

DESY

Teilchenphysik

HERA

HERA → LHC

LHC

ILC

Astroteilchenphysik



Helmholtz Alliance Physics at the Terascale



| | |
|-------------------|-------------------|
| Approved | May 2007 |
| Started | July 2007 |
| Kick-off Workshop | 3-5 December 2007 |

Creates **strong network between German University groups and DESY:**

- establishes DESY as **analysis centre** in D for LHC analysis and ILC preparation
- DESY as partner in a **Grid backbone**
- DESY as partner in **detector infrastructure**
- DESY helping to establish **accelerator physics courses** at Universities

DESY's particle physics activities are embedded in the framework of this Alliance

more details: I.B.

related news :

October 2007

Helmholtz-Russia Research Group (HERA + LHC + ILC)

November 2007

Two new Young Investigator Groups approved

ATLAS (in Zeuthen) in collaboration with HU Berlin

CMS (in Hamburg) in collaboration with Univ. HH

HiGrade negotiations with EU (FP7) → E.E.

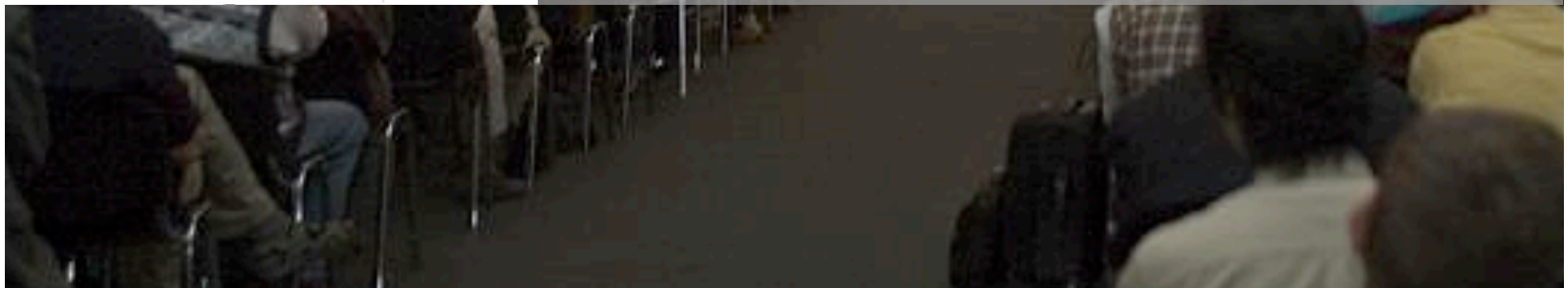
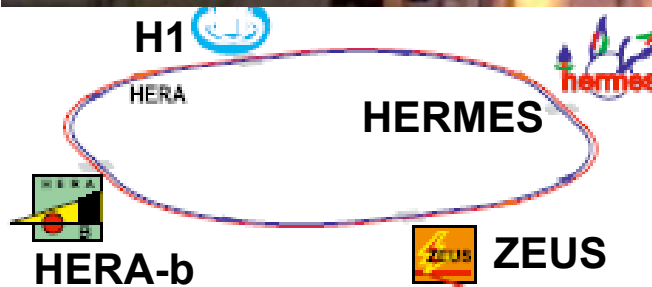
HERA: 1992 – 2007

Many congratulations to **all**
who have worked at HERA

Highly
Exceptional
Research
Achievement



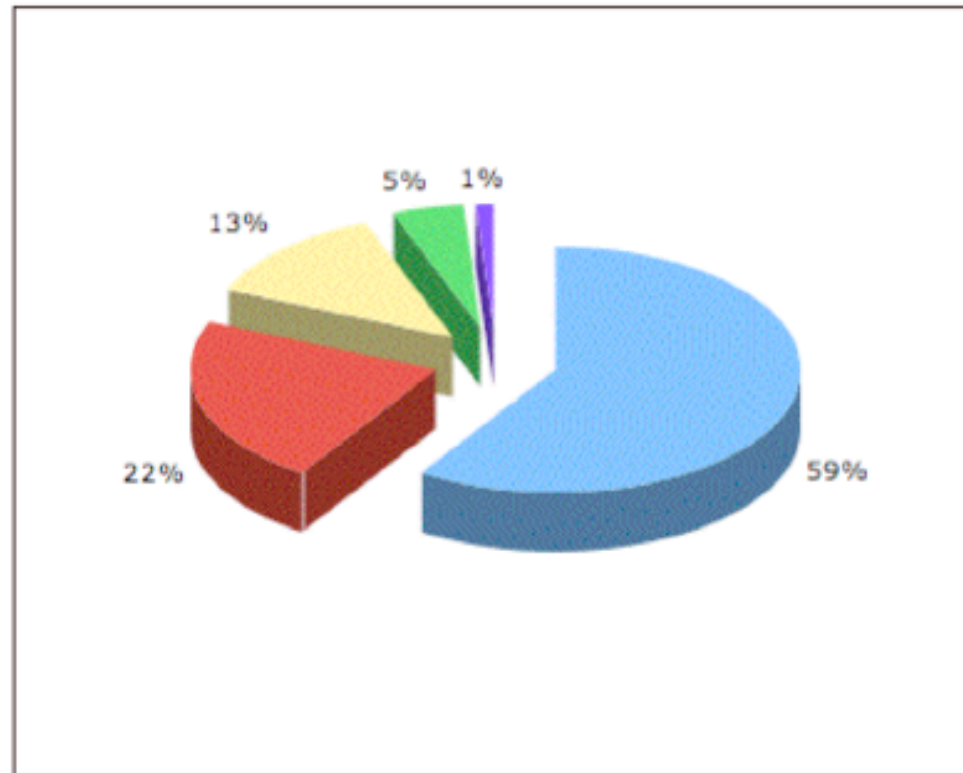
More than 1,000 Physicists
About 1,000 Ph.D.s
About 400 Physics Publications



Students in ZEUS



Total of 346 diploma and 343 Phd students - some overlap among them (information from the majority of the Institutes). For some of these (239) we know that:



141 are Postdocs or staff

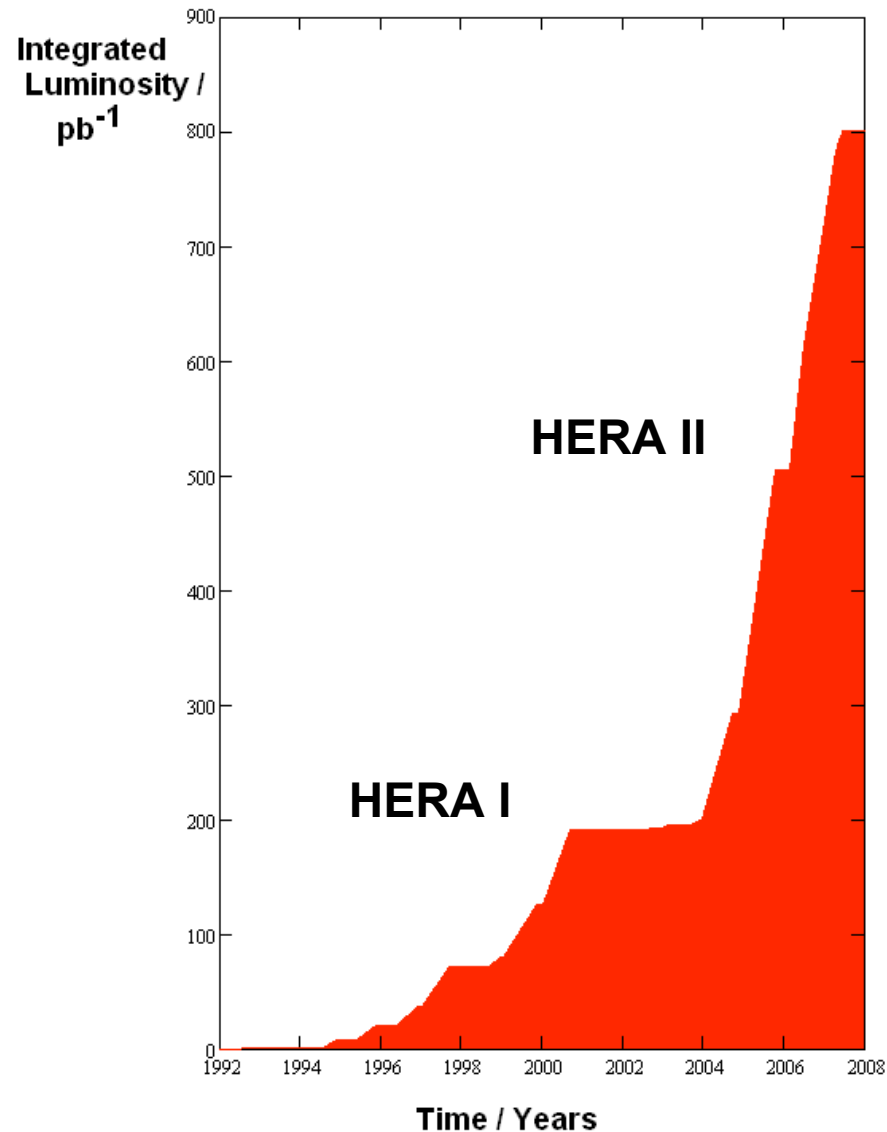
53 are Professors

31 have leading positions outside HEP

11 founded a company with <10 people (limited info)

3 founded a company with >10 people (limited info)

15 Years of e-p Collisions are over

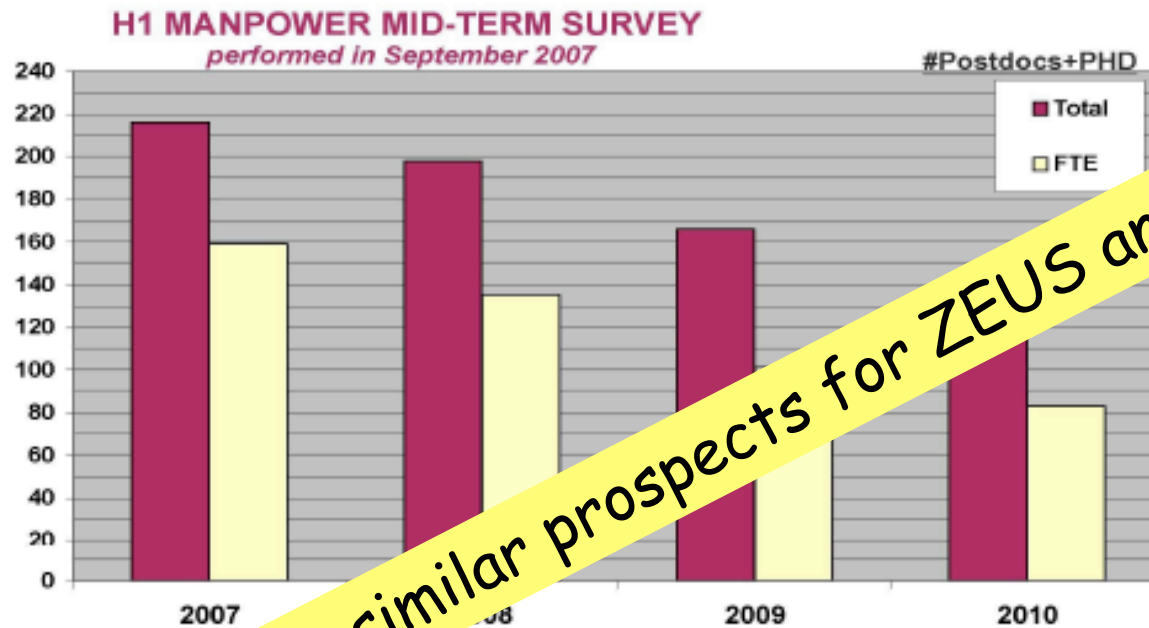


15 years of

- constant effort
- constant improvements
- good collaboration
- growing mutual trust and understanding
- excellent physics results



Prospects : Collaboration



Very similar prospects for ZEUS and HERMES

2009 :
2/3 of present FTE

2010 :
1/2 of present FTE

H1 Collaboration is strongly motivated to finalise data analyses for publication.

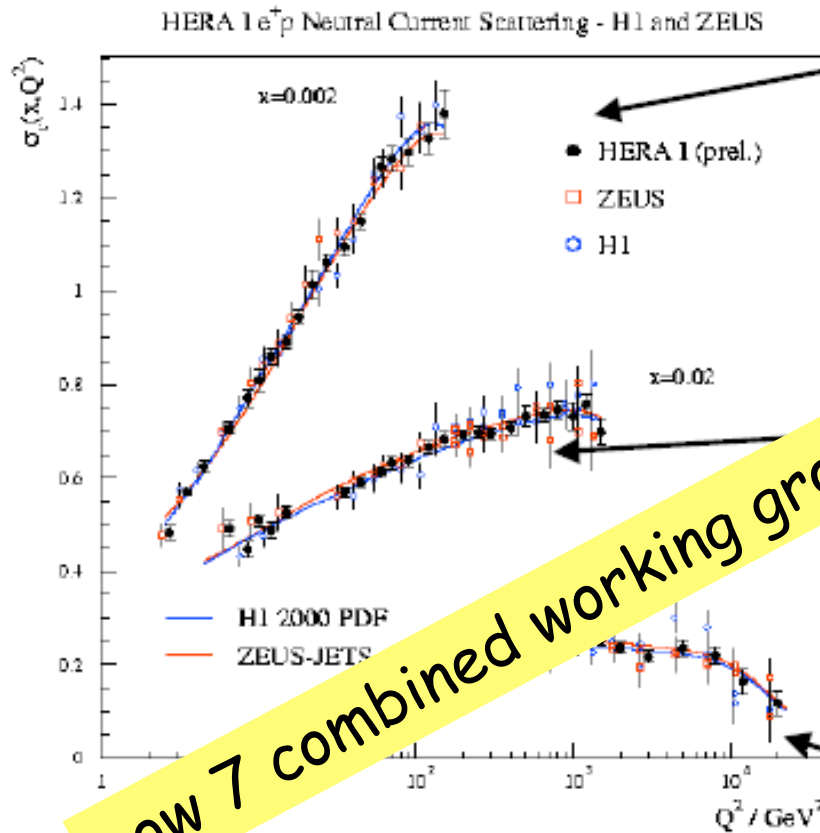
Legacy of HERA



Now need to publish the HERA II data. Flagship analyses:

- F_L , preliminary in 2008, publication in 2009
- inclusive NC and CC cross-sections, also combined with H1 and extraction of HERA PDFs
- charm and beauty cross-sections. Grand reprocessing with a consistent tracking code will be run on all HERA II data starting from early 2008.
- jets and α_s , also combined with H1
- publish searches (with H1 combined) before LHC results
- Diffractive cross-sections and dPDFs and GPDs
- more exclusive final states or something coming out from LHC

Average HERA I cross-sections



Grows at low x
Precision H1, ZEUS
2-3%, <2% when
combined

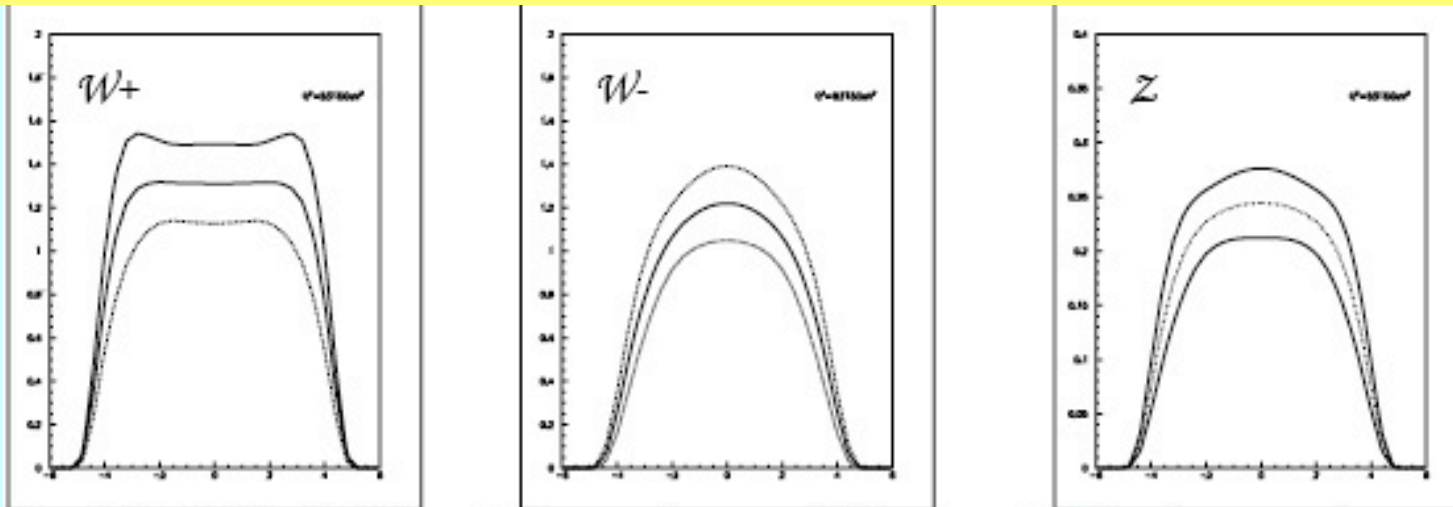
DGLAP works
The extraction of
HERA PDFs is the
next step (see also
HERA-LHC workshop)

Decreases at large x
~10% precision, due to
low statistics

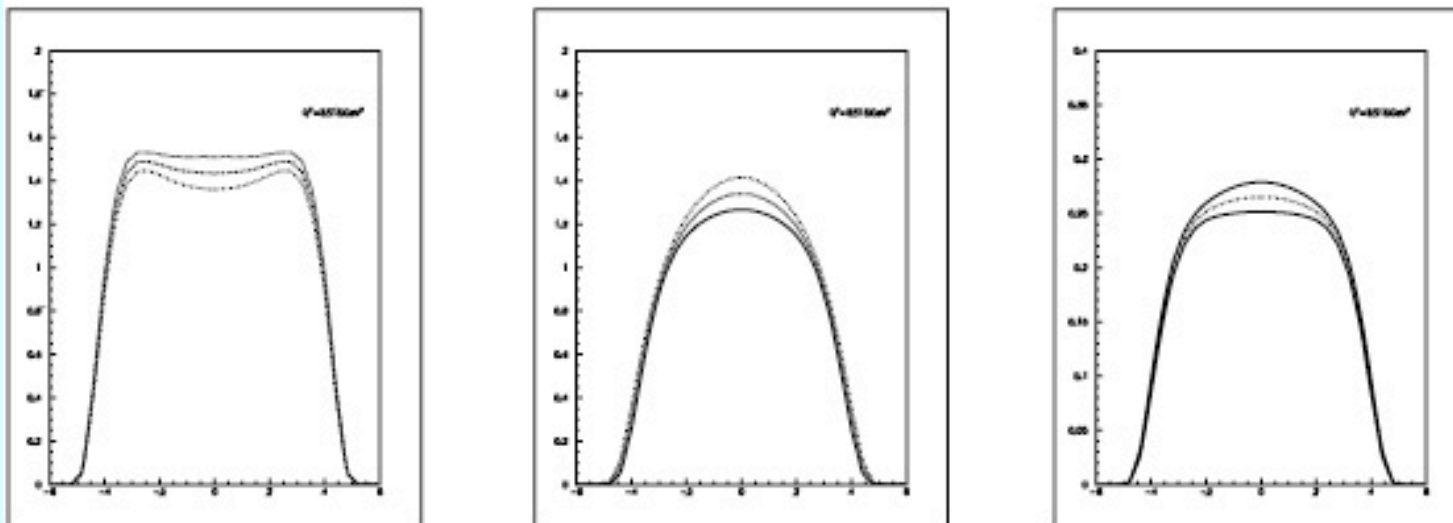
Each experiment 'calibrates' the other one, some systematic errors are much reduced. Method will be extended to all HERAI+II data

E. Gallo, ZEUS Report, FAM meeting 6/11/2007 -12

Ex: HERA results improve luminosity measurement uncertainties at LHC



Pre-HERA $W^+/W^-/Z$ rapidity spectra $\sim \pm 15\%$ uncertainties
NO WAY to use these cross-sections as a good luminosity monitor
Post-HERA $W^+/W^-/Z$ rapidity spectra $\sim \pm 5\%$ uncertainties



DESY/CMS group

- News:
 - Management involvement: 2 Scientists
 - Coordination tasks: 5 Scientists
 - The group continues to grow, presently:
2 dipl., 7 PhD students, 5 PostDocs, 21 staff
- Activities:
 - Higher Level Trigger
 - Data Quality Monitoring
 - Computing & Software
 - Tracker Alignment (close coll. Uni HH)
 - Participation in construction & installation of the CASTOR Calo
 - Beam Radiation Monitor
 - Physics
 - Coming up: R&D sLHC

DESY/ATLAS group

- News:

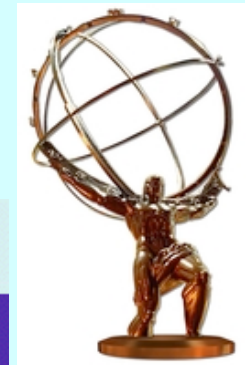
- Additional activities: ALFA, MC generator support.
- Young investigator group joined.
- The group continues to grow, presently:
13 dipl., 7 PhD students, 13 PostDocs, 11 staff, 1 J.Prof (Uni HH)

- Activities:

- Trigger configuration
- Trigger monitoring
- Development of showering simulation algorithms
- Technical maintenance of MC generator interfaces
- Participation in construction & installation of ALFA
- Distributed data management: exercising ATLAS grid tools (e.g. GANGA) & providing extensive user feedback
- Physics
- Coming up: R&D sLHC

Computing for LHC-Experiments: Tier2

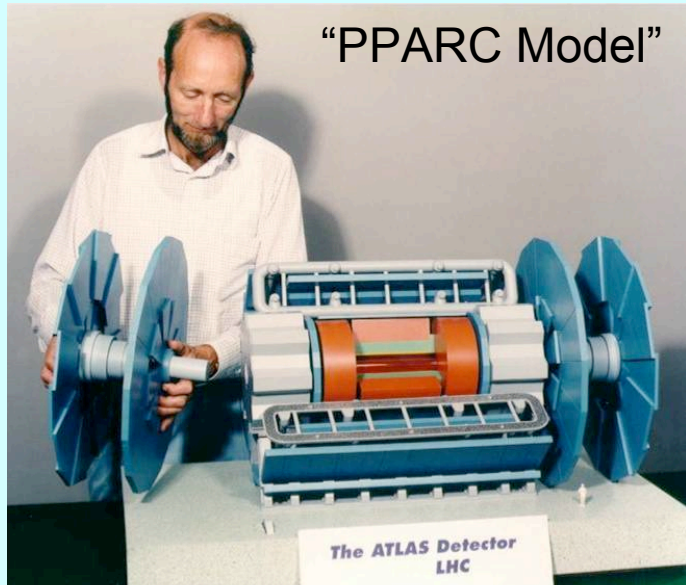
- 3 average Tier 2's (Atlas) and 1.5 average Tier 2 (CMS) are requested for Germany
- Desy commitment: 1 av. Tier 2 for CMS
 - - " - 1 av. Tier 2 for Atlas
 - - " - 1 av. Tier 2 for LHCb
- Aachen commitment: 0.5 average Tier 2 (CMS)
- Uni. of Freiburg, Wuppertal, LMU Munich & MPIfP (Atlas)
- Desy's Tier 2 is distributed between Hamburg and Zeuthen
- Set up a National Analysis Facility



Outreach Activities

T. Naumann, (ATLAS/DESY) is now chairman of GELOG
(German Executive LHC Outreach Group)

CERN visits of science journalists on
Nov.06 + Aug.07, including press, TV, radio
>30 journalists, and resulting in >40
articles in the German press
(Support by DESY, MPI, CERN)



"PPARC Model"



stern.de - 17.11.2006 - 07:53
URL: <http://www.stern.de/wissenschaft/kosmos/576426.html?iv=cb>

"Large Hadron Collider"
Urknall im Labor



NETZEITUNG.DE
URL dieses Artikels: <http://www.netzeitung.de/wissenschaft/453522.html>

Höllenglut bei Urknall im Labor
15. Nov 2006 15:00

WISSENSCHAFT
SEITE 17

Sie über sechs Jahren bauen Wissenschaftler, auch mit Hilfe Deutscher Firmen und Institute die Forscher mit unvorstellbar hohen Energien Atomkerne aufeinander prallen lassen, sollen die 'Lange Hadron Collider' (LHC = 'Großer Hadronen-Aufwandbeschleuniger') soll im kommenden Jahr seinen Probetrieb aufnehmen und ab 2008/2009 auf ein paar der fundamentalsten DFN-Redakteur Heiko Westbrodt besuchte die neue Wundermaschine.

Die Antwortmaschine
Higgs-Boson-Suche: Bei Genf entsteht als europäisches Projekt der weltweit größte Teilchenbeschleuniger, der den Ursprung des Universums ergründet soll



Das Universum in der Röhre
Von Gerhard Semmler

Wissen & Geschichte

Urknall im Labor: Das größte Experiment der Welt entsteht bei Genf - unter der Erde

- 27 Kilometer lange Teilchenkanone im Mittelpunkt
- Existenzielle Frage: "Warum sind wir überhaupt da?"

Wissen
HEUTE: LERNEN | TECHNISCHES: COMPUTER | FORSCHUNG
SERIE: BESUCH AUF DER BAUSTELLE DES GRÖSSTEN TEILCHENBESCHLEUNIGERS DER WELT (2)
Auf den Spuren des Urknalls

Entdeckungsreise zum Urknall
Naha Genf entsteht zur Zeit das größte Experiment aller Zeiten. Wissenschaftler aus der ganzen Welt versuchen herauszufinden, wie das Universum entstand - und warum es den Menschen gibt.

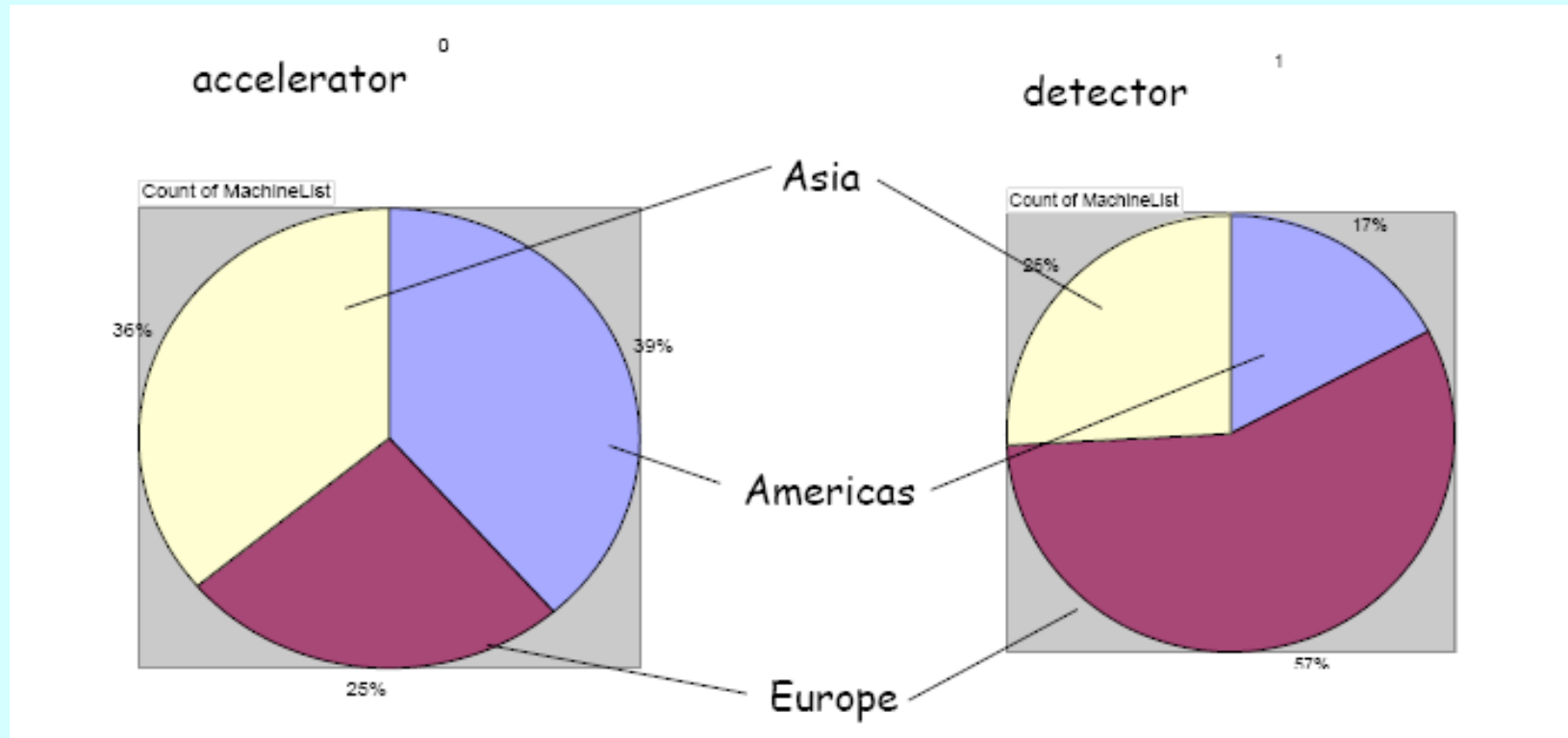
Similar but larger model to be built by DESY carpenters, firstly for LHC inauguration in '08, and will then be added to a traveling exhibition.

R.-D. Heuer, KET Nov. 2007

www.teilchenphysik.org/journalisten.htm
<http://hausch.web.cern.ch/hausch/Visits/Wissenschafts-Presskonferenz.html>

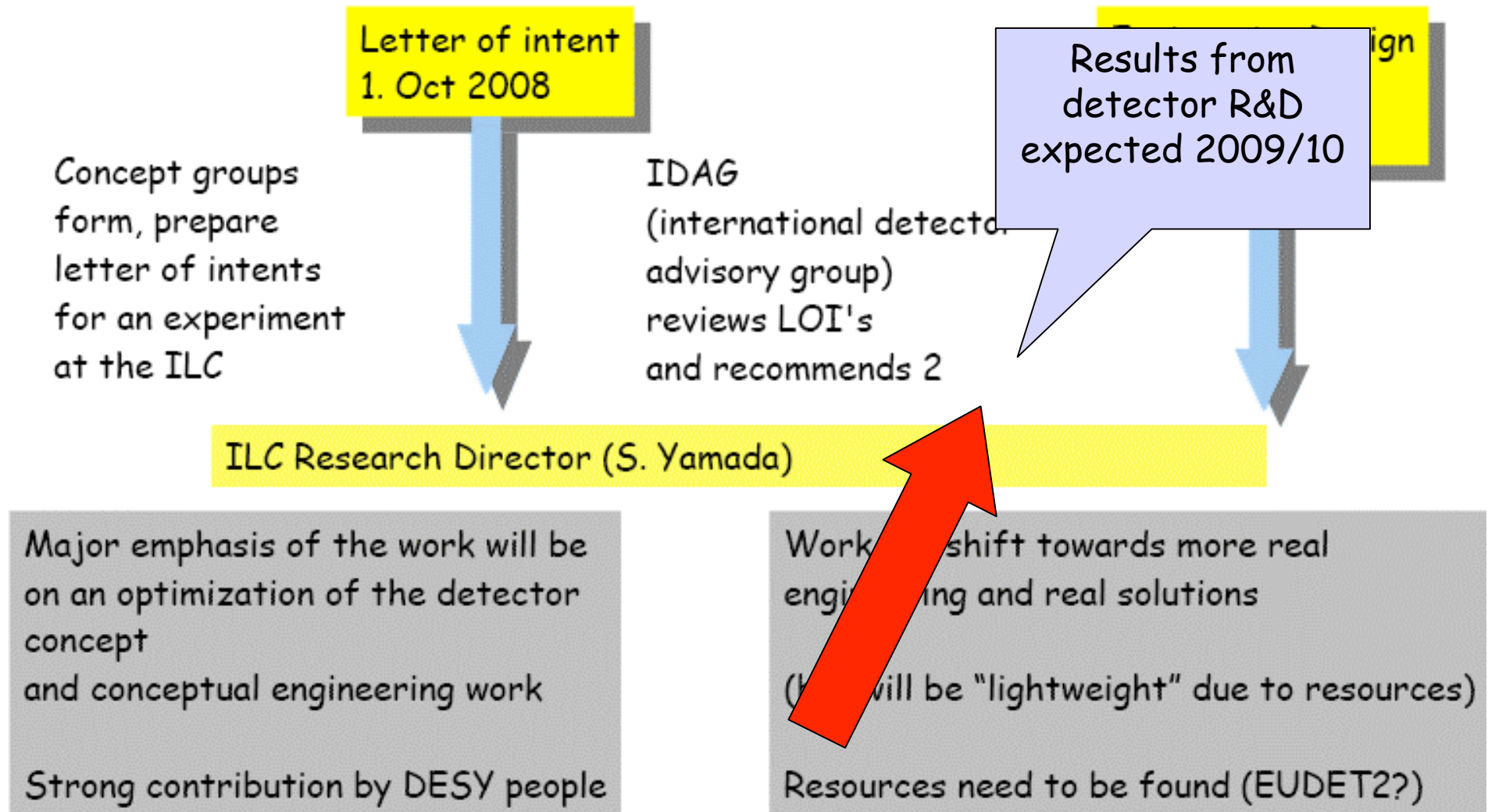
The ILC Reference Design Report

August 2007: Reference Design Report has been published



Close to 2000 people have signed the RDR

Next steps / timescale detector activities



DESY ILC Activities

R&D activities:

- Infrastructure (test beam)
- Pixel
- TPC
- analog HCAL
- FCAL

Detector concept:

ILD
(with increased collaboration with Japan)

DESY activities are funded from many sources:

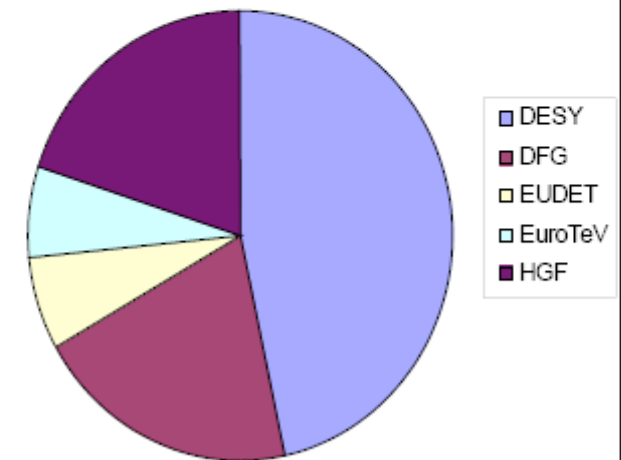
funding

- DESY own funds
- 2.5 young investigator groups (1.5xHGF, 1xDFG)
- EUDET
- HGF-Alliance

Distribution of physicists manpower at DESY-HH

(students not included)

Detector group (HH only)



All activities: DESY 60% / third party 40%

Particle Physics Summary

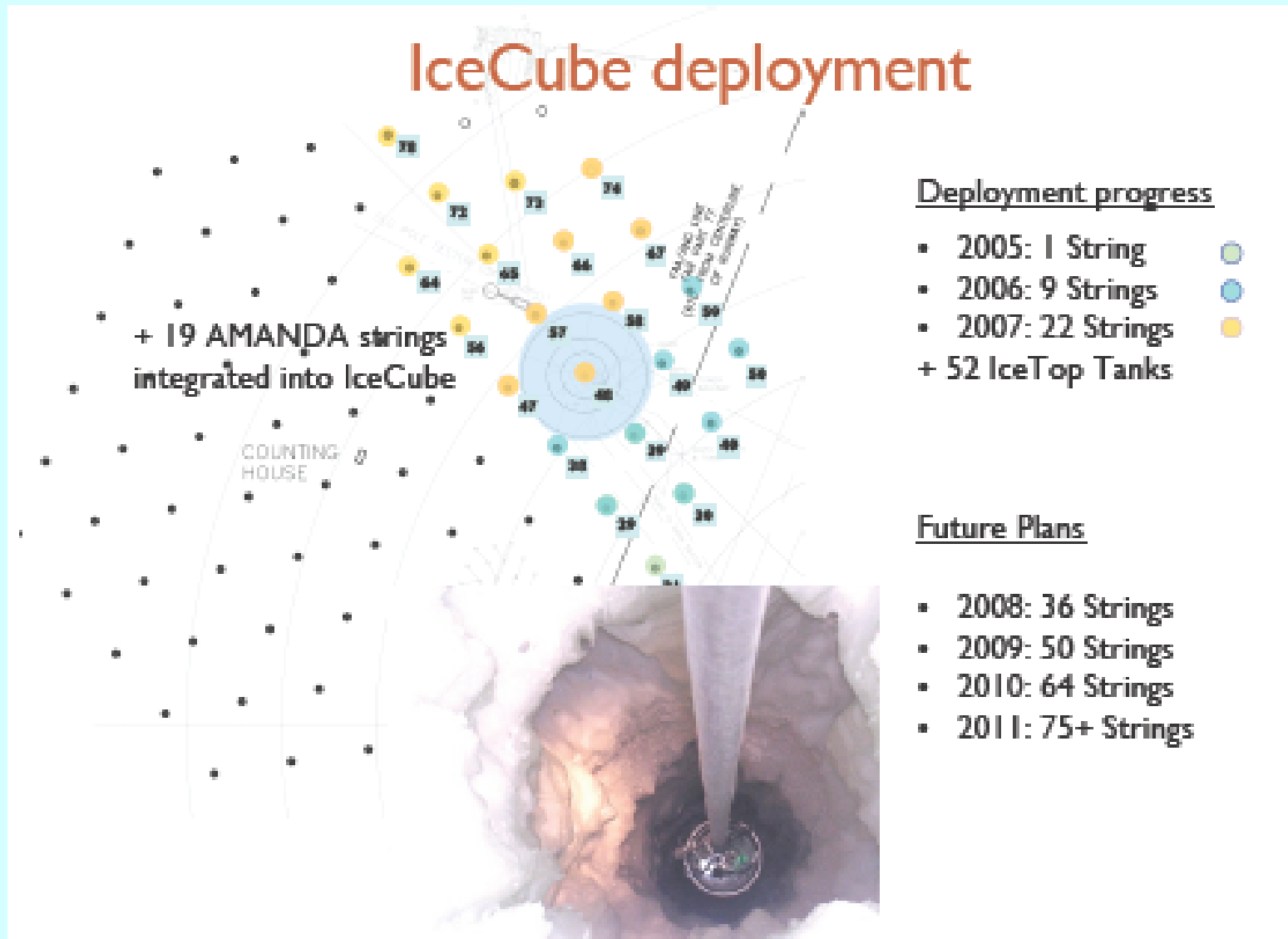
Alliance: excellent start

HERA: clear roadmap towards final analyses
(endorsed by Funding Agencies)

LHC: high visibility within short time

ILC: high visibility within international
collaborations
synergy with other areas/application

IceCube deployment



Deployment progress

- 2005: 1 String ●
- 2006: 9 Strings ●
- 2007: 22 Strings ●
- + 52 IceTop Tanks

Future Plans

- 2008: 36 Strings
- 2009: 50 Strings
- 2010: 64 Strings
- 2011: 75+ Strings

Next ~ 5 years

- Baikal: mission accomplished in 2008, after 20 years of a pioneering experiment.
- IceCube
 - DOM assembly: to be completed in 2008/9
 - European data and processing center
 - Physics: most interesting years will be 2008-2012. Boost in sensitivity and discovery potential
 - Well positioned for IceCube analysis. Top priority.
- Acoustic detection
 - R&D and South Pole Tests
- Multimessenger Physics
 - Participation in *MAGIC*
- CTA design study