

# Swiss Institute of Particle Physics

- ▶ What is CHIPP?
- ▶ The roadmap and other recent activities of CHIPP
- ▶ Overview of Swiss research activities
- ▶ Statistics: Switzerland and Europe
- ▶ Particle physicists in Swiss Universities, students
- ▶ Funding of Swiss particle physics
- ▶ Achievements since 2002 and worries for the future

# What is CHIPP ?

- ▶ Advisory council for particle physics in Switzerland
  - ▶ Founded in 2003, with strong support by R-ECFA at its last visit
- Thank you very much!

## Structure:

- ▶ plenary (all active p.p. researchers), meets once per year
- ▶ board (all professors), meets twice per year
- ▶ executive board (presently 4 members, daily operation), monthly meetings

## Purpose:

- ▶ coordinate the involvement of Swiss institutes in particle, astroparticle and nuclear physics research.
- ▶ coordinate high level graduate student teaching.
- ▶ recommend priorities within available resources.
- ▶ give advise on vacant professorships to promote synergies and well balanced programmes in Switzerland.

# The Roadmap

Published by CHIPP in 2004

Research activities ordered along three pillars:

- ▶ High energy frontier H
- ▶ Neutrino physics N
- ▶ P.p. at the interface to Cosmology A

Contents of roadmap:

- ▶ Particle Physics
- ▶ Survey of existing activities
- ▶ Planned activities in the three pillars.
- ▶ Spin – offs
- ▶ Education and outreach



The 10 recommendations on how to develop p.p. in Switzerland are still valid. However some new activities came in - we plan an update of the roadmap.

# Activities of CHIPP: [www.chipp.ch](http://www.chipp.ch)

## Planning of resources for particle physics research:

- ▶ Maintain table of Swiss resources recommended for proposed activities -> 2013
- ▶ Coordinate EU FP7 contributions to and from Swiss institutes.

## Coordinate LHC exploitation:

- ▶ Received a grant from IKP ("Innovations- und Koordinationsprojekte") of the Swiss University conference to support LHC exploitation:
  - 9 additional PostDocs positions, 2008 - 2011
  - some CHIPP administration and graduate student education support
- ▶ Coordinate the installation and usage of the computing resources in CSCS Manno (Tier-2)
- ▶ Coordinate Swiss maintenance and operation resources
  - managed to get extra funds for both these purposes!

## Science and education:

- ▶ Regular scientific workshops on the three pillars H, N, A and on detector R&D (biannually)
- ▶ Plan an update of roadmap
- ▶ Yearly Swiss CHIPP school for PhD students
- ▶ Yearly CHIPP prize for the best Swiss PhD student
- ▶ Outreach: website, LHC facts sheets, European master classes (EPPOG)

# Research Activities: high energy frontier

Details see Olivier Schneiders and Gilberto Colangelo talk:

Swiss involvement in three detectors  
at LHC, similar group sizes

ATLAS:	Uni Geneve, Uni Bern
CMS	Uni Zurich, ETH Zurich, PSI
LHCb	Uni Zurich, EPF Lausanne

**Exploitation of LHC data  
is CHIPPs first priority**

Other Activities in accelerator based physics:

H1 at DESY:	Uni Zurich, ETH, (PSI)
CDF	Uni Geneve, ETH
D0	Uni Zurich (until 2008)
BELLE	EPF Lausanne
DIRAC	Uni Zurich

+ theoretical phenomenology  
groups in many unis / ETH

# Research Activities: Neutrino

Details see Antonio Ereditatos talk:

**Strong Swiss contributions  
Reasonable well coordinated, R&D**

## Neutrino Oscillations:

OPERA at CNGS:	Uni Bern, ETHZ
T2K at JPARC	Uni Bern, Uni Geneve, ETHZ

## Neutrinoless double beta decay

EXO	Uni Bern, (Uni NE)
GERDA	Uni Zurich

## Prepare for future neutrino factory

MICE	Uni Geneve
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# Research Activities: Astroparticle

Details see Thierry Courvoisiers talk:

## Direct Dark Matter Search:

CDMS at Soudan  
ArgonDM  
Xenon at LNGS

Uni Zurich  
Uni Zurich, ETH Zurich  
Uni Zurich

## Gamma Ray Astrophysics with Cerenkov Telescopes

MAGIC  
CTA

ETHZ  
Uni Geneve, Uni Zurich, ETH Zurich, EPF Lausanne

## other

POLAR  
AMS  
ICEcube

Uni Geneve  
Uni Geneve, ETHZ  
EPF Lausanne

lots of data analysis  
(ISDC Geneve) and  
theoretical activities

**Roadmap recommends strengthening  
=> many projects are emerging now  
=> more coordination by CHIPP anticipated  
(successfull in CTA)**

# Research Activities: 2009 versus 2002

High energy and accelerator based particle physics:

- ▶ stronger concentration to CERN in view of LHC operation and exploitation
- ▶ reduced activities at DESY and Tevatron
- ▶ some small activities terminated (ATHENA, HARP, KOPIO, D0)
- ▶ some accelerator R&D in connection with PSI

Neutrino and Astroparticle

- ▶ activities strengthened significantly
- ▶ more people and groups involved
- ▶ more projects, more diversity in topics
- ▶ N: reasonable well coordinated, A: try to improve on coordination

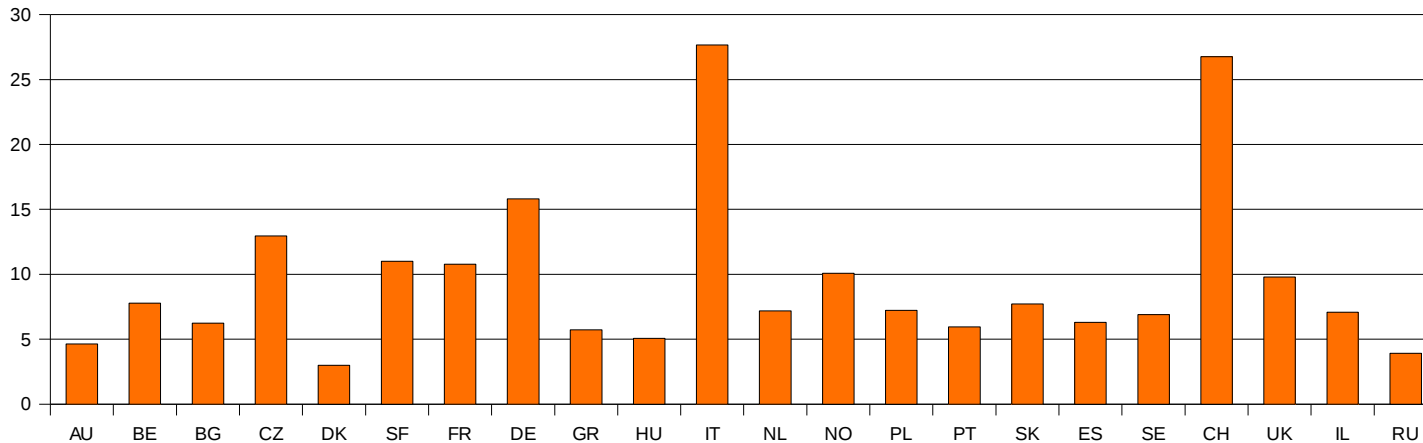
Detector R&D

- ▶ new strong LAr TPC R&D, (in view of Glacier...)
- ▶ after LHC is commissioned: sLHC, CTA, etc.



# Swiss particle physics and Europe (as of 1. January 2006) - experimentalists only

All FTE per population



26 particle physicists / Million

**Swiss community is rather strong**

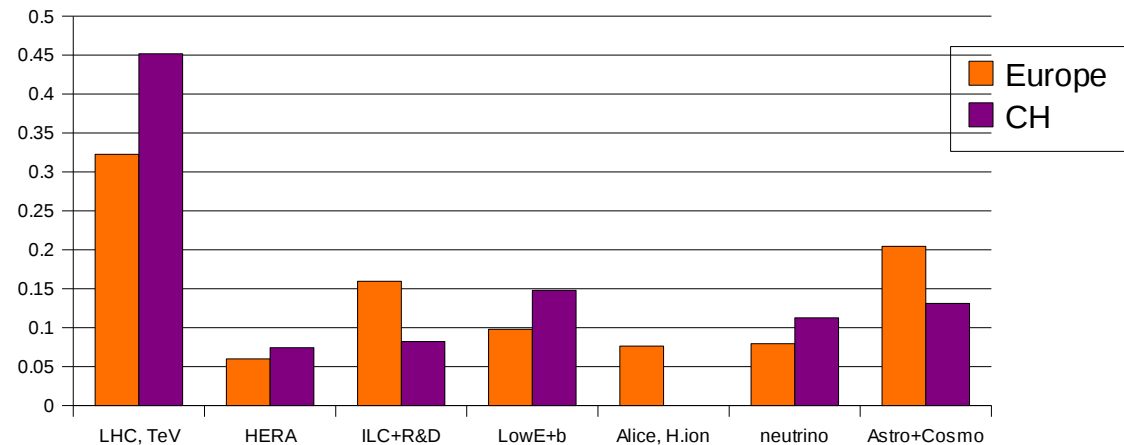
**Makes use of the excellent opportunity being the host of CERN**

Swiss FTE physics researchers (incl. PhD students)

<b>H</b>	<b>111</b>
<b>N</b>	<b>23</b>
<b>A</b>	<b>26</b>
<b>Low Energy</b>	<b>40</b>

Total #:  
2002: 227  
2006: 200  
2009: 209

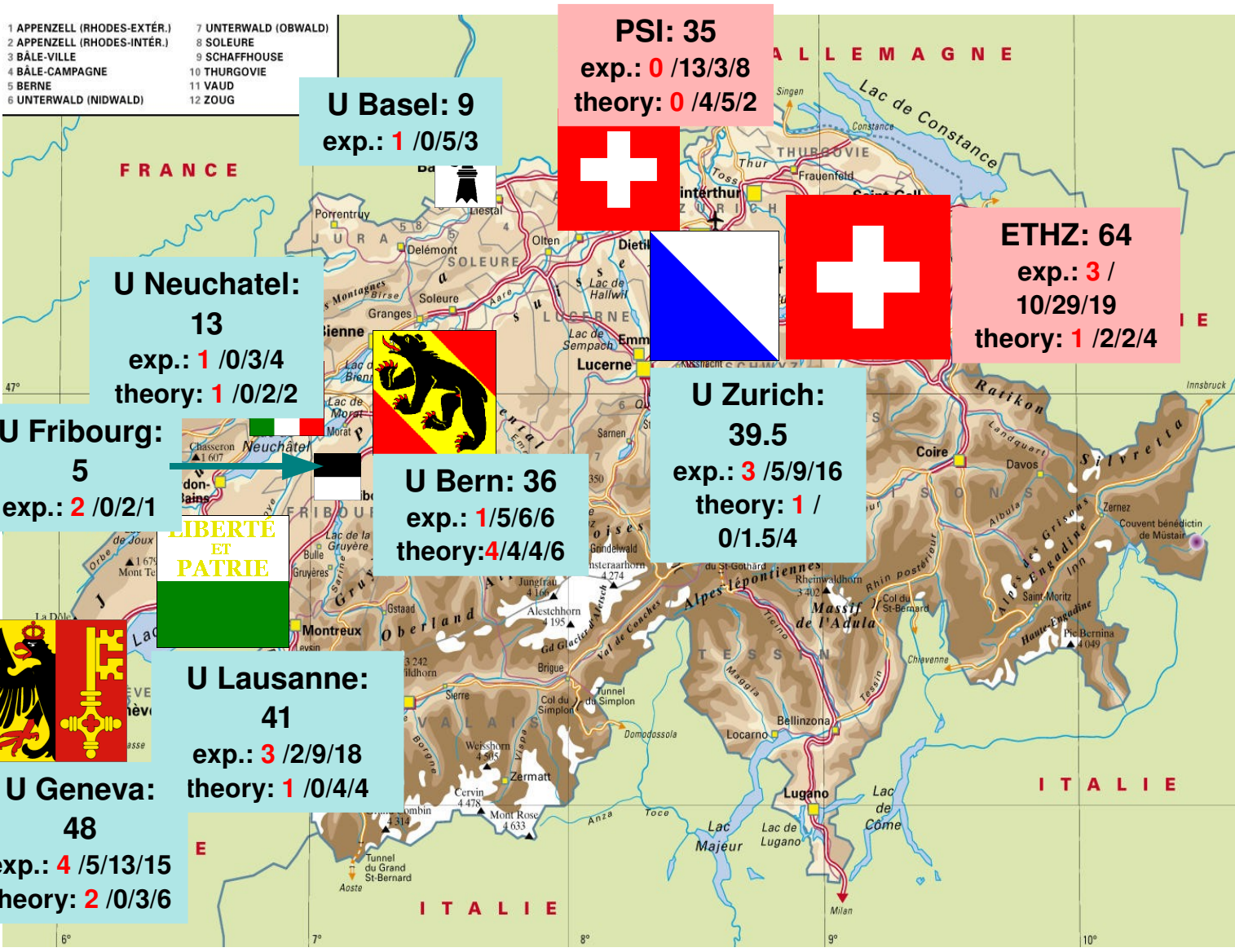
Fraction of FTE in research fields



Pillars: ----- **H** ----- **LowE** **N** **A** 9

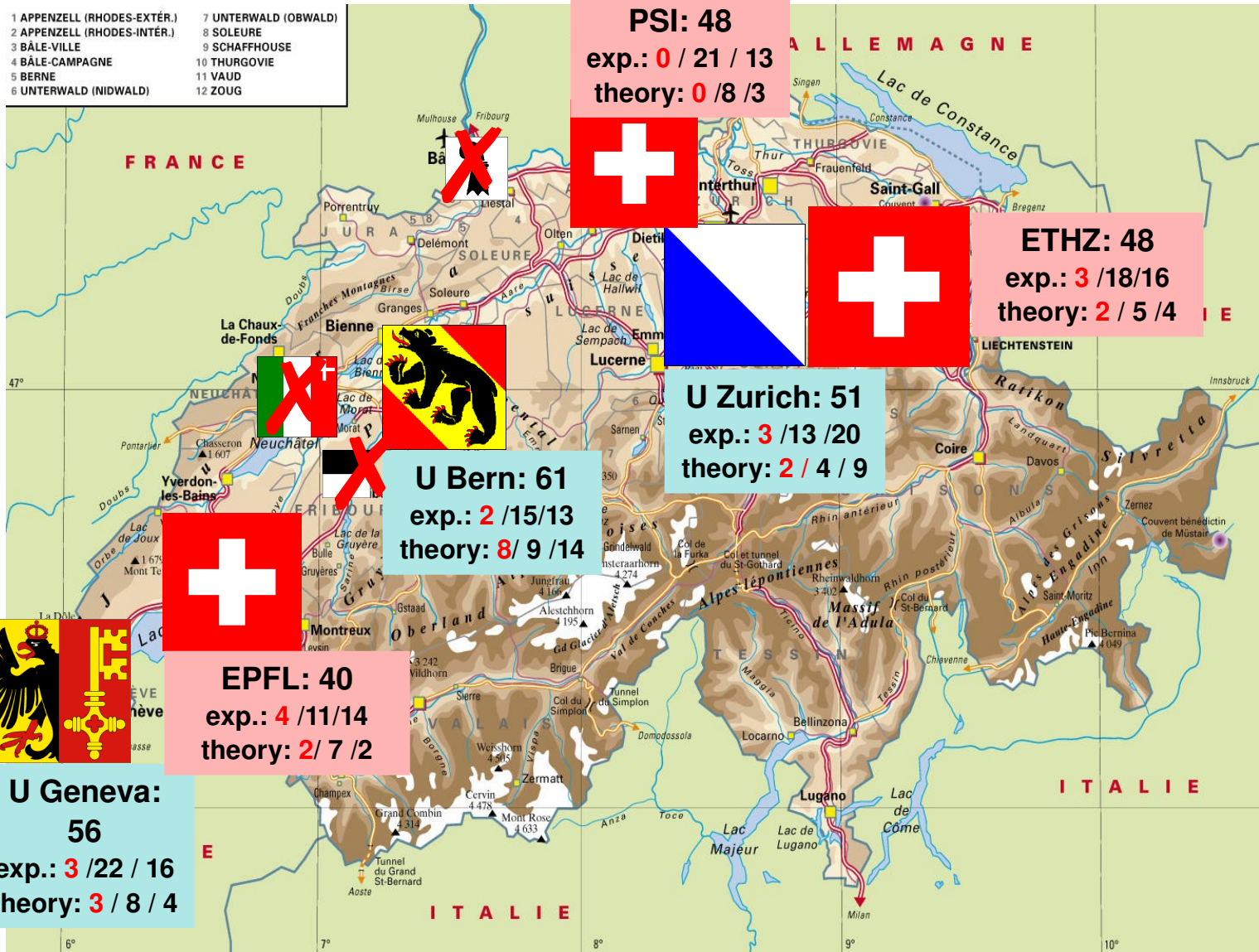
# Swiss HEP landscape in 2002

Scientific personnel:  
 Full professors /  
 tenured staff /  
 untenured staff /  
 PhD students  
 + administrative  
 & technical staff  
 (hard to  
 quantify)



# Swiss part. phys. landscape in 2009

Scientific personnel:  
 Full professors / staff / PhD students  
 + administrative & technical staff (hard to quantify)

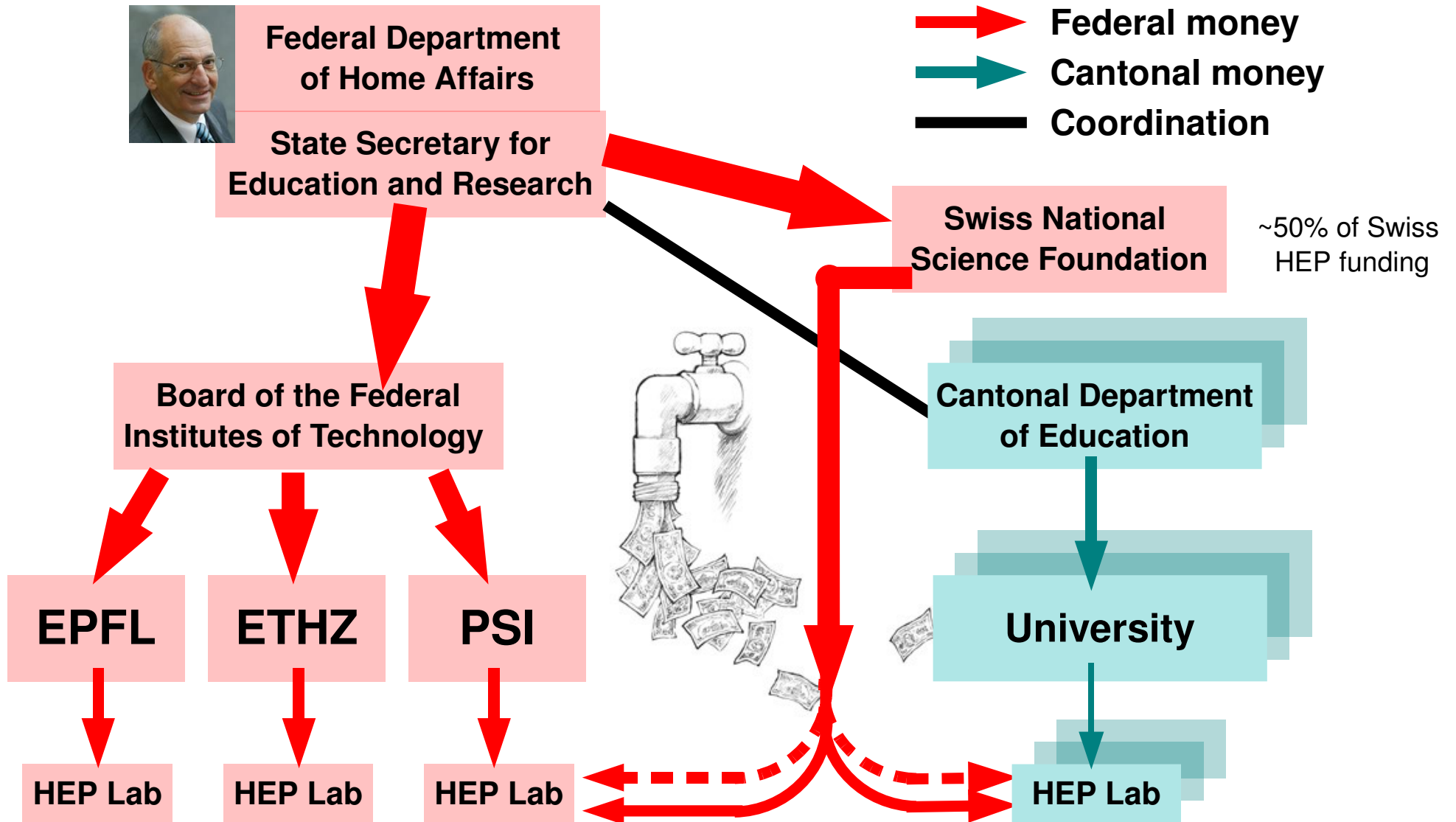


Particle physics concentrated to less universities, without reducing sum – so far

# Physics students statistics

Total number of physics students 2007/8:	2180	(constant since many years)
of which are women	399	18%
of which have foreign nationality	808	37%
Total number of physics PhD students	724	
of which are women	154	21%
Total number of particle physics experimental PhD student	89	

# Organization of Funding

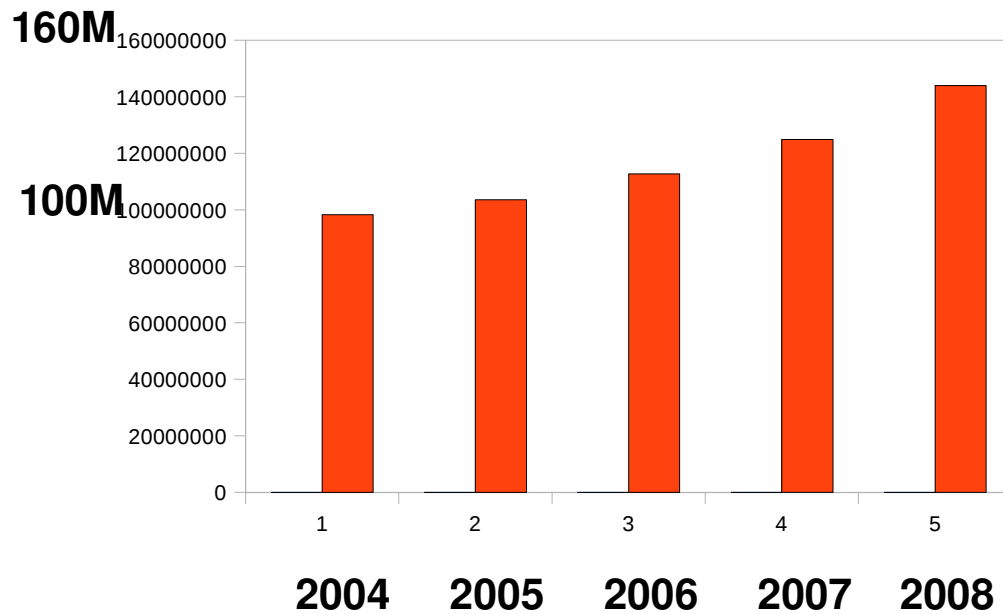


# Funding in Physics

(Swiss National Science Foundation only)

## Budget Division II

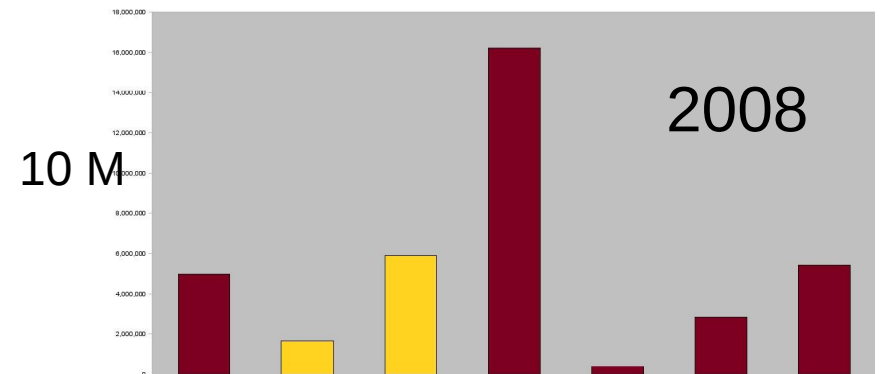
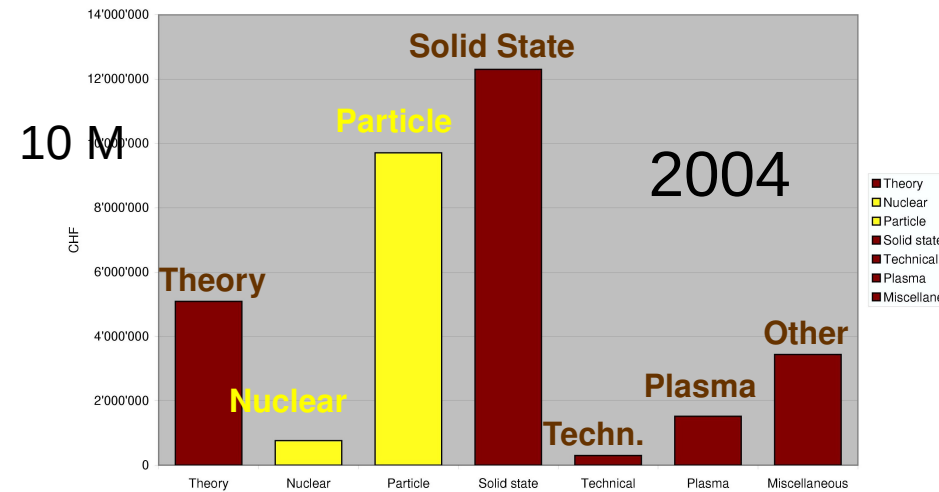
(= Mathematics, Natural and Engineering Sciences)



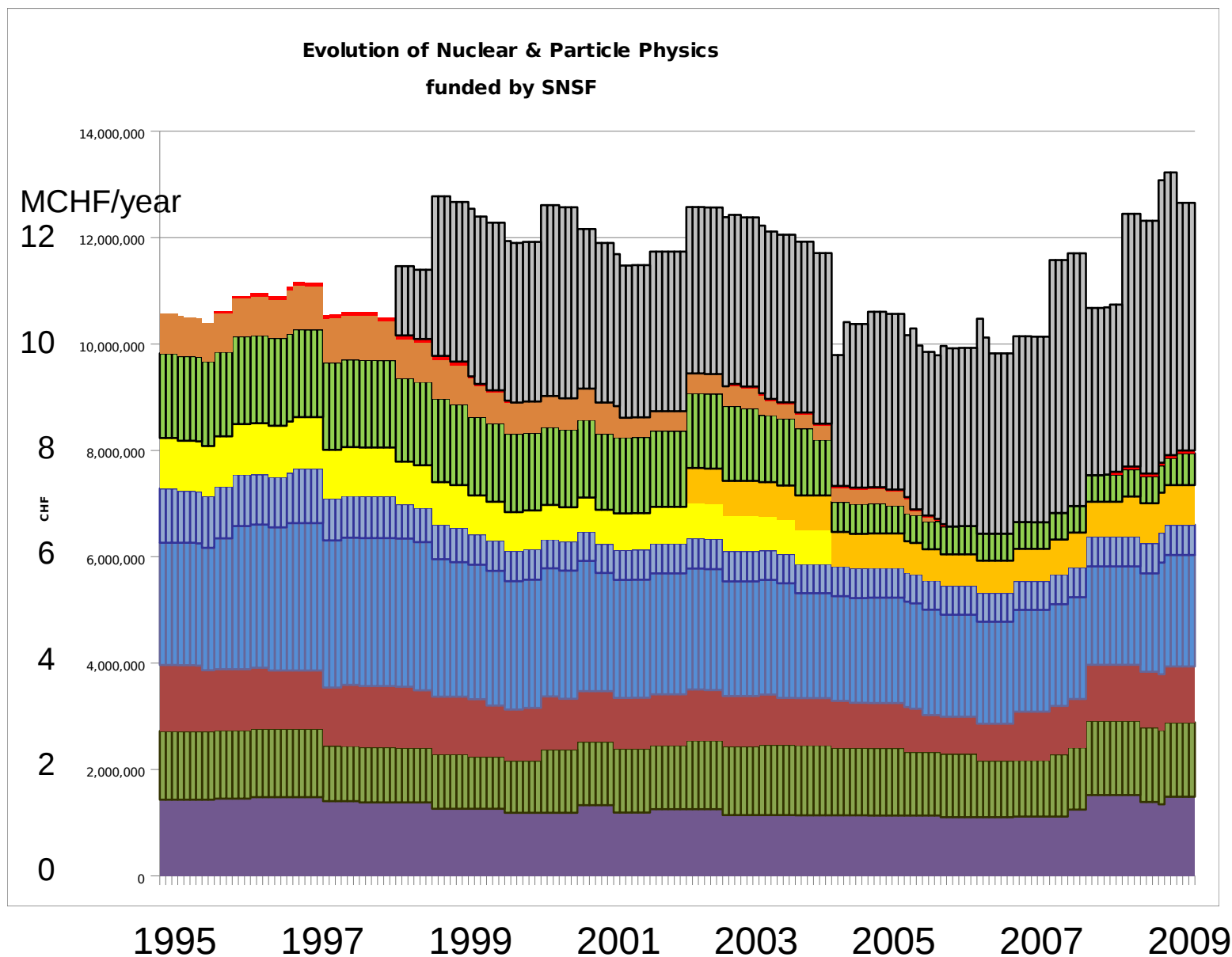
**Particle physics could not profit from increase in funding**

## Distribution within Physics

Distribution of SNF-Funding in Physics (without FORCE)



# Funding (Swiss National Science Foundation only, about 50%) for PhD students, PostDocs, a few technicians and investments



**FORCE:** for investments into CERN based experiments, operation, computing, (but no physicists)

- FORCE
- PSI
- FR
- BS
- EPFL
- LA
- NE
- GE
- BE
- ZH
- ETHZ

# Achievements and worries

Recommendations of R-ECFA from 2002:

- ▶ CHIPP has indeed been founded and works successfully
- ▶ Accelerator R&D: Collaboration between EPFL and PSI works, but was not really extended
- ▶ FORCE is still alive, even increased to cover all LHC M&O and computing needs for LHC
- ▶ Accelerator based physics is now more streamlined and concentrated on LHC

In addition:

- ▶ New diversity and enlarged activities in the neutrino and astroparticle "pillars".
  - ★ Lacking significant funding for these new activities ("infrastructure is not funded by SNF").
- ▶ Concentration on fewer universities and less professors,  
Lost NE, FR, BS for HEP. Uni Lausanne moved to EPFL
- ▶ Decline of federal funds in absolute numbers has been halted,
  - ★ However we lost considerably in funding in terms of fraction of whole science  
Nevertheless we were able to keep the community alive and stable in size.
- ▶ Future of fundamental particle physics at PSI is uncertain: new UCN source and Muons.
  - ★ The worlds highest intensity muon beams allow very sensitive search experiments  
like  $m \rightarrow e\gamma$ ,  $\mu \rightarrow 3e$ .
  - ★ Naturally the world wide communities for these are very small, almost negligible in CH.

Relation to CERN:

- ▶ CH makes significant special contributions to CERN, e.g. "white paper", extension of bldg 40.
- ▶ Outreach coordination with CERN failed so far, lack of time, lack of will, lack of funds.  
But: we profit significantly from the EPPOG activities (Masterclasses)



## Conclusion: Main points

- (1) LHC exploitation is our first priority
  - most important pp project these days
  - CH recognizes its responsibility, being one of the host states of CERN.
- (2) We would like to improve contributions to astro-particle physics. This probably needs more coordination.
- (3) We need new funding mechanisms for A and N ("large infrastructure")
- (4) We wish us a stronger engagement in using the highest intensity muon beams and UCN source at PSI.  
=> World-wide community