

Outreach in particle physics, Czech Republic

Jiří Rameš

EPPOG Meeting, Prague

18 April 2008

- Broad consensus in particle physics community that outreach activities are important, but the number of people who actively participate is rather limited
- No centralized structure of command, outreach financed in the framework of various projects, no separate financing
- So, the environment is not particularly suitable for mass scale actions, for which we lack both means and manpower
- Possible solution:
 - To do one's best in organizing modest actions
 - To treat particle physics outreach as a part of broader whole – physics and science outreach in general

Targets

- Students and teachers
- General public
- Media

Students, teachers

- Masterclasses
- Weeks of science, open days
- Day of CERN
- The “Open science” project
- Visits of students in home laboratories
- Visits to CERN and other major labs abroad
- Project CZELTA – cosmic rays at high schools

Masterclasses

Sáhněte si na částice 2008 - Mozilla Firefox



Google

co obnáší analýza

ch 2, Praha 8

prezentace o standardním modelu, metodách experimentální částicové fyziky a detailní instrukce o následující počítačové analýze událostí zaznamenaných na detektoru DELPHI ve srážkách elektronů a pozitronů z urychlovače LEP,

- ♦ **přestávka na oběd** (z vlastních zdrojů nebo v kantýně MFF UK),
- ♦ **odpoledne v počítačové laboratoři MFF UK** vlastní analýza dat,

Done

start 5 Firefox 4 Windows Explorer 3 Microsoft PowerP... CS 17:49

Students, teachers



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Prague

Day of CERN, 2004



Students, teachers

- Masterclasses
- Weeks of science, open days
- Day of CERN
- The “Open science” project

OPEN SCIENCE



WE ARE OPENING STRAIGHT WAY FROM THE SCHOOL TO THE SCIENCE



PROJECT OS



THE ACADEMY OF SCIENCES OF THE CZECH REPUBLIC

PROJECT OS

PARTNERS

ACTIVITIES

CONTACTS

NEWS

OPEN SCIENCE and media



INTRODUCTION OF THE PROJECT OPEN SCIENCE

This project aims to improve the qualification of secondary schools teachers and, especially, to expand the opportunities for talented students. It focuses on the life sciences and technology. The Project comprises four main steps, as follows:

- 1a) Practical training courses for teachers will take place throughout the duration of the Project. Three one-week-courses will take place each August relating to every branch of science, such as physics, chemistry and biology.
- 1b) A one-week-seminar covering all fields of science and including lectures, excursions to science labs and practical examinations will also be offered.
- 2) Students may compete for 150 scholarships in 24 scientific specialities during the two-year-duration of the Project. Secondary schools students will undertake research work of their choosing under the supervision of scientists.
- 3) Three interactive DVDs will be produced in cooperation with teachers from secondary schools and scientists covering every field of science, e.g., physics, chemistry and biology. They will be distributed consecutively in secondary schools to facilitate their use as educational resources.

Students, teachers

- Weeks of science, open days
- Day of CERN
- European Masterclasses
- The “Open science” project
- Visits of students in home laboratories
- Visits to CERN and other major labs abroad

Students visiting ATLAS



18 April 2012

Students visiting MICROCOSMOS



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Czech Teachers Programme, March 2008



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Students, teachers

- Weeks of science, open days
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- Project CZELTA – cosmic rays detection at high schools

CZELTA

(CZEch Large-area Time coincidence Array)

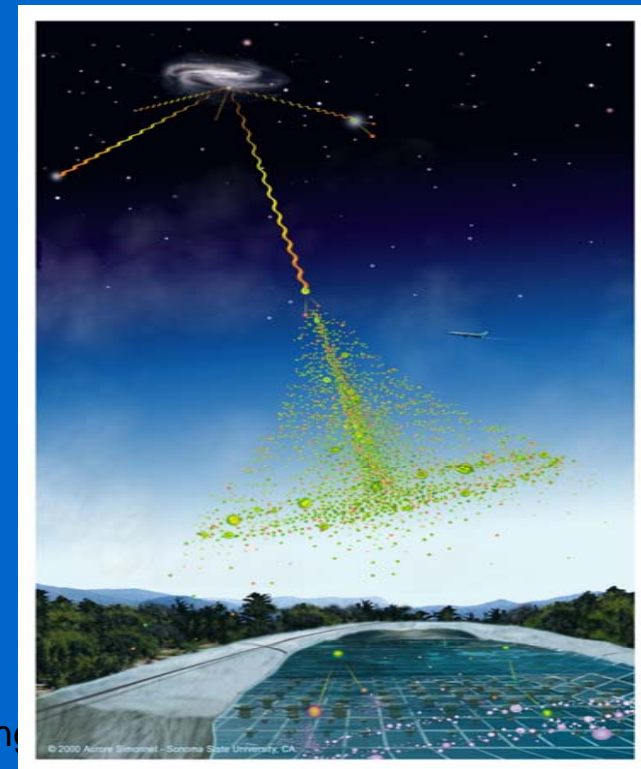
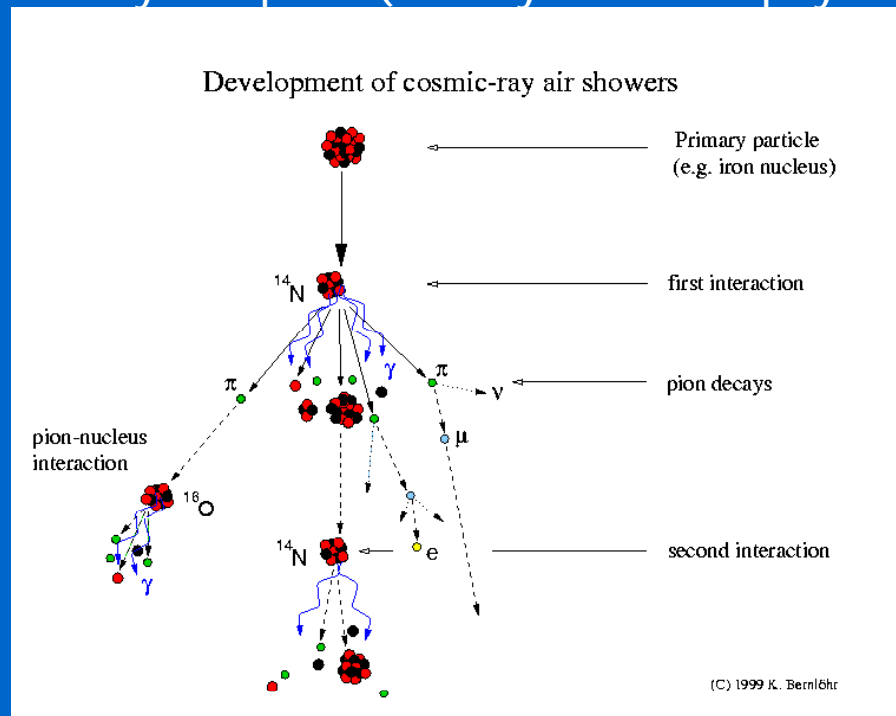
Czech Technical University in Prague
- Institute of Experimental and Applied Physics

Silesian University in Opava
- Faculty of Philosophy and Science

Supplied by **Karel Smolek**
(Karel.Smolek@utef.cvut.cz)

Project CZELTA

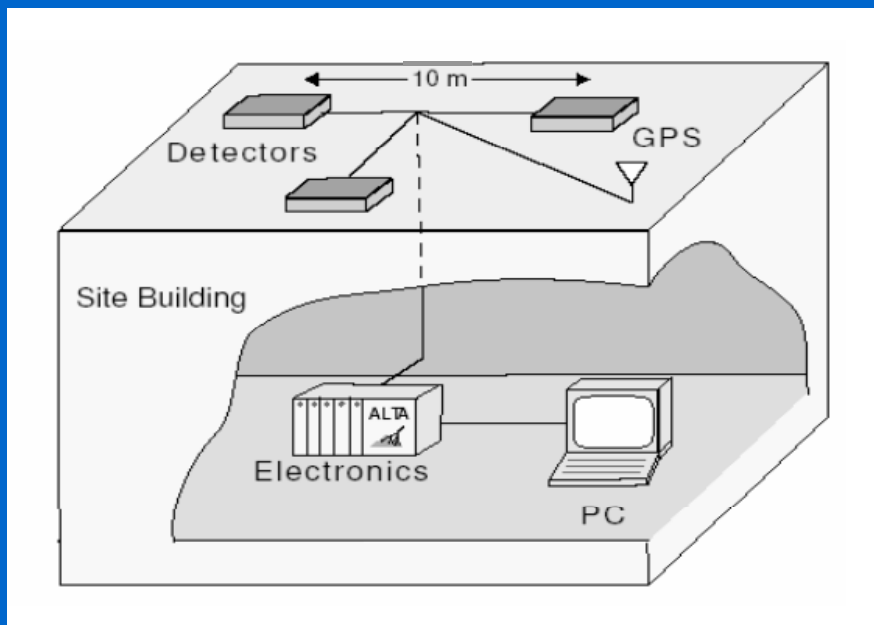
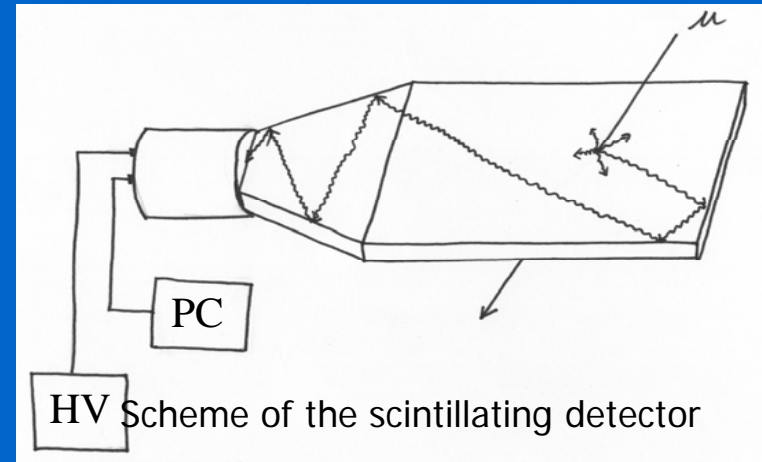
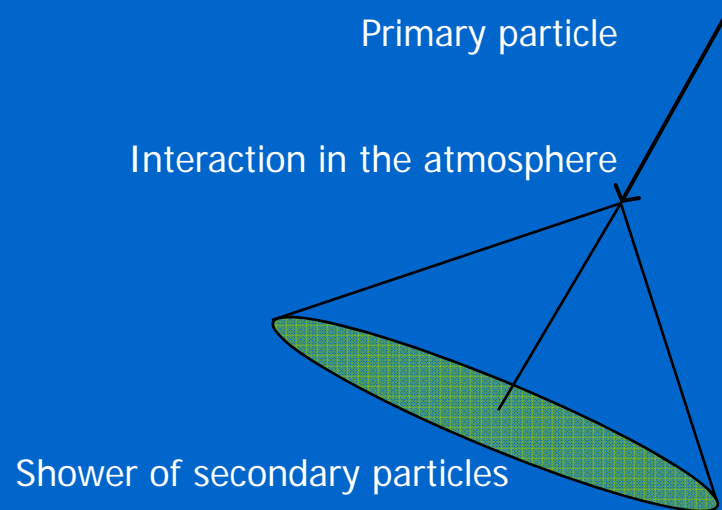
- Project for the detection of high energy cosmic rays ($>10^{14}$ eV).
- Detection stations are installed at roofs of high schools -> educational impact .
- Collaboration with Univ. of Alberta (project ALTA, the same hardware is used).
- CZEch Large-area Time coincidence Array – project of Czech Technical University in Prague (Institute of Experimental and Applied Physics) and Silesian University in Opava (Faculty of Philosophy and Science).



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Shower of particles of secondary cosmic rays.

Hardware of the detection station



- Three scintillators with photomultipliers in a triangle with a side ~ 10 m, work in a coincidence \Rightarrow detection of showers with the energy $> 10^{14}$ eV.
- GPS for precise time-labeling of detected showers (precision ~ 10 ns) \Rightarrow it is possible to study space and time coincidence of the detected showers.
- Each detection station is equipped with a simple meteorological station, measured data are automatically stored on PC.

Hardware of the detection station



GPS antenna

Thin metal tube
with cable 230 V

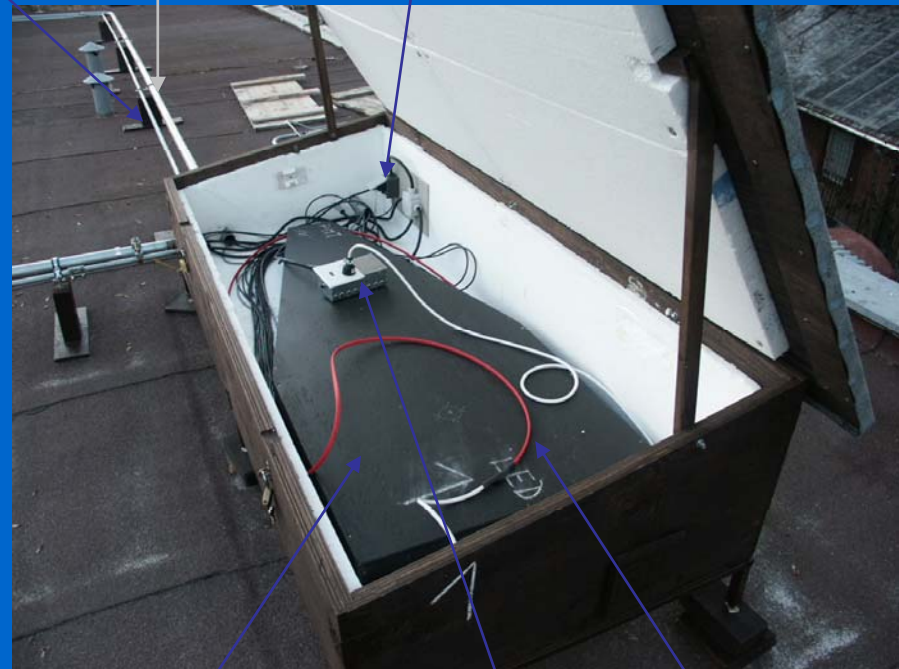
Metal tube with other cables:

- high voltage for photomultiplier
- signal cables from photomultiplier
- cable to testing LED diode
- cable for controlling of thermostat

Socket of 230 V (heating)



18 April 2006
Outer box
with temperature insulation



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Wooden box
With scintillating detector

Thermostat

Heating cable

Light guide

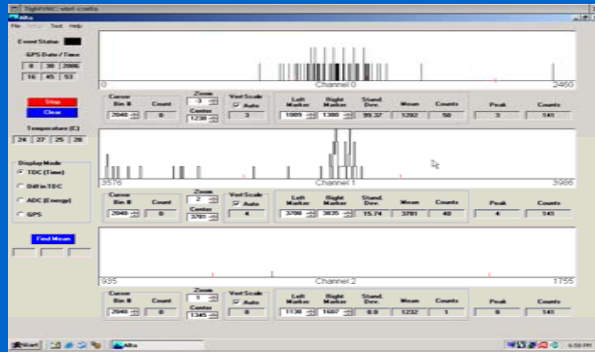
Photomultiplier



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Testing LED diode

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Prague Scintillator

Electronics



Crates



GPS receiver

UPS

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PC

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Present status of the project

- In the CR - 5 running stations.
- Other stations are in preparation (3 stations in 2008).
- Production of hardware in the CR (10 planned stations)
 - first electronic boards produced in Awos Pardubice
 - scintillators produced in JINR Dubna
 - Technical school in Pardubice – possible collaboration in completion of electronics.
- Achievement of the students from Pardubice
 - National round of the competition of student scientific projects – AMAVET, organized with collaboration of the American Meteorological Society. Students from Pardubice got special price from the American Meteorological Society.



General public

- TV, radio, press, web pages
- Open days at the labs
- Public lectures
- *Science at the streets* project

Particle physics in the Czech Republic

Laboratories in the Czech Republic Particle physics research

- [Division of elementary particle physics, Institute of Physics of the Academy of Sciences of the Czech Republic, v. v. i., Prague](#)
- [Institute of Particle and Nuclear Physics, Faculty of Mathematics and Physics of the Charles University, Prague](#)
- [Nuclear Physics Institute of the Academy of Sciences of the Czech Republic, v. v. i., Rez](#)
- [Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University, Prague](#)

Laborator



General public

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Science at the streets



Media

- Cooperation with journalists, especially TV journalists
- Original Czech TV documentaries about CERN and particle physics, shots in TV news, Czech dubbing of foreign documentaries
- Radio
- Press conferences, round tables

Czech TV crews at CERN



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Original TV documents

- Descent to the cave of giants (2004)
- Elementary particles – from the series *Planet Science* (2006)
- Popular science magazine PORT dedicated to CERN, LHC and particles (2007)

Sometimes remarkable personalities appear on screen



Particle physics on the radio





Round table on particle physics,
Week of science and technology

A couple of remarks

- Personal contacts with people
- Opportunities offered by *events* like conferences, exhibitions, anniversaries etc. (CERN traveling exhibition)
- On the importance of being on TV

- Everybody is impressed by visiting CERN, the impact of seeing by one's own eyes and feeling the atmosphere cannot be overestimated



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Prague

Great opportunity for making
particle physics visible is the
LHC start-up