

# Reaching out to teachers, students and public

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EPPOG meeting in Prague  
April 18.-19., 2008

## **Basic problem:**

- Our resources (money, time available, capabilities ... ) are always limited and we should set some priorities.

## **My ( $\approx$ our ...) priorities:**

- Care for the image of (particle) physics,
- attracting enough students to physics

## **My approach:**

- focus on teachers,
- stimulate rather than lecture,
- keep on other activities,
- try to employ media whenever possible

## Why teachers and what to do with them?

- Teachers have enormous (positive or negative) effect on attractivity of the subject,
- they influence everybody who passes the educational system,
- they either stimulate students and help them to get closer to physics or repel them from physics.

## Our experience and strategy:

- It is rather difficult to teach teachers, but ...
- it is quite easy to excite them and (it is not so easy) to support their further activities.

# Teachers: good teachers attract students

- teachers in CZ educated separately from physics students
- usually specialized in two sciences, best case being physics-mathematics
- no centralized “quality control”
- no systematic in-service training
- possibly have heard something about particles, but probably didn't digest it
- ...

**Instead of complaints, let's help them!**

... active teachers form an appreciative audience!

R-ECFA meeting in Prague  
March 9.-10., 2007

I am repeating myself ...

# Exciting teachers - Excursions ...



From Prague  
via Munich  
to Geneve



... and Chamonix





# Exciting teachers:

We have a „club“ of interested teachers – „Heureka“

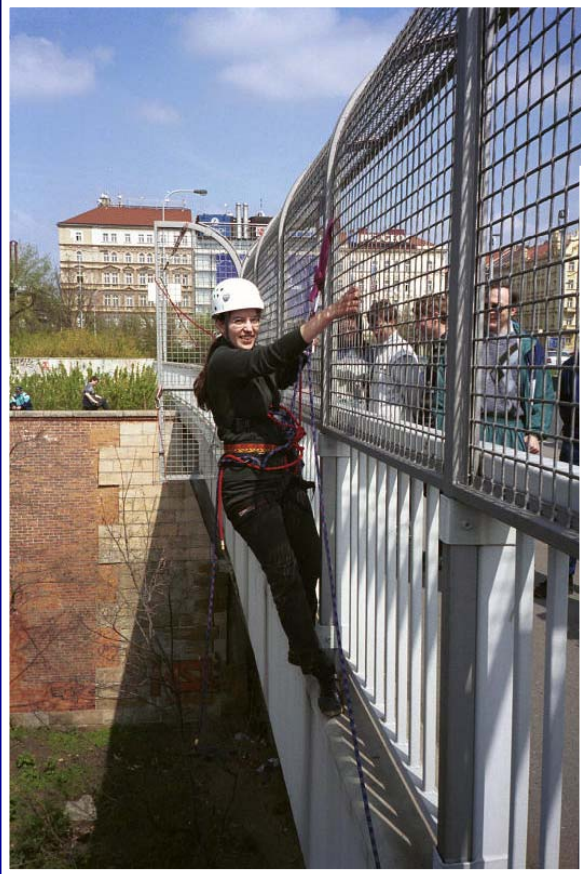
... <http://kdf.mff.cuni.cz/Heureka/>

Seminars should help in basic orientation in given field, they should enhance the qualification of teachers, stimulate the contacts and **bring fun.**



**Nuclear Physics in Czech manner: Teachers measure the decay law of the beer froth ...**

# Exciting teachers ... not only particle physics, here Physics and Climbing





# Exciting teachers ... Physics on Stage

Geneva 2000

Communication & Collaboration



Institute of Physics,  
Academy of Sciences

Dept. of Physics  
Education, Charles  
University

Teachers

PhD Students

Me ... Inst. of Particle and Nuclear  
Physics, Charles University



# Exciting teachers ... Science on Stage

Grenoble 2007

Communication & Collaboration



Me ...

Teachers

PhD Students

Masaryk University  
Brno

Academy of Sciences

# Exciting (and teaching) teachers ... CERN Teachers Programme





# Exciting (and teaching) teachers ... CERN Teachers Programme



We have a rather detailed response:

**Visit to ATLAS and LHC was the most interesting part of the week ... 5 points from 5,**

lectures ... 4.1-4.6,  
building the cloud chamber ...  
... 4.6

GLOBE with posters ... 3.3

General evaluation of the programme ... about 4.7

**Participants now give lectures, prepare teaching aids, we review it !!!**

# Excited teachers attract students:

www.g Expedice mikrokosmos | www.gymzr.cz  
http://www.gymzr.cz/mikrokosmos1.htm

Gymnázium Žďár nad Sázavou, Neumannova 2

Hledat RSS

Již 54 let poskytujeme kvalitní vzdělání.

Domovská stránka

**Expedice mikrokosmos** [Děni ve škole](#)

→ [Popis projektu](#)

→ [Přednášky](#)

→ [Doc. RNDr. Aleš Lacina, CSc.](#)

→ [RNDr. Jiří Dolejší, CSc.](#)

→ [Mgr. Jana Nováková](#)

→ [Závěrečné prezentace](#)

→ [Deník](#)

→ [Zeměpisné zajímavosti](#)

→ [Fyzikální aspekty](#)

→ [Článek do novin](#)

→ [Divadlo](#)

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→ [Hodnocení projektu](#)

→ [Ocenění projektu a pokračování](#)

**Complexity: lectures, CERN visit, events after**

**Interested young people with positive experience with physics!**

Expedice MIKROKOSMOS 2007

CMS

Proč jet do CERNu?



# Support for teachers and students

## Particle Physics "Textbook"

written by physicists for high school teachers and interested students

The aim is to create an interface between the outreach materials aimed at general public & students and the "professional" textbooks

### Length and Form:

- ◆ about 6 chapters, each corresponding to a lecture (or a lecture we give on different occasions).
- ◆ ppt/pdf/ps presentation or html pages to be available having in mind the possibility to put it on the paper - appropriate
- ◆ possibly in many different flavors respecting different needs but hopefully providing a fresh and vivid introduction to this field of physics.
- ◆ English for all, national versions.

A „technical support“, there are also chances for a financial support, and ...

### Chapter 1. What is the current Standard Model of the microworld?

- atoms, nuclei, particles
- relevant **scales**
- leptons, quarks, interactions
- theories, what are Feynman diagrams

Scales

Particle Physics Experiment

LHC, ATLAS, ...

### Chapter 2. What is the typical arrangement of a particle physics experiment?

accelerator, target, cross section, conservation, kinematics / two-particle collisions, colliding beams, invariant

# Support for teachers and students

... we do care for  
a moral support



**Česká fyzikální společnost**

sekce Jednoty českých matematiků a fyziků

uděluje

**ocenění za významný čin v popularizaci fyziky**

učitelům fyziky Gymnázia Žďár nad Sázavou  
za uskutečnění Projektu mikrokosmos

Předsedkyně České fyzikální společnosti

Praha, 4. prosince 2007

# Not only particle physics ...

Review of outreach activities organized by the Czech Physical Society



- School projects
- Institutional outreach
- Active people
- WWW and media





# Attracting enough students to physics ...

Public  
lecture  
on  
photo-  
effect

High school students  
and their teachers





# On the path to particle physics

## Introductory lectures

- bachelor thesis
- selection of the specialization of the master study
- master thesis
- deciding whether to stay for PhD studies, ...

## Summary:

- We don't know about the BEST METHOD for outreach (and from our past experience we are suspicious to any B.M.)
- a significant number of people know about CERN, LHC ...
- we have roughly constant number of students coming to (particle) physics

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