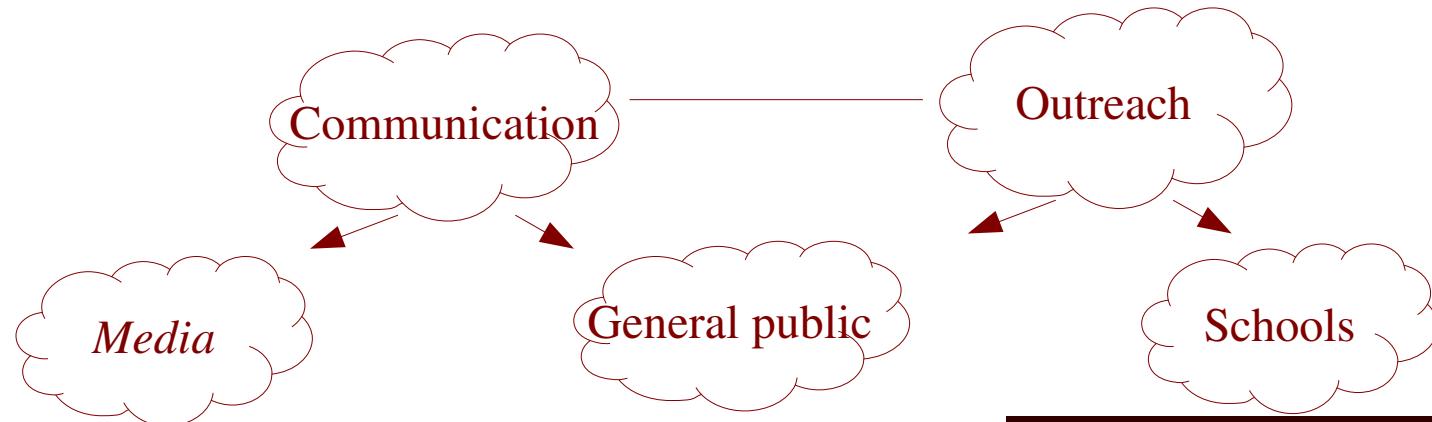
The LIP outreach team cares about science communication and scientific knowledge dissemination

- Includes researchers from the different LIP teams working at different fractions of their time
- Has its own (funded) activity lines, that go beyond the specific projects
- Is a member of international outreach groups, namely IPPOG and EPPCN
- Closely collaborates with CERN, Ciência Viva and the PT Universities and research centres



In this talk, only a brief overview and some ideas for the future...

Overview



Communication with PT media
and other institutions

Press-releases

EPPCN



Public sessions
Exhibitions

Highlights in Particle and Astroparticle Physics
- an overview -



Sergio Bertolucci

29 de Janeiro, 4ªFeira, 18h00



New World in Particle, Astroparticle and Cosmology
Braga, Universidade do Minho, Campus de Gualtar



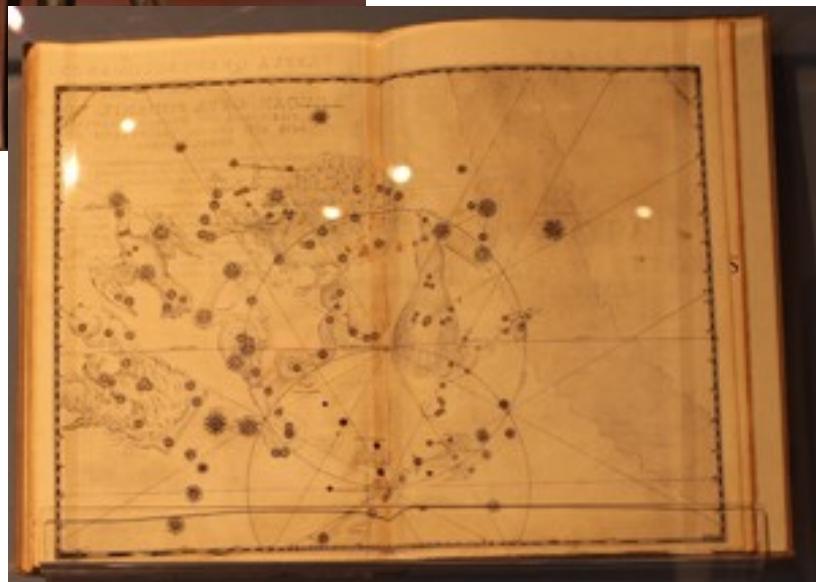
Exhibition: From the skies to the Universe

Combining historical documents and artifacts
with current scientific research

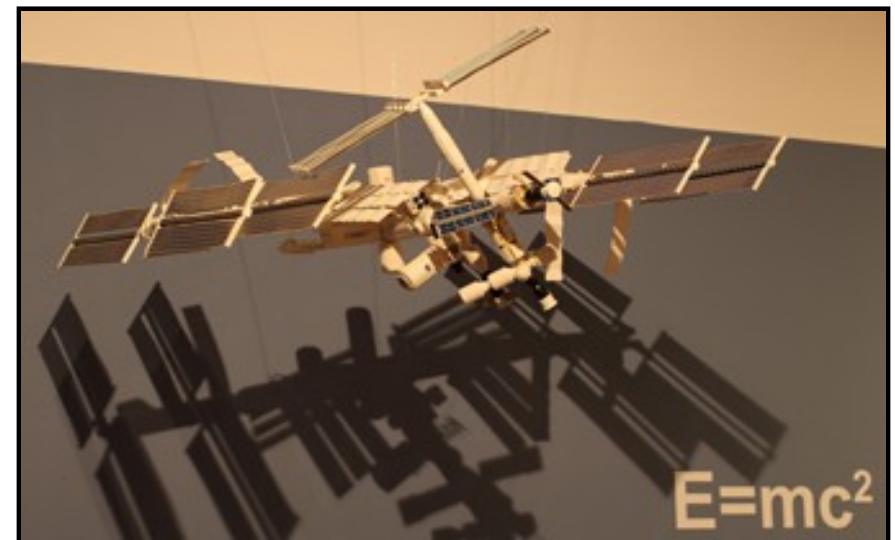
3 month exhibition at the National Library



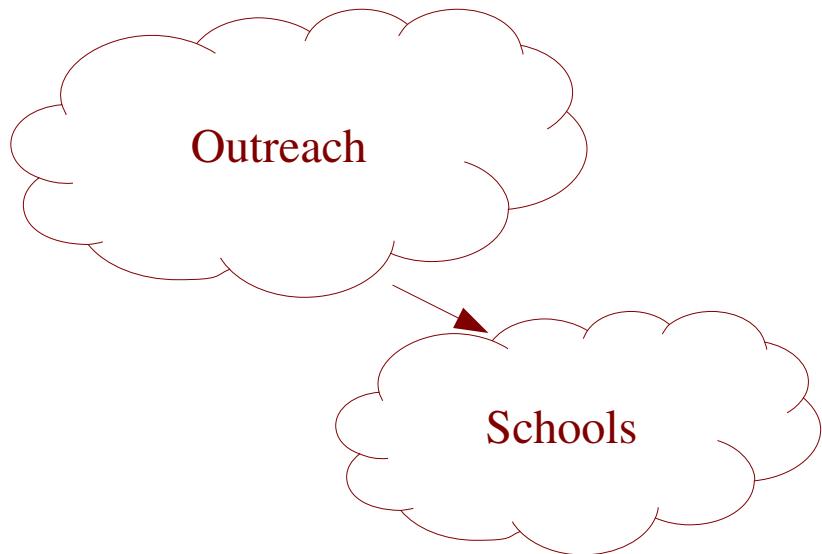
Exhibition: From the skies to the Universe



1. Measuring the skies
2. Cosmic rays: messengers of the Universe
3. Universe: known and unknown



Outreach for schools



- CERN School for teachers in PT
- Seminars at schools
- Masterclasses
- Environmental Radiation Project
- “Science in the Summer” programme (Ciência Viva)
- ...

- Different activities for different purposes
- Increasing time/motivation required
 - Decreasing number of participating students



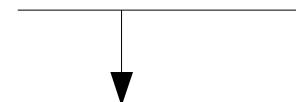
Portuguese language programme for teachers



- National until 2008
- International since 2009

Today, a wide network of teachers and schools

Increased the participation in Masterclasses, requests for Seminars, visits to CERN, ...



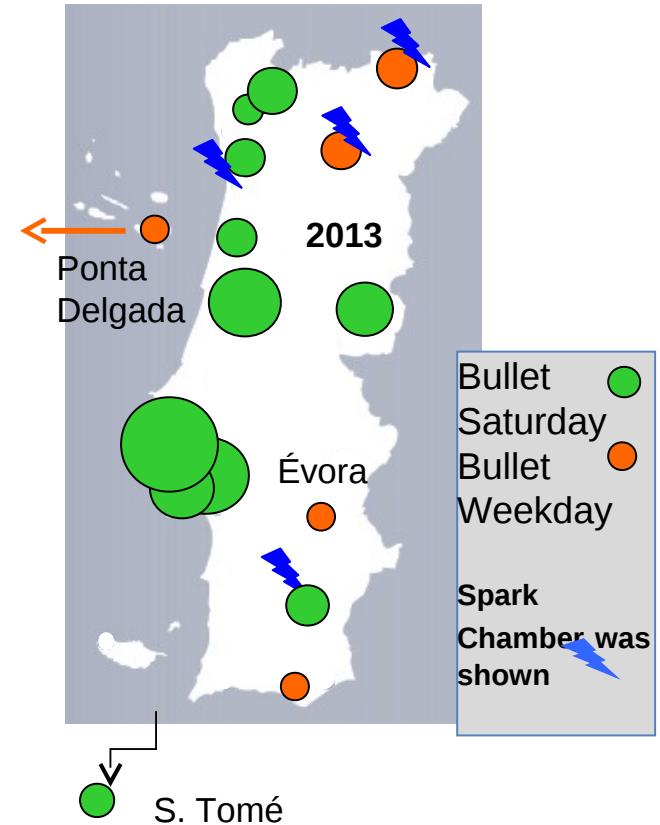
Always present, the PT CERN guides:
A. David, J.C. Silva, J. Oliveira, J. Bento, R. Gonçalo, J. Miguéns, ...

IPPOG Masterclasses

10th Edition ongoing now! tomorrow, masterclasses in Évora and Beja

13 locations all over the country

Support from all LIP researchers and students





WCPE

The World Conference on Physics Education

July 1-6, 2012 Istanbul / Turkey



International Masterclasses Hands on Particle Physics - The Portuguese Approach

M C Abreu¹, P Abreu^{1,2}, F Barão^{1,2}, J Carvalho³, A Guerreiro, A Maio^{1,5}, A Onofre^{1,6}, L Peralta^{1,5}, A Pereira⁷, M F Mota⁴, M G Pereira⁸, R Potting⁹, J Santos¹⁰, J L Santos⁴, S Soares^{1,11}, F Veloso^{1,3}, J Veloso¹²

1 – Laboratório de Instrumentação e Física Experimental de Partículas, 2 – Instituto Superior Técnico, Universidade Técnica de Lisboa, 3- Faculdade de Ciências, Universidade de Coimbra, 4 – Faculdade de Ciências, Universidade do Porto, 5 – Departamento de Física, Universidade de Lisboa, 6 – Universidade do Minho, 7 – Instituto Politécnico de Bragança, 8 –CITAB, Universidade de Trás-os- Montes e Alto Douro, 9 – Faculdade de Ciências e Tecnologia, Universidade do Algarve, 10 – Instituto Politécnico de Beja, 11 – Departamento de Física, Universidade da Beira Interior, 12 –I3N, Departamento de Física, Universidade de Aveiro.

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The Environmental Radiation project

Coordination team

Luis Peralta Lisboa

Florbela Rego
Pedro Abreu

João Carvalho Coimbra
Rui F. Marques
Paulo Mendes
Lucília Brito

Sandra Soares Covilhã

Experiments in the school

Talks in the school

Visits to the associate research Institute and universities

Teachers training

National Meetings (next 10 of May 2014)

Sponsored by:



The Environmental Radiation project

Experiments:

Radon detection inside the school with CR-39 detectors

Detection of radiation with Geiger counter

Detection of radiation with radiochromic film

Construction and testing of an infrared detector

Analysis of public Auger data

This year

35 participating schools

about 200 students

The Environmental Radiation project

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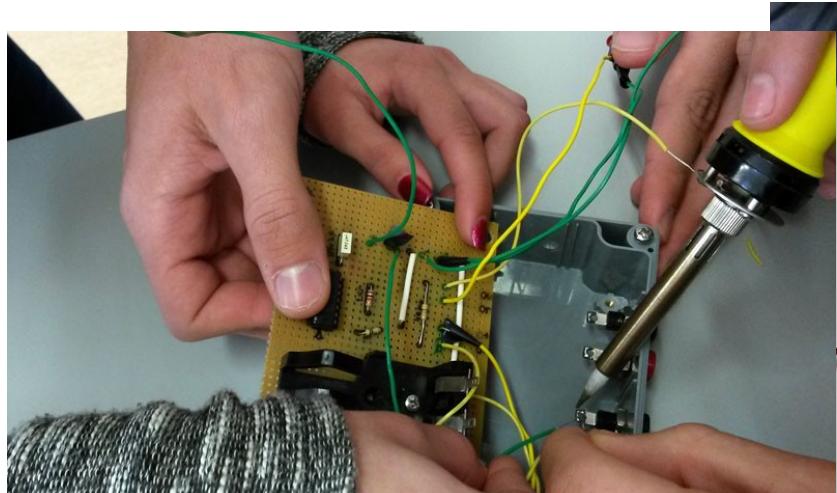
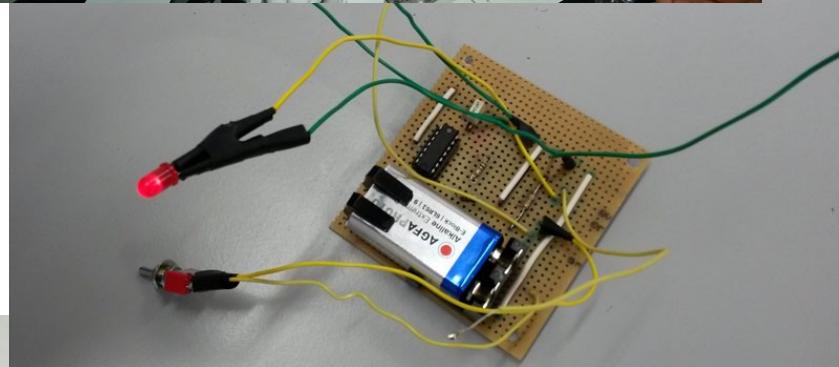
Detection of radiation with Geiger counter

Detection of radiation with radiochromic film



Construction and testing of an infrared detector

Analysis of public Auger data



“Science in the Summer” Ciência Viva Programme



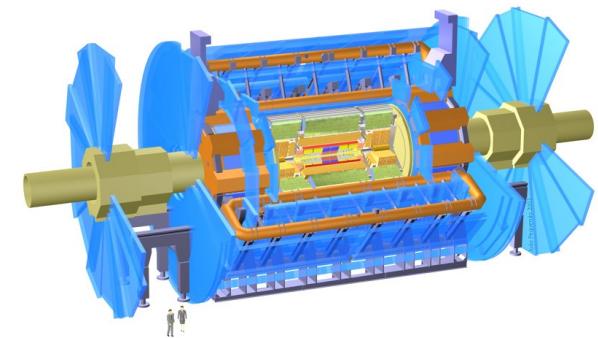
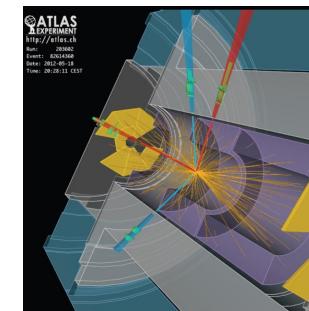
AGÊNCIA NACIONAL
PARA A CULTURA
CIENTÍFICA E TECNOLÓGICA



2 weeks @ LIP

3 work Proposals in 2013:

- Explore the Auger public data set
- ATLAS – Light, fibers, cintilators + real event analysis (A. Gomes)
- “Hunting for particles” (NEW)

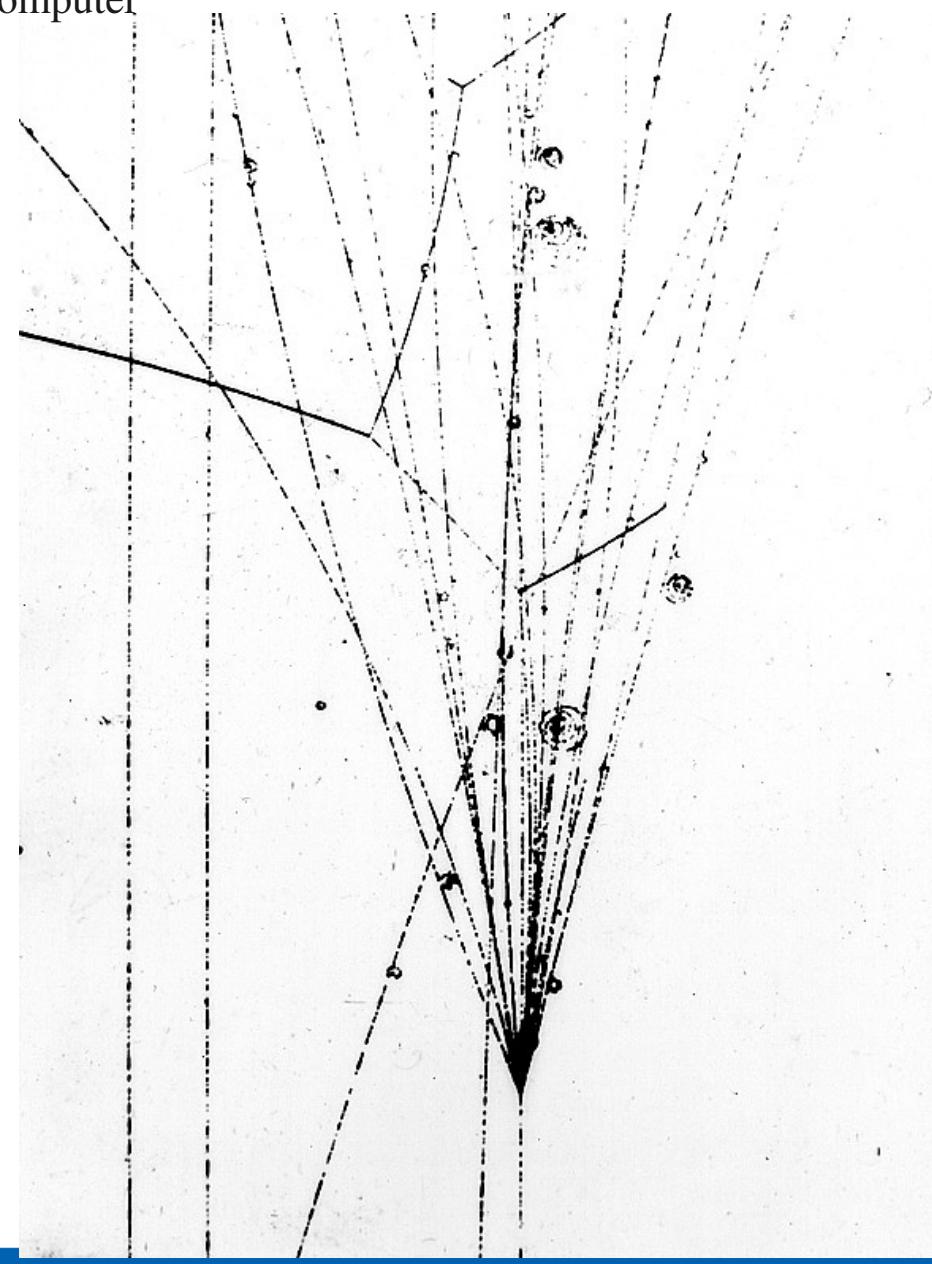


Hunting for particles

- A tour through particles, interactions, and the physics done at LIP
- Every day, a different topic
- Combination of talks, experiments, paper and pencil, computer

1. to “see” and identify particles

Learn about particles and interaction
Analyze particle tracks



2. In the lab:

γ
 β
 ν
 μ

Gamma spectroscopy, beta decay,
cosmic muons...

3. At the LHC:

W
Z
H

A guide to explore the Auger public data

Developed at LIP

For students in the final years of high school

Exists in English, Portuguese and Spanish

Used in:

Science in the Summer programme (@LIP)

Environmental radiation project (@schools)

Towards masterclasses in cosmic rays?

Questions and Answers on Extreme Energy Cosmic Rays

- A guide to explore the public data of the Pierre Auger Observatory -

Since 100 years, we know that planet Earth is constantly hit by particles arriving to us from the cosmos. Such particles have very diverse energies, abundances and origins, and many questions remain to be answered about them. This study is devoted to extreme energy cosmic rays - the rarest, most energetic, particles arriving to us from the Universe. When these particles produce a shower of millions of particles, the larger the number of particles. The Pierre Auger Observatory detects these some of the mysteries of extreme energy. Where do they come from? How are they energies? The Pierre Auger Observatory collecting since 2004 available to all those energy cosmic rays. These data are available page, which is updated every day. This guide is meant to be a roadmap for you making it more fruitful and complete. The

1. The cosmic ray spectrum

Preguntas y respuestas sobre los rayos cósmicos de energía extrema

- guía para explorar los datos públicos del Observatorio Pierre Auger -

Hace más de 100 años que sabemos que la Tierra está siendo continuamente bombardeado por partículas que nos llegan del cosmos. Estas partículas tienen energías, cantidades y orígenes muy diversos, y hay aún muchas preguntas a su respecto por responder. En este estudio nos dedicamos a los rayos cósmicos de energía extrema - las partículas más raras y más energéticas que nos llegan del Universo. Cuando estas partículas chocan con la atmósfera, producen una cascada o lluvia de millones de partículas, tantas más cuanto más elevada sea la energía de la partícula inicial.

El Observatorio Pierre Auger detecta estas cascadas de partículas con el objetivo de desvelar algunos de los misterios relacionados con los rayos cósmicos de energía extrema: ¿Qué partículas son estas? ¿De dónde vienen? ¿Dónde son producidas y cómo son aceleradas hasta tener energías tan altas? El Observatorio Pierre Auger ha decidido hacer públicos 1% de los datos que registra desde 2004 a todos los que quieran aprender más sobre los rayos cósmicos de energía extrema. Esos datos están disponibles en la página del Public Event Explorer, que se actualiza diariamente.

La intención de esta guía es ser un hilo conductor en vuestra exploración de los datos públicos de Auger, para hacerla más rica y completa. El trabajo está organizado en las siguientes partes:

1. El espectro de energía de los rayos cósmicos
2. Cómo se desarrollan las cascadas de rayos cósmicos
3. Cómo se detectan las cascadas de rayos cósmicos

Perguntas e Respostas sobre os raios cósmicos de energia extrema

- Um guia para explorar os dados públicos do Observatório Pierre Auger -

Há já 100 anos que sabemos que o planeta Terra é constantemente atingido por partículas que nos chegam do cosmos. Estas partículas têm energias, abundâncias e origens muito diversas, e existem ainda muitas perguntas por responder a seu respeito. Neste estudo dedicamo-nos aos raios cósmicos de energia extrema: as partículas mais raras e mais energéticas que nos chegam do Universo. Quando estas partículas atingem o topo da atmosfera produzem um chuveiro de milhões de elevada for a energia da partícula inicial.

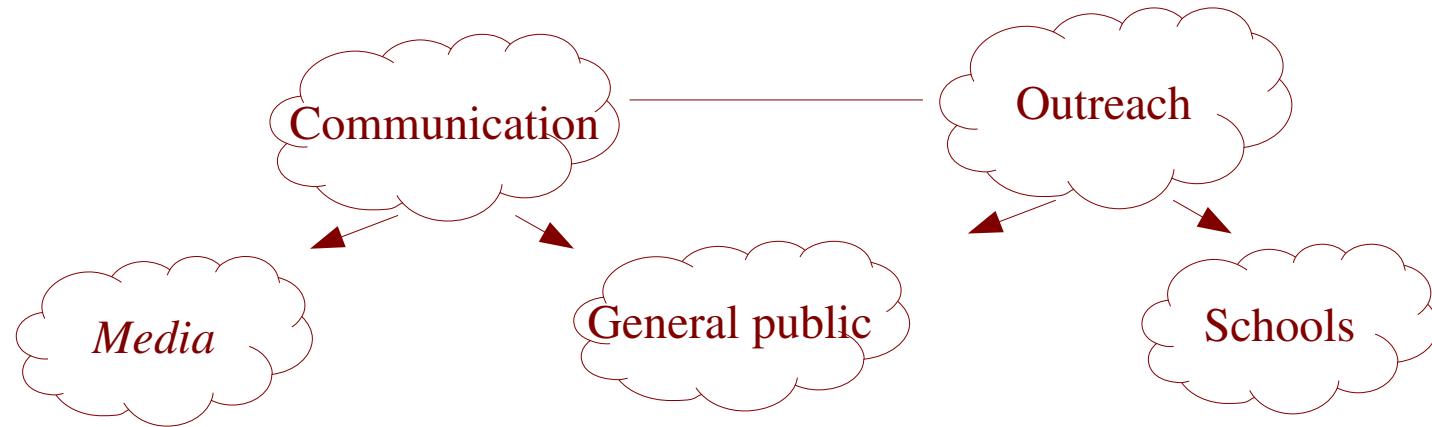
estes chuveiros de partículas com o objectivo lacionados com os raios cósmicos de energia De onde vêm? Onde são produzidas e como são tão elevadas? O Observatório Pierre Auger é que está a recolher desde 2004 a todos os os raios cósmicos de energia extrema. Esses do Public Event Explorer, que é actualizada

utor na vossa exploração dos dados públicos de leta. O trabalho está organizado nas seguintes

eiros de raios cósmicos
s de raios cósmicos
icos de energia extrema
obre os raios cósmicos de energia extrema

<http://www.auger.org>
dados públicos de Auger): <http://auger.colostate.edu/>
www.auger.org/education
<http://www.particleadventure.org>

Prospects

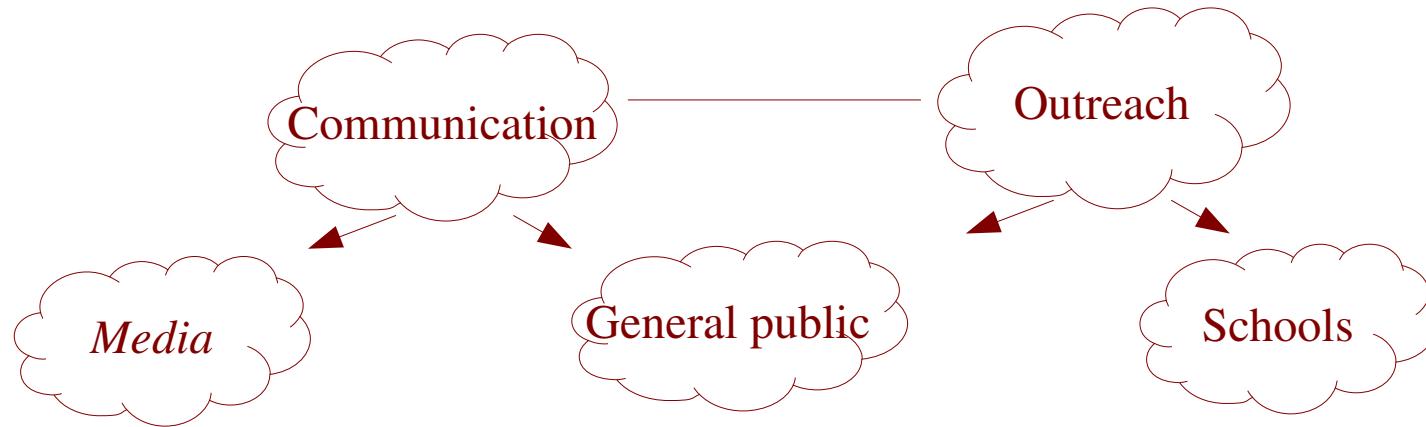


A set of consolidated activities and networks...

Much to improve

Much do be done

Prospects



A set of consolidated activities and networks...

Much to improve

Organization and sharing of responsibilities needed!
Encourage participation of all researchers

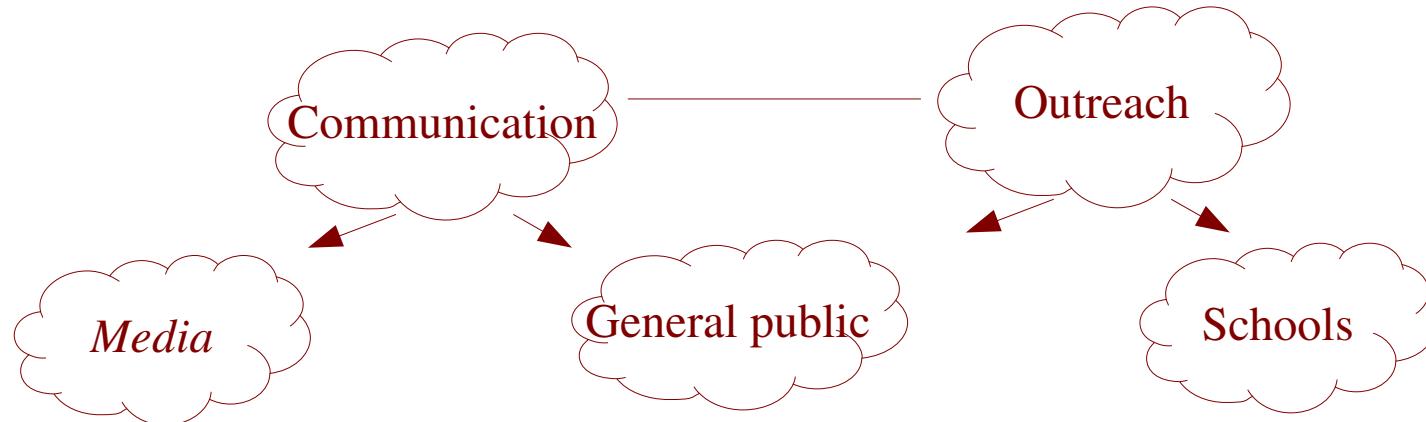
Much do be done

List of seminar requests, school contacts, scientific ephemeris

Pool of talks and material for talks

--> New Web page to be announced soon

Prospects



A set of consolidated activities and networks...

Much to improve

Much do be done

↓
Development of educational contents:

- Booklets, activity guides, small exhibitions
- Increase publications in science education journals
- Build demonstration and experimental kits

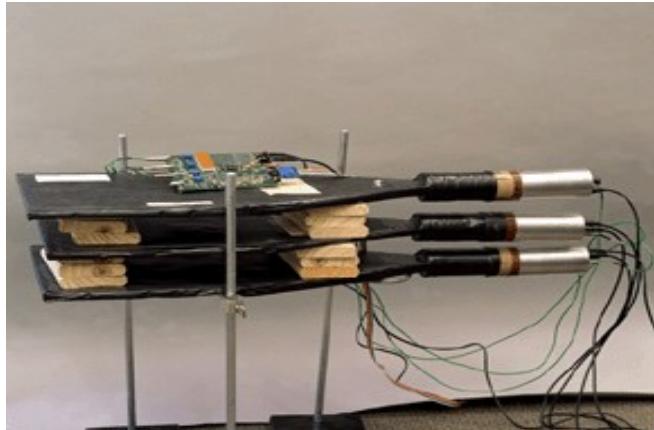


LIP spark chamber: now in Portugal (3), Argentina (1), Italy (1), Spain (1), Austria (2)
Soon in Sweden and at CERN

Project for a portable cosmic muon detector

Cosmic rays have a large outreach potential: from particles to the Universe
They are easy to demonstrate

Build portable scintillator based cosmic muon detector to perform measurements at schools



Put it in a “small suitcase”:
portable, tidy and easy to use,
able to rotate in zenith angle

The LIP Bulletin is out



Next issue: Aug/Sept 2014

