Große Detektoren

Elektron-Positron-Collider

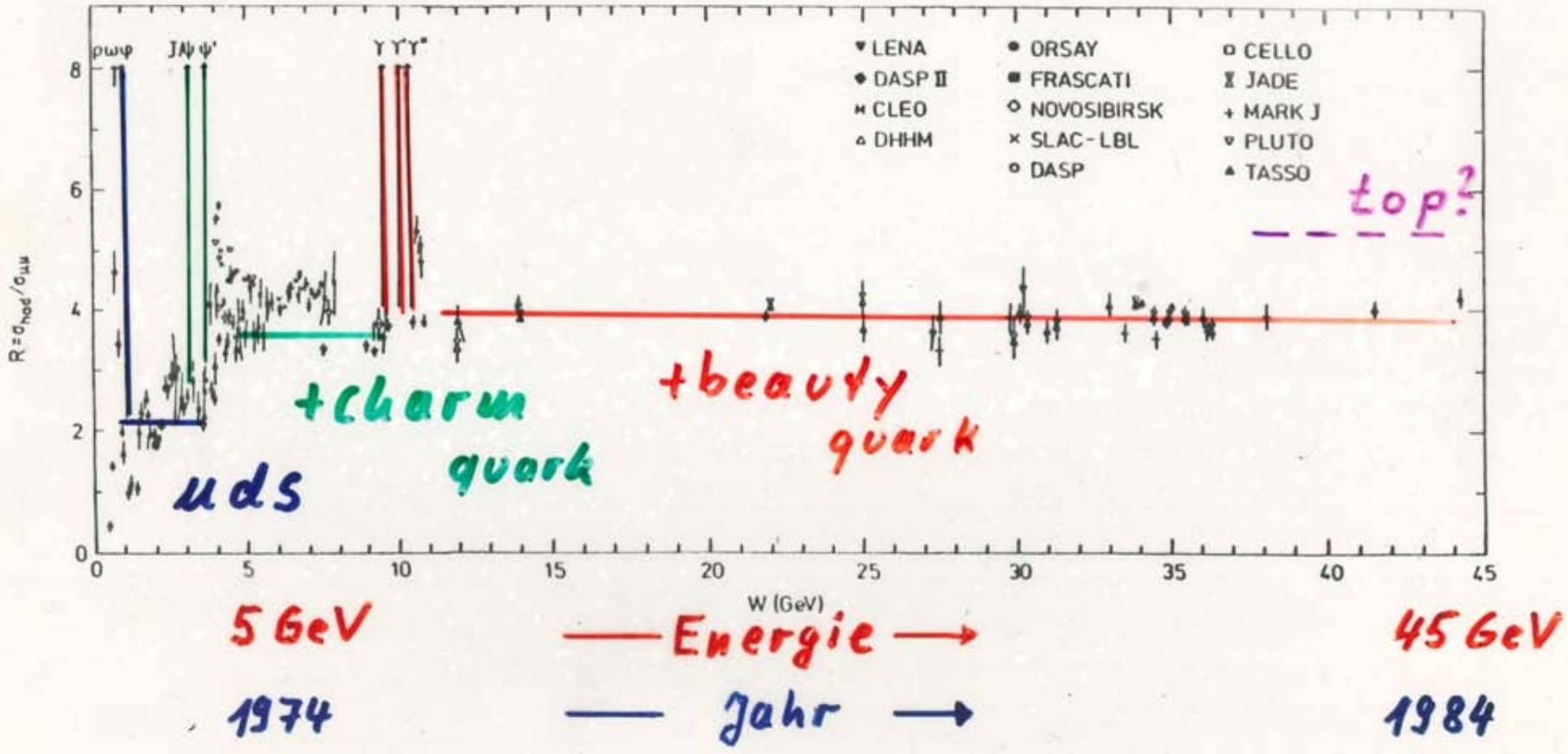
Elektron-Proton-Collider

Proton-Proton-Collider

Historische Folie 125 Jahre RWTH
Oktober 1995

$e^+e^- \rightarrow$ Hadronen (j

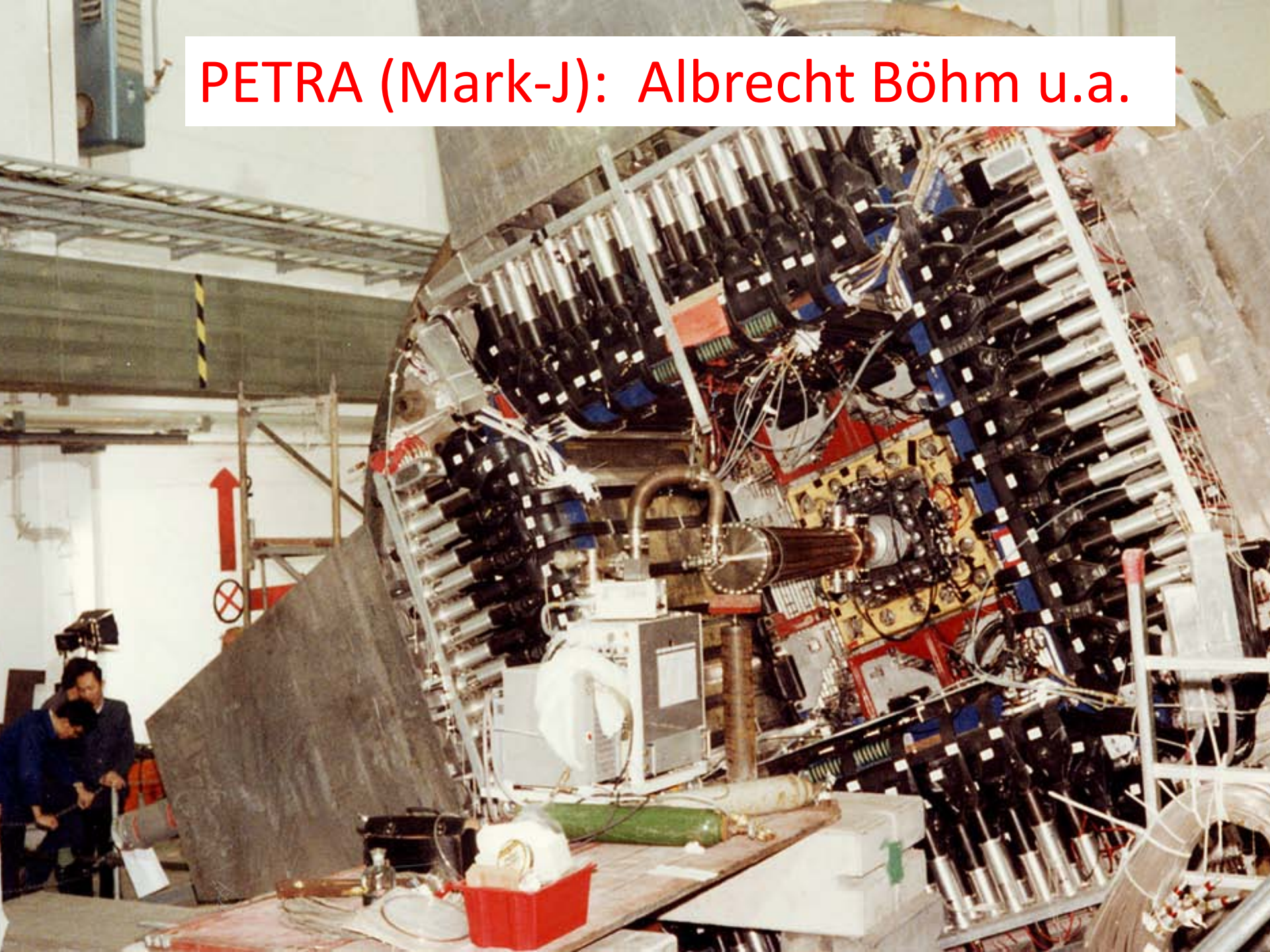
↑ Zahl der Ereignisse (skaliert)



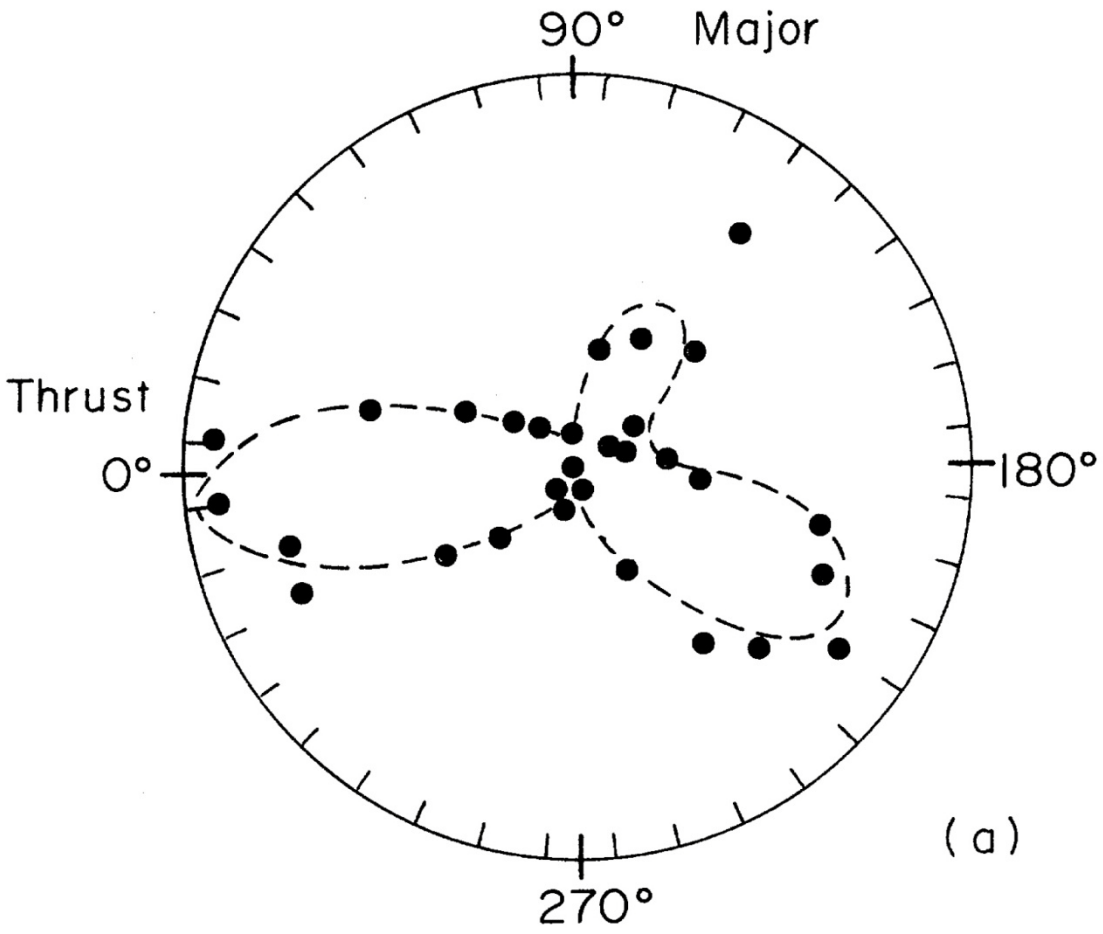
5 GeV — Energie → 45 GeV

1974 — Jahr → 1984

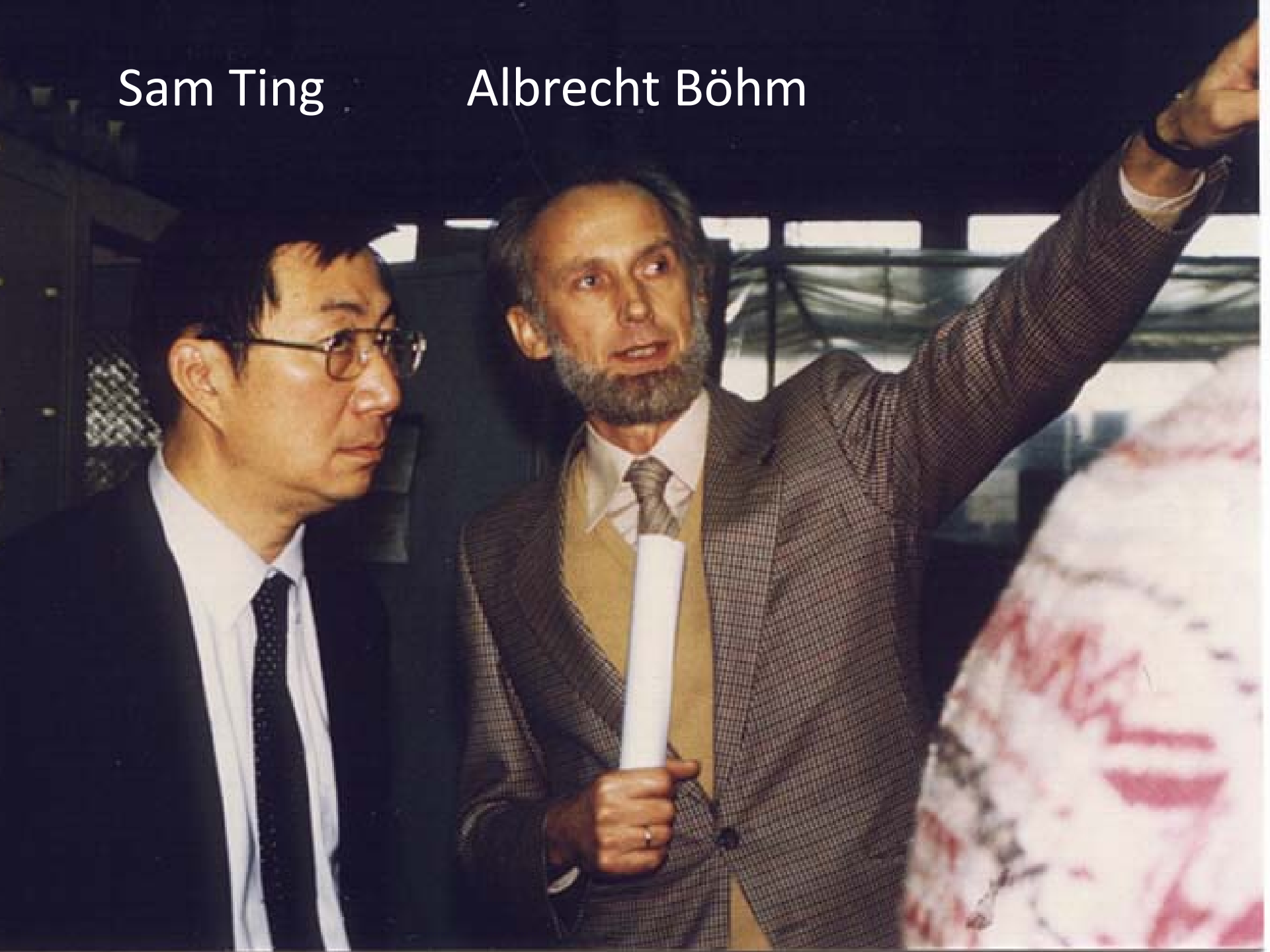
PETRA (Mark-J): Albrecht Böhm u.a.



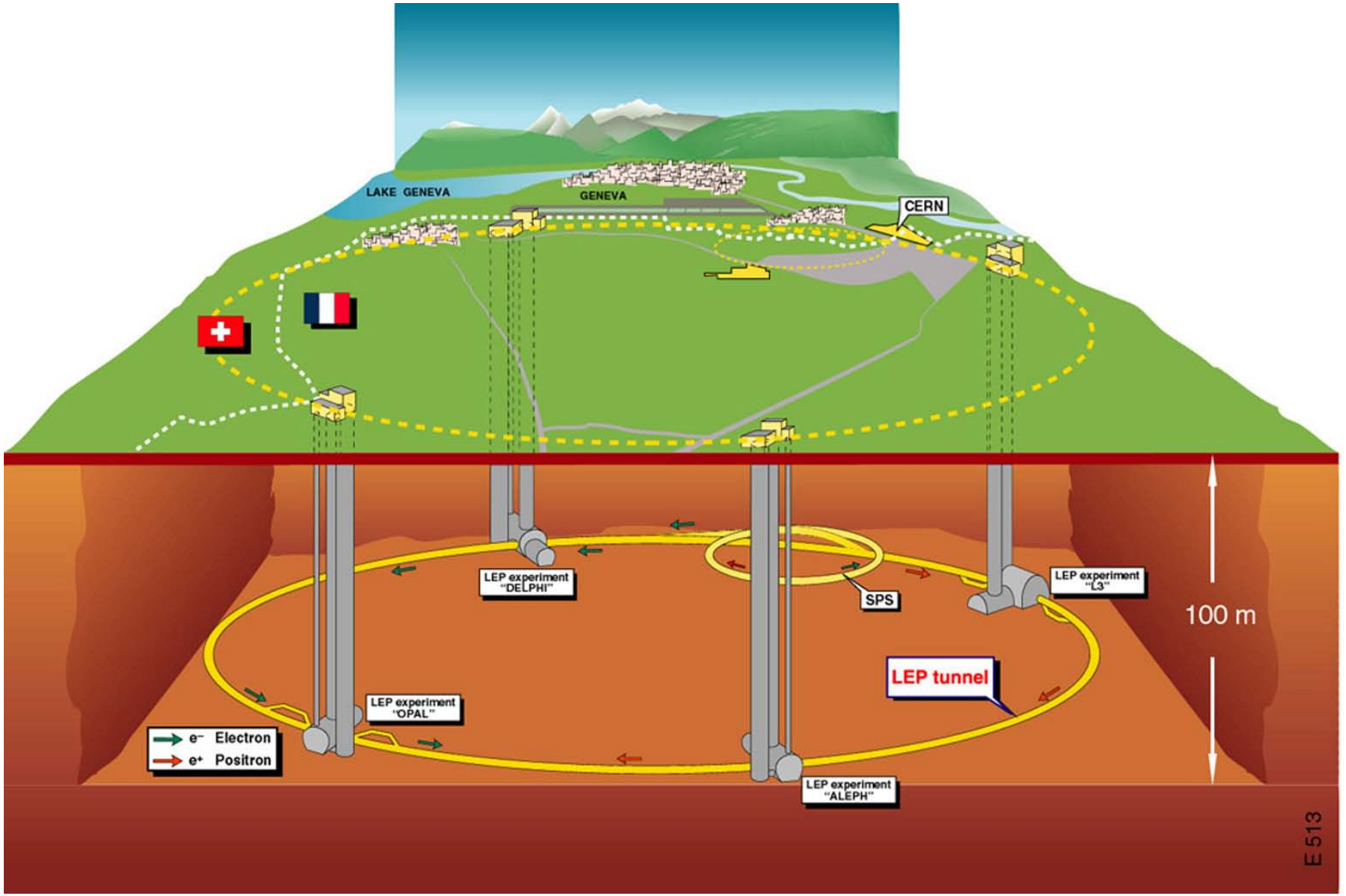
Diplomarbeit Gregor Herten



Gluonen!


Sam Ting
Albrecht Böhm

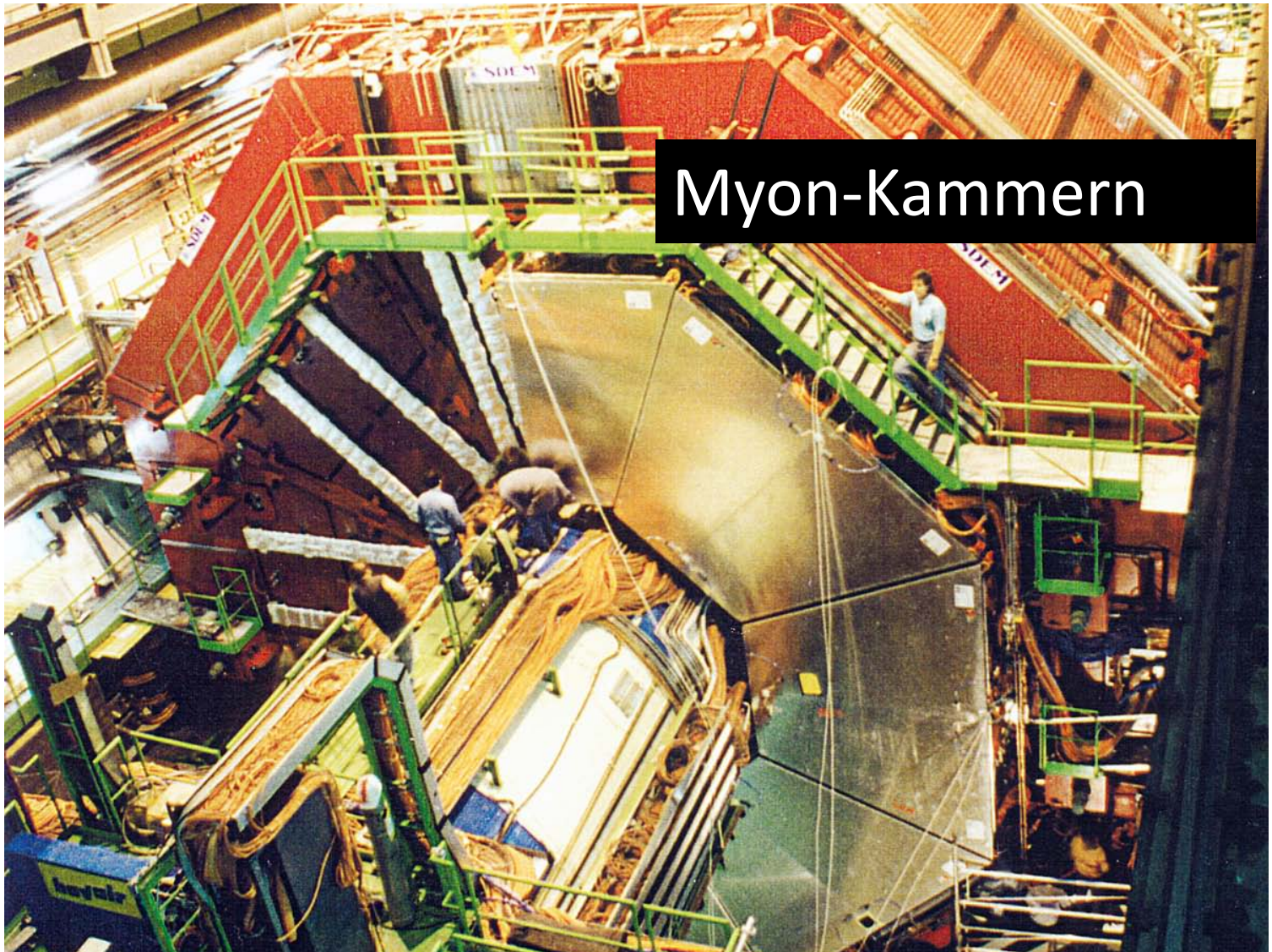
Elektron-Positron-Teilchenbeschleuniger LEP am CERN

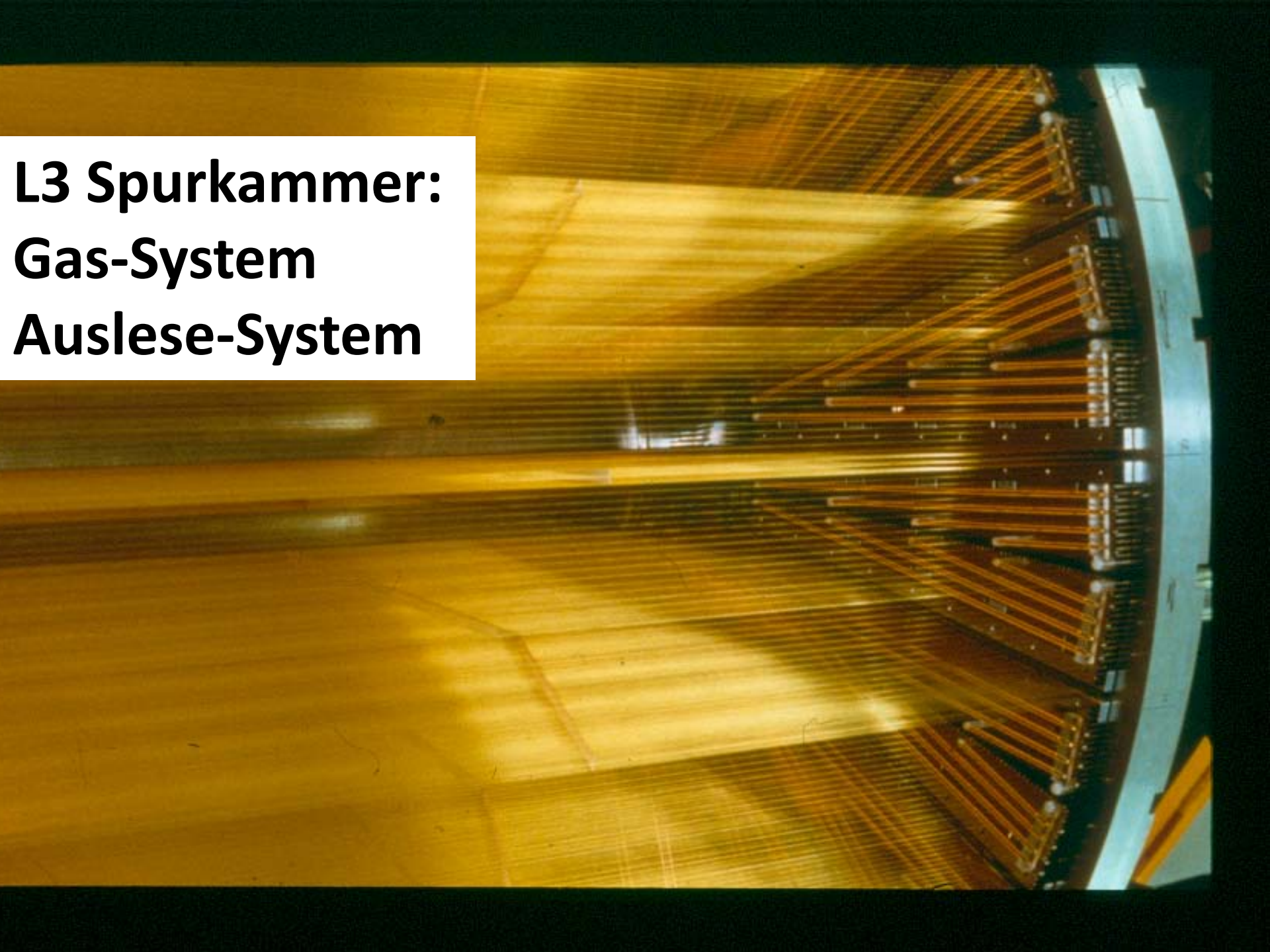


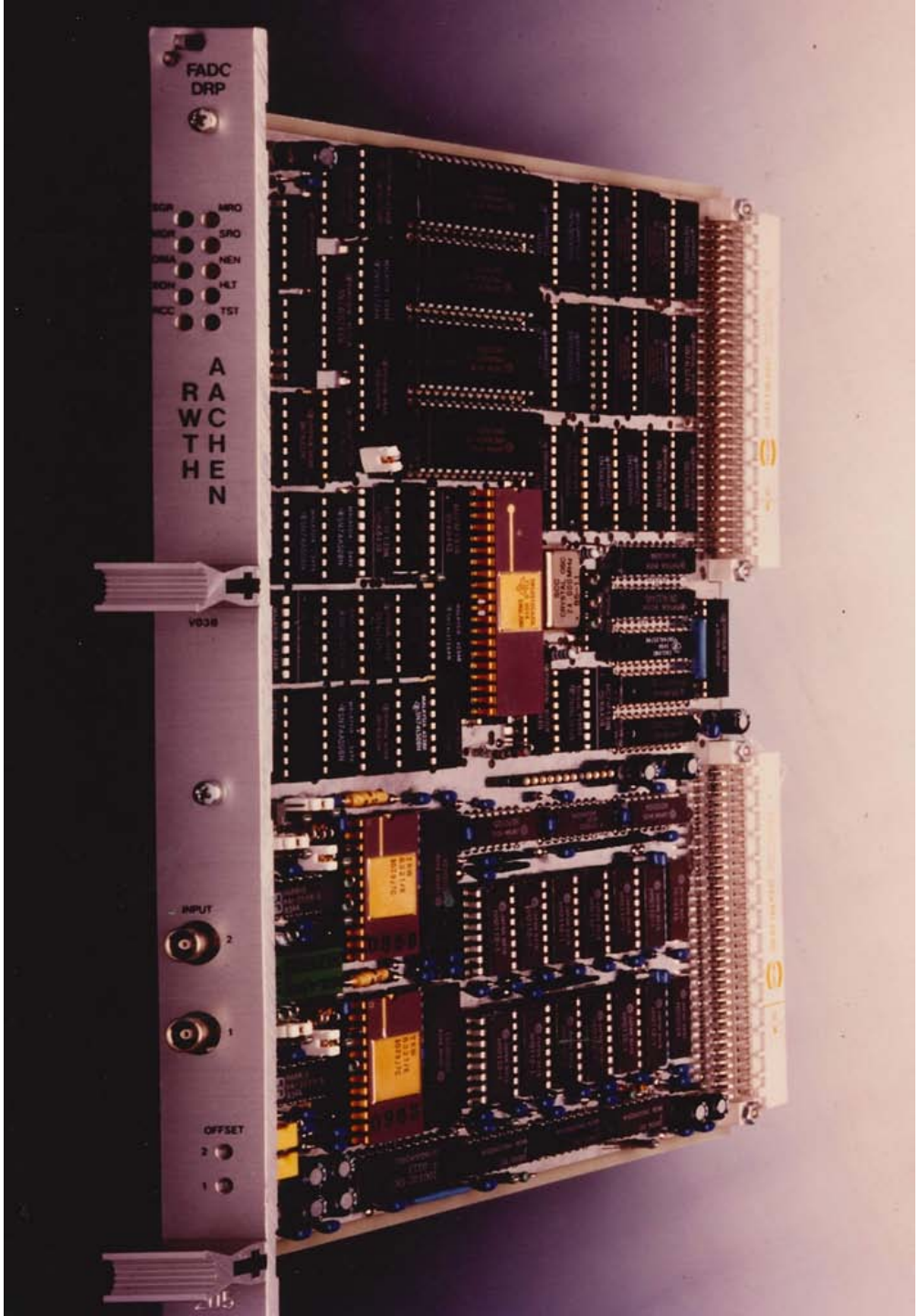
L3-Detektor:

I. Inst. (K.Lübelsmeyer, D. Schmitz)

III. Inst. (A. Böhm, M.Deutschmann, K. Schultze)

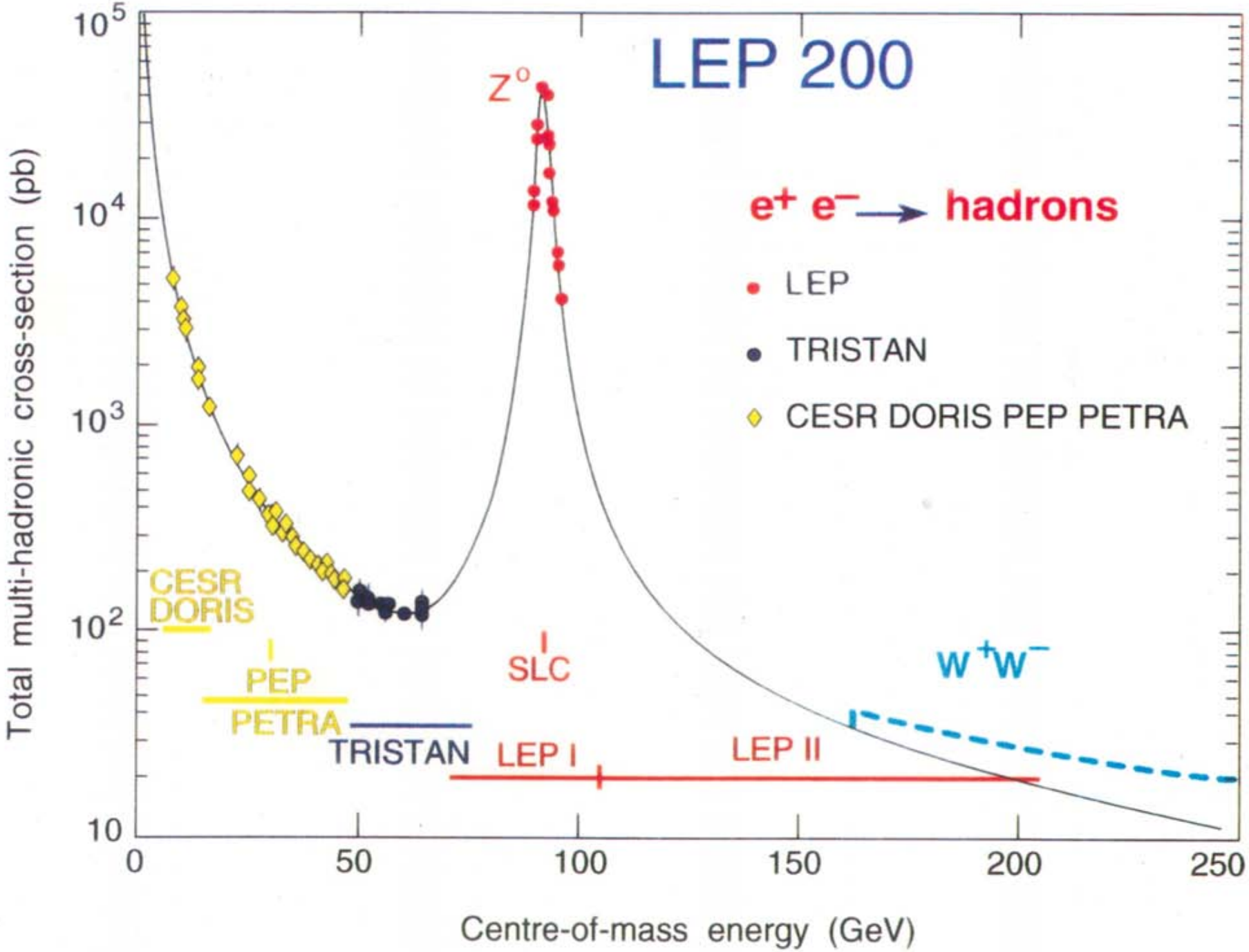



L3 Spurkammer:
Gas-System
Auslese-System

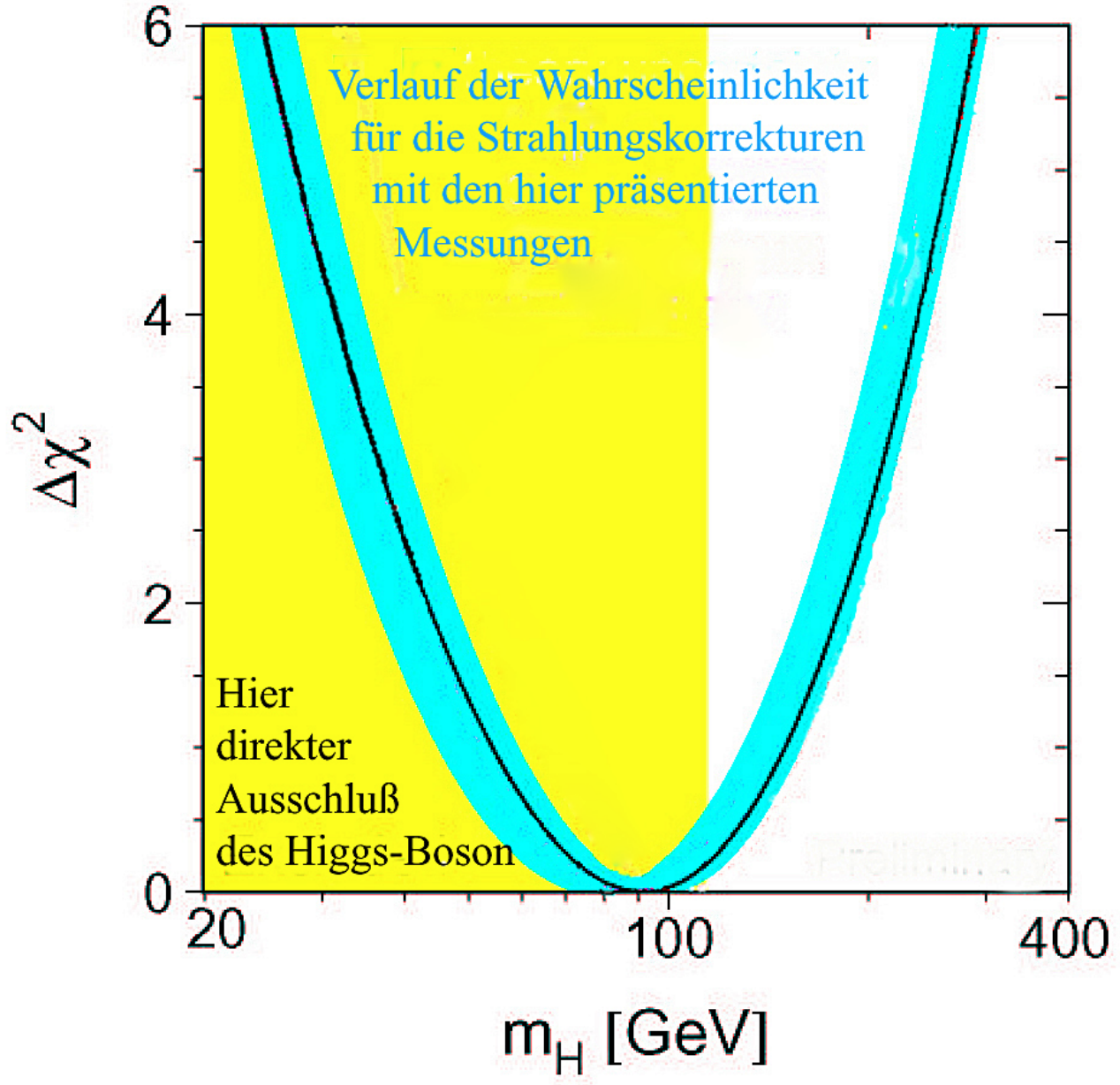


Auslese-Elektronik für den L3-Tracker

Volker Commichau u.a.


LEP 200
Z°
e+ e− → hadrons
LEP
TRISTAN
CESR DORIS PEP PETRA
CESR
DORIS
PEP
PETRA
TRISTAN
SLC
LEP I
LEP II
W+W−
Total multi-hadronic cross-section (pb)
Centre-of-mass energy (GeV)
10^5
10^4
10^3
10^2
10
0
50
100
150
200
250

Higgs Masse aus schwachen radiativen Korrekturen



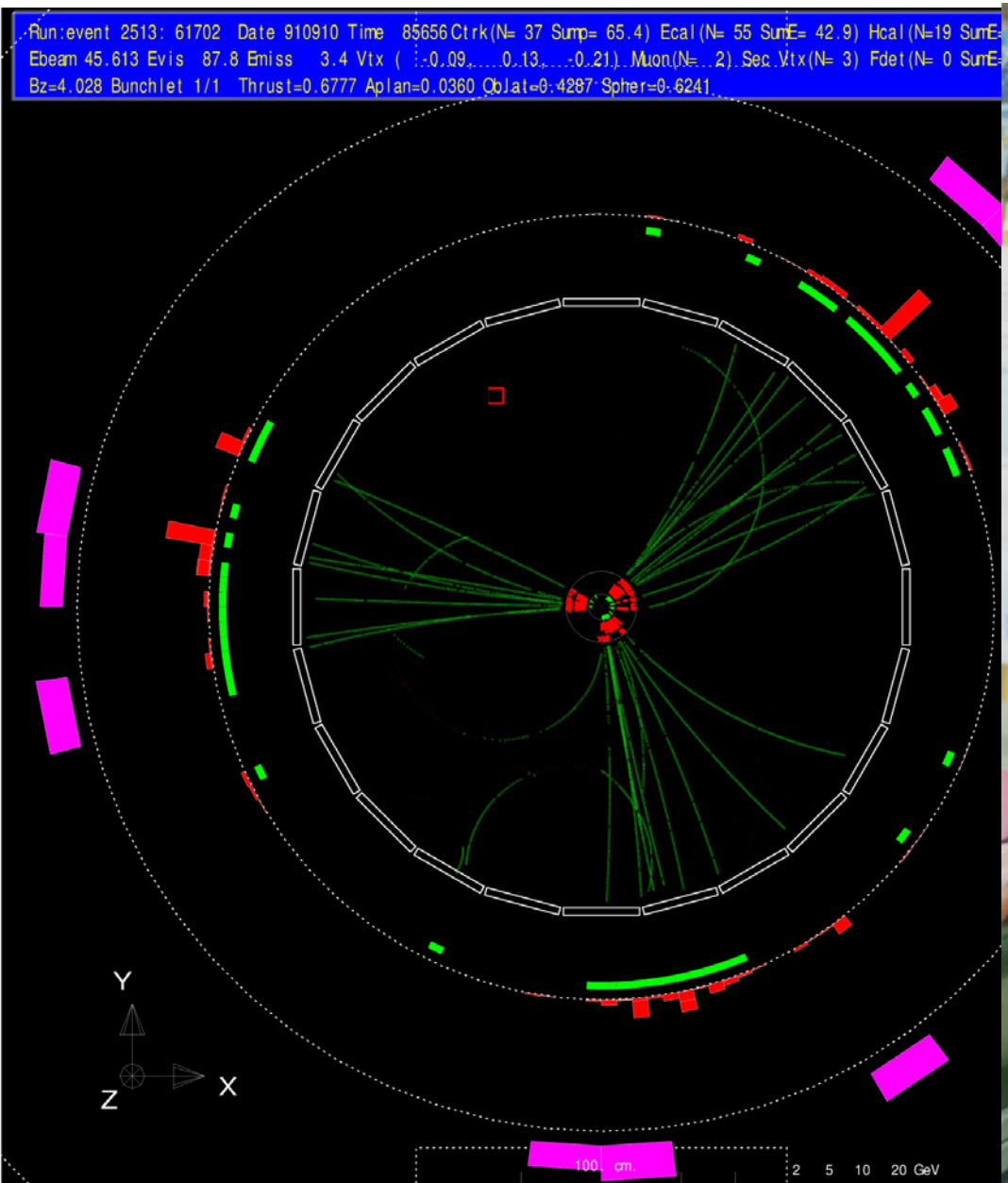
$$\log m_H/\mathrm{GeV} = 1.96\,^{+0.21}_{-0.23}$$

$$m_H = 91\,^{+58}_{-37}\ \mathrm{GeV}$$

95% CL upper limit

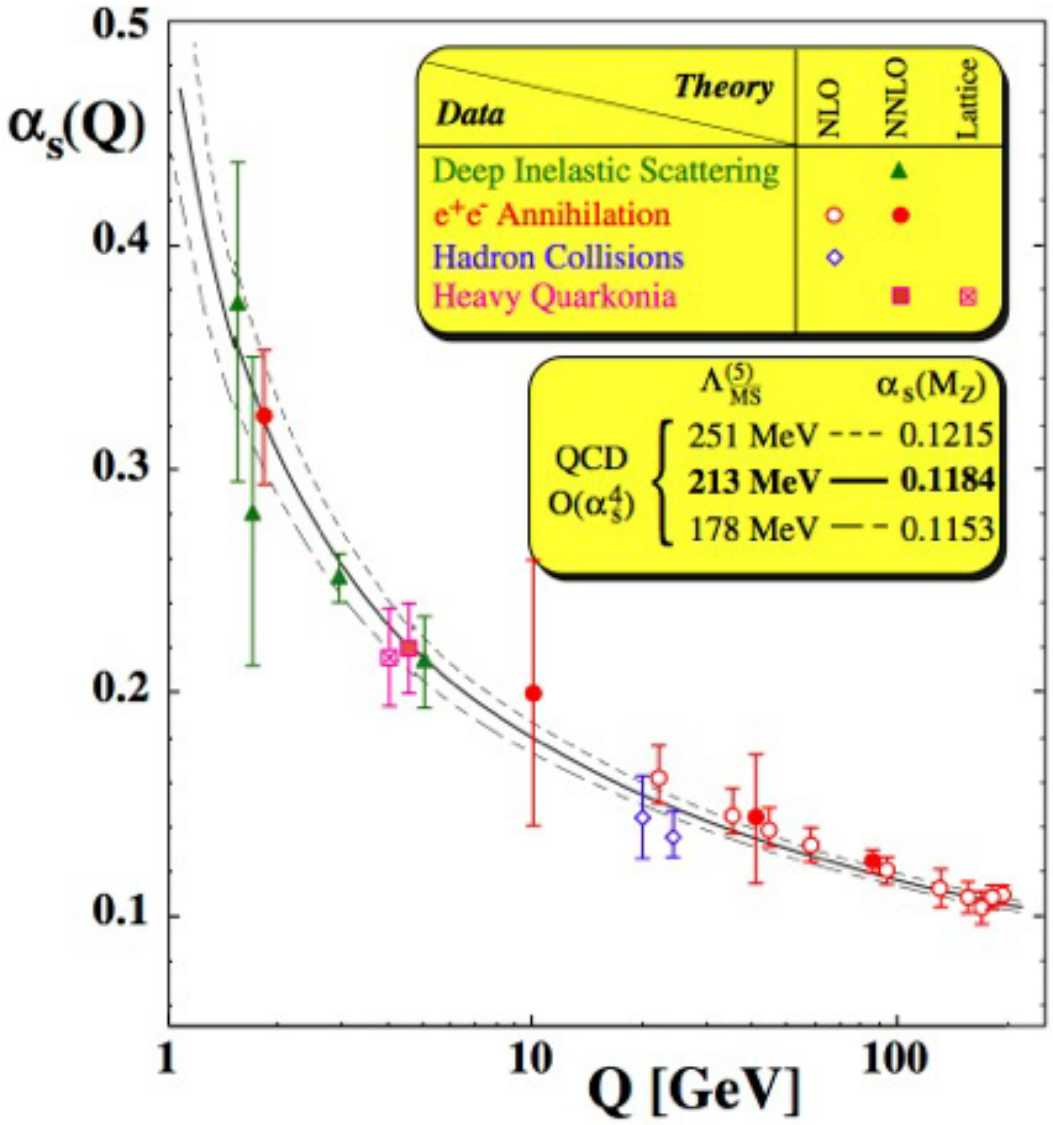
$m_H < 211$ GeV

Opal: 1993 Siggi Bethke



erfährt von seinem Leibniz-Preis 1995

Starke Kopplungskonstante

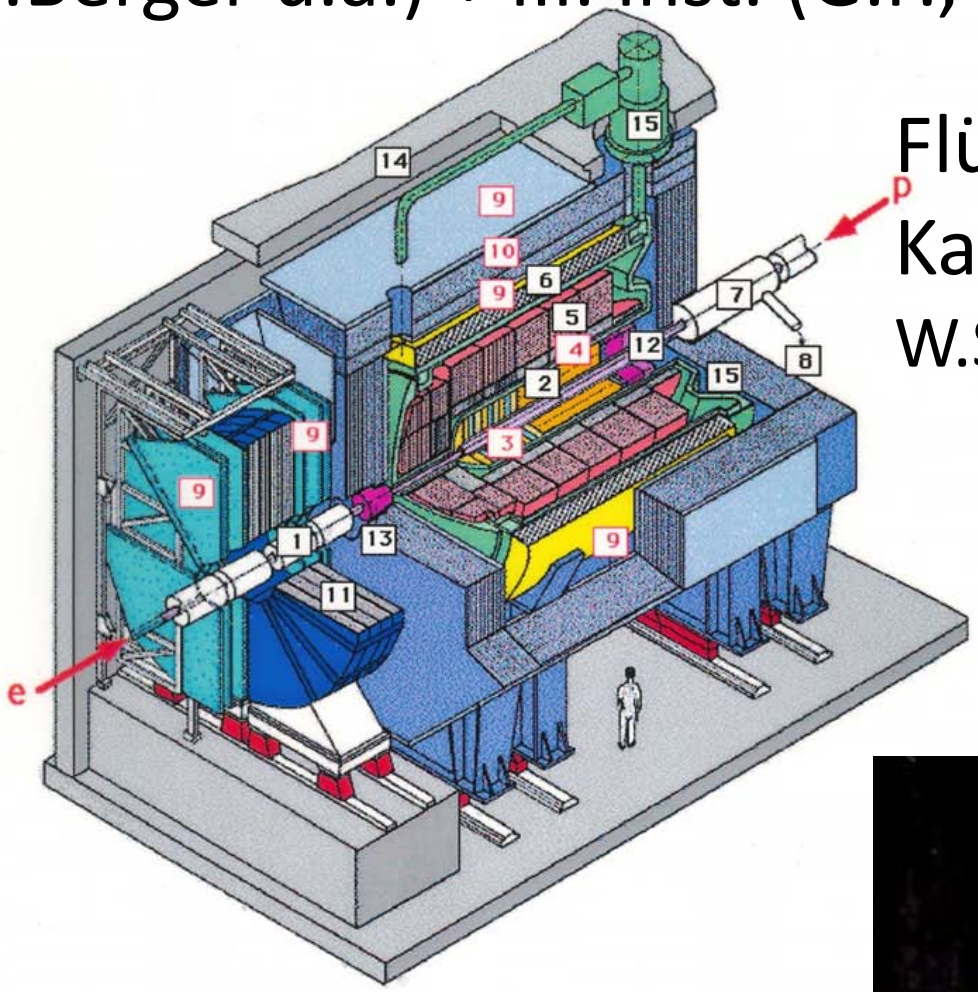


1984 Emeritierung Martin Deutschmann

Elektron-Proton-Speicherring HERA

Das H1-Experiment am DESY

I.(Ch.Berger u.a.) + III. Inst. (G.F., Herbert Gräßler u.a.)



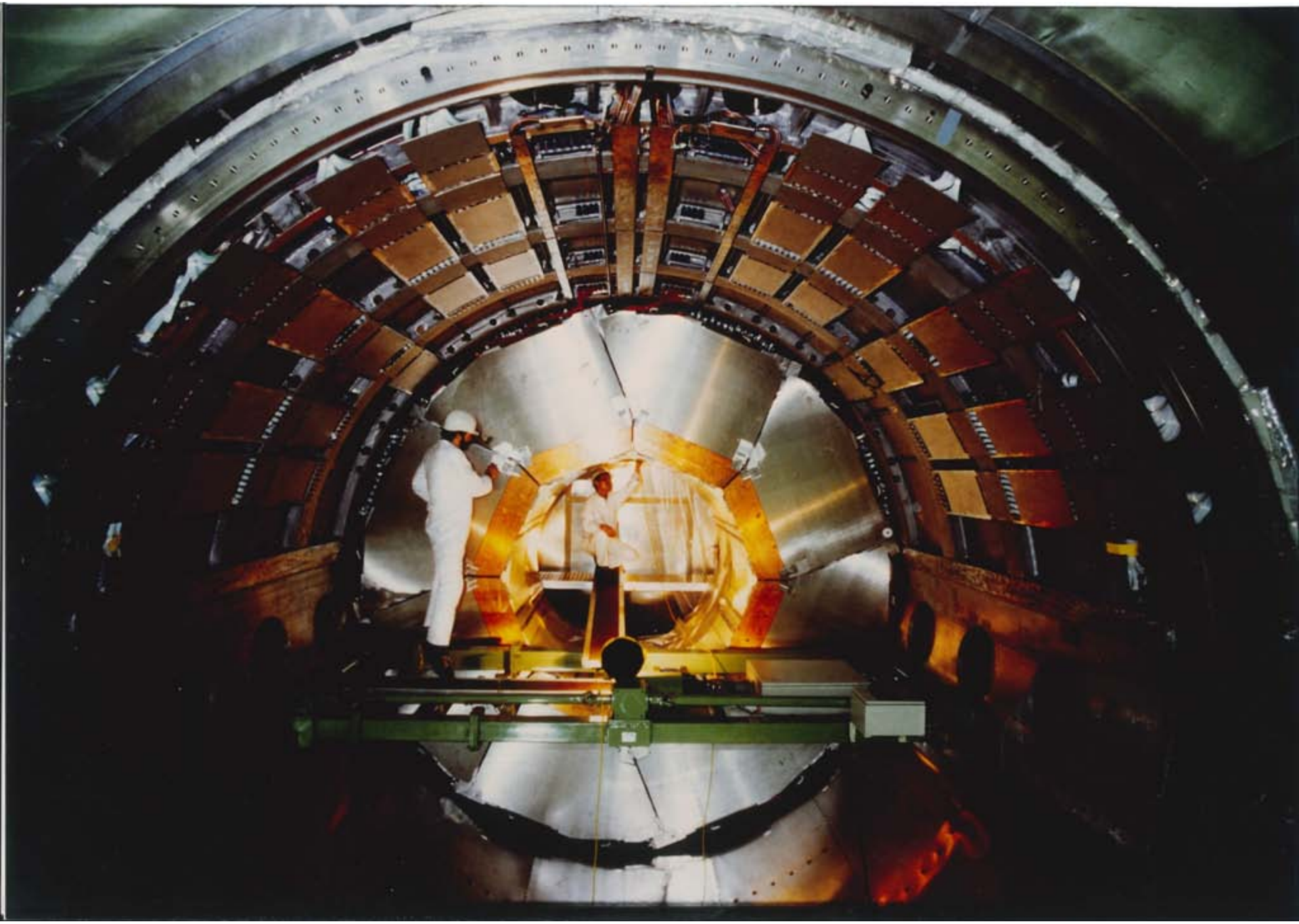
1.Strahlrohr und Strahlmagnete 2.Zentrale Spurenkammer 3.Vorwärtsspurenkamm
Übergangsstrahlungsmodul 4.Elektromagnetisches Kalorimeter (Blei,Flüssig Argor
5.Hadronisches Kalorimeter (Edelstahl, Flüssig Argon) 6.Supraleitende Spule (1,2 T
7.Kompensationsmagnet 8.Helium-Kälteanlage 9.Myon-Kammer
10.Instrumentiertes Eisen (Eisenplatte + Streamerröhren-Detektoren) 11.Myon-Toro
Magnet 12.warmes Kalorimeter (Spacal) 13.Vorwärts-Kalorimeter 14.Betonabschir
5.Flüssig-Argon-Kryostat.

Flüssig-Argon Kalorimeter

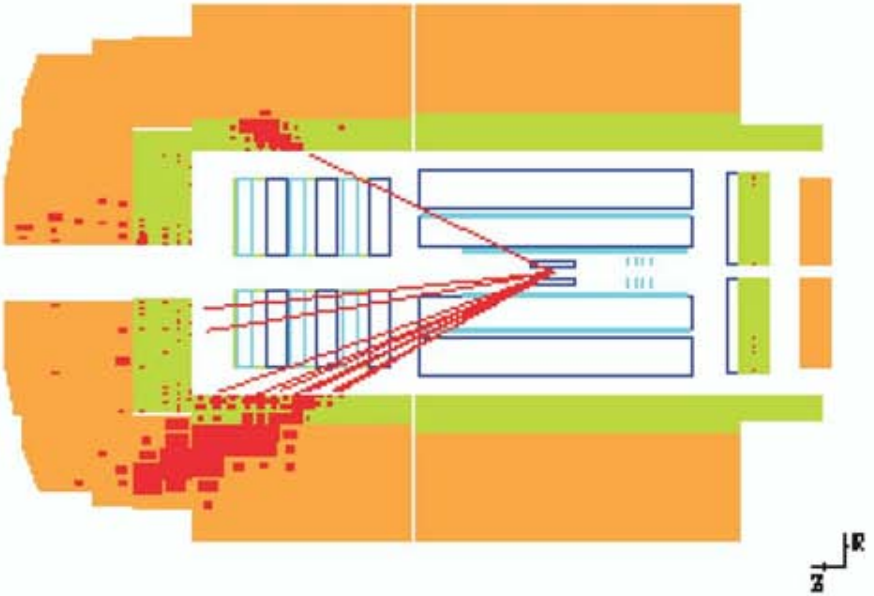
W.Schmitz, K.Boffin, E.Bock

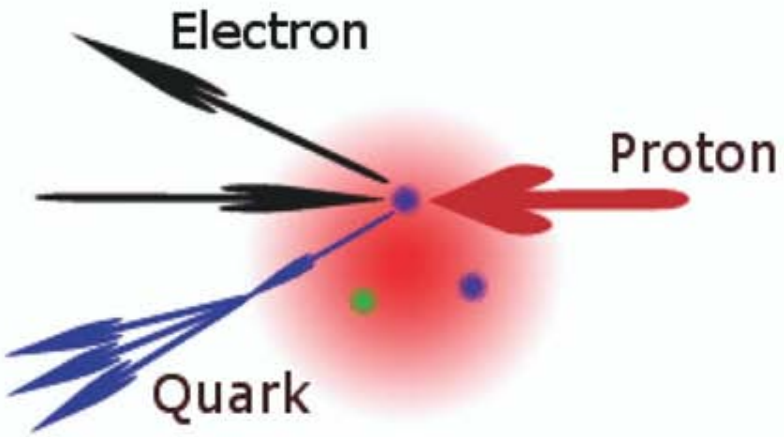
Zentraldetektor: Transition Radiator Gassystem

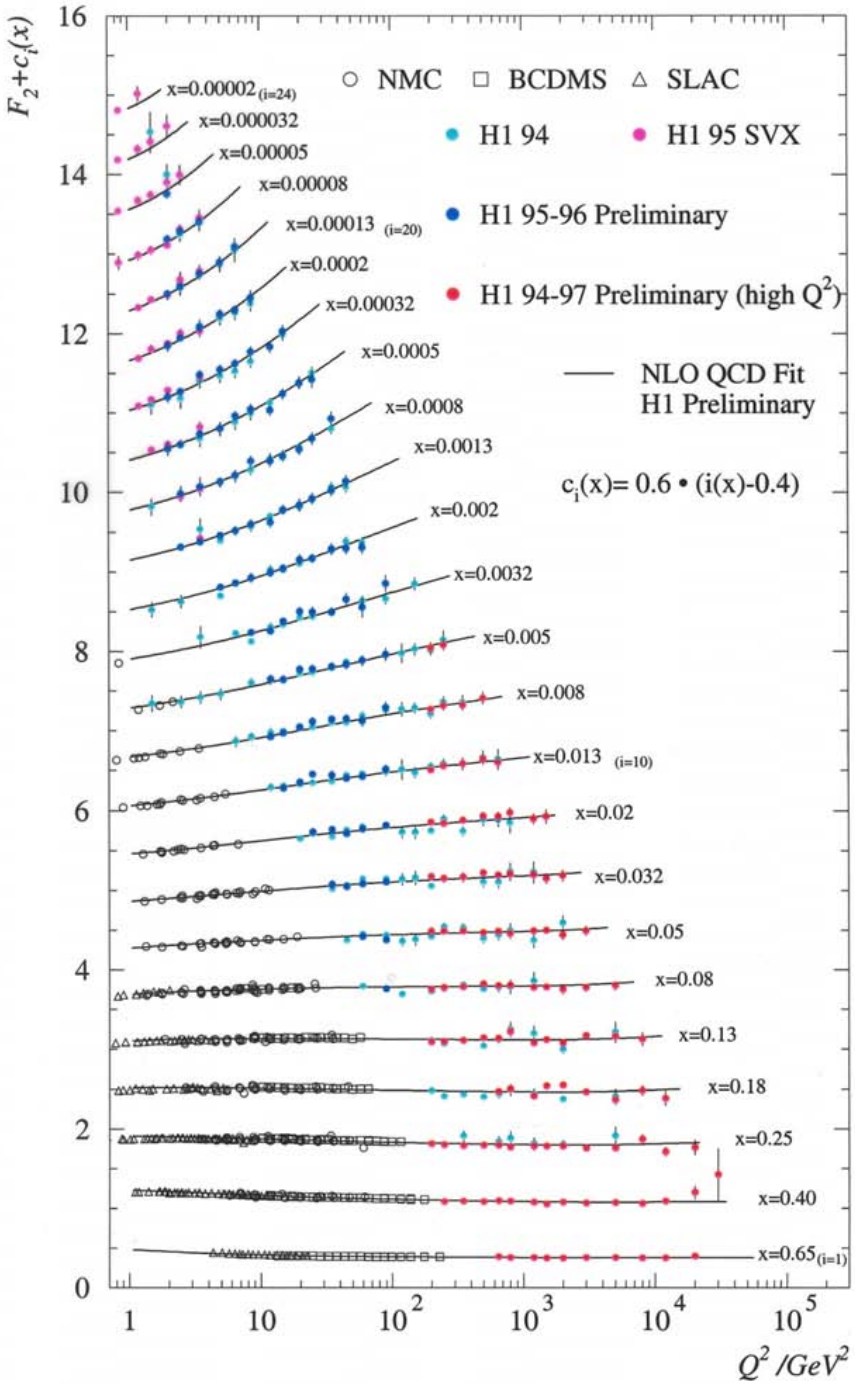
Wolfgang Struczinski



HERA e-p scattering events observed in the H1Detector



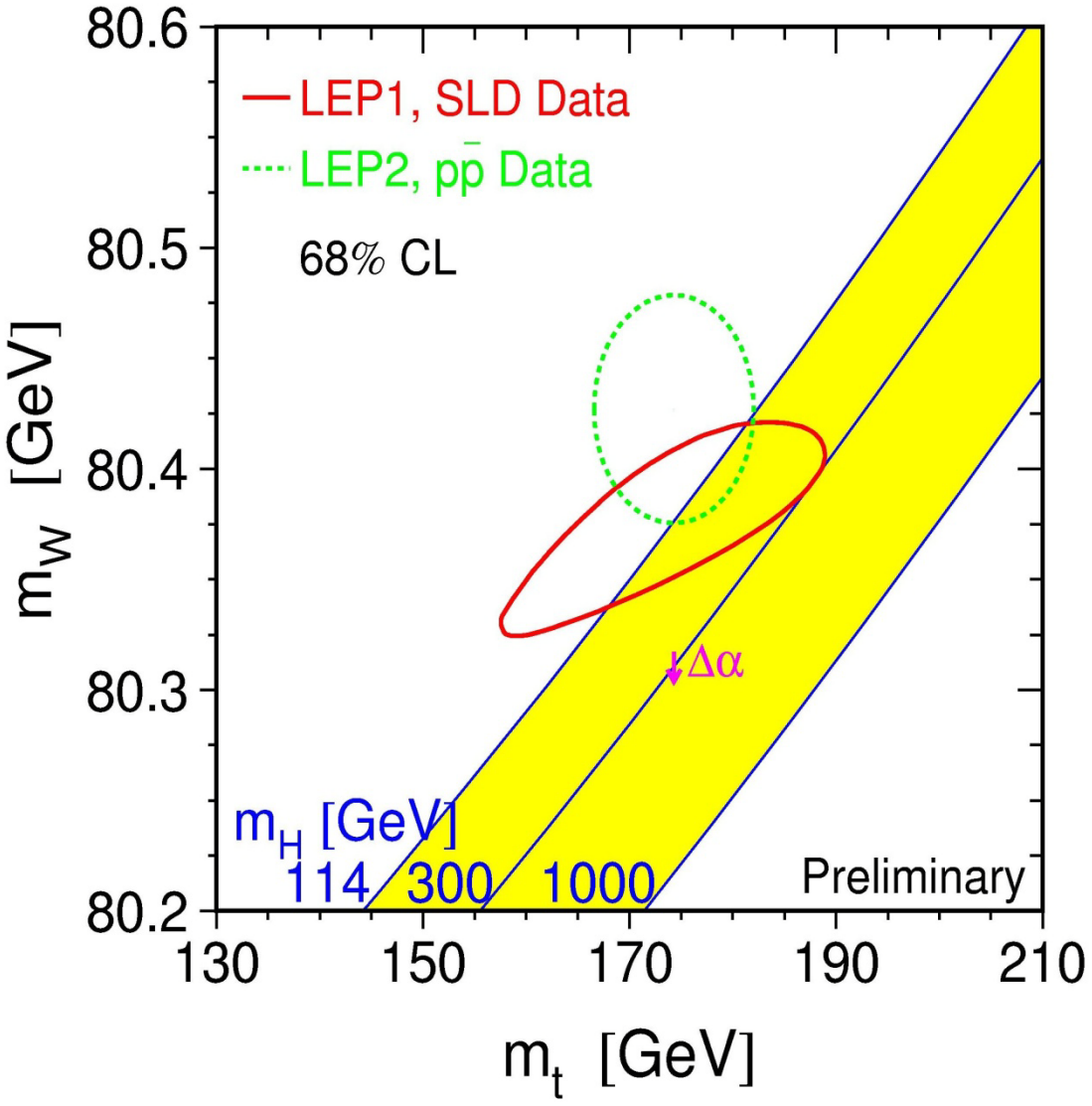




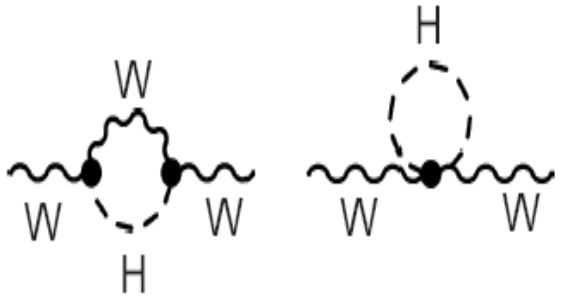
Präzisionsmessung der Struktur des Protons:

Unverzichtbar für Proton-Proton-Collider

Vergleich mit SM Vorhersage



Abhängigkeit von Higgs-Masse:

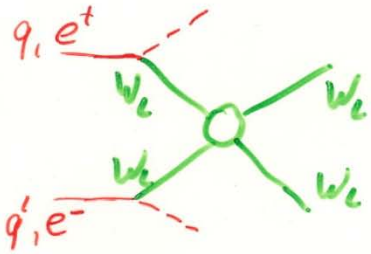


$$\propto \log\left(\frac{m_H}{m_W}\right)$$

WHY do we NEED a TeV-MACHINE?

UNITARITY LIMIT of SM:

(like in Fermi Theory)



$\sigma(W_L W_L \to W_L W_L) = \frac{G_F s}{16\pi\sqrt{2}} \sim E_{CM}^2$!

SM breaks down at

$\sqrt{s} \gtrsim 1 \div 2$ TeV !

→ $\sigma(W_L W_L) =$  +

HIGGS : $m_H \lesssim 1$ TeV

→ OR SOMETHING ELSE

'CONSTITUENT ENERGY' $\hat{E}_{CM}$

pp	ep	e^+e^-
$\hat{E}_{CM} \simeq \frac{1}{10} E_{CM}$	$\simeq \frac{1}{3} E_{CM}$	$= E_{CM}$

$\Rightarrow$ $E_{CM} \simeq 10 \div 20$ TeV $\quad \simeq 1 \div 2$ TeV

Historische Folie ECFA-Vortrag 1989

Lin. Collider TESLA:
Joachim Mnich,
Manfred Tonutti,
Stephan Roth u.a.

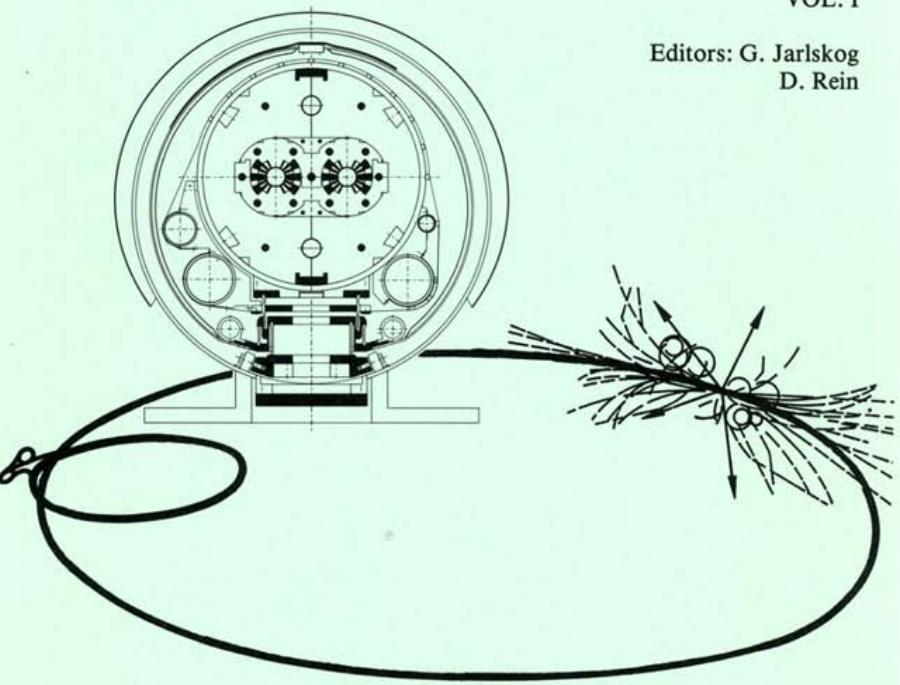
CERN 90-10
ECFA 90-133
Volume I
3 December 1990

EUROPEAN COMMITTEE FOR FUTURE ACCELERATORS

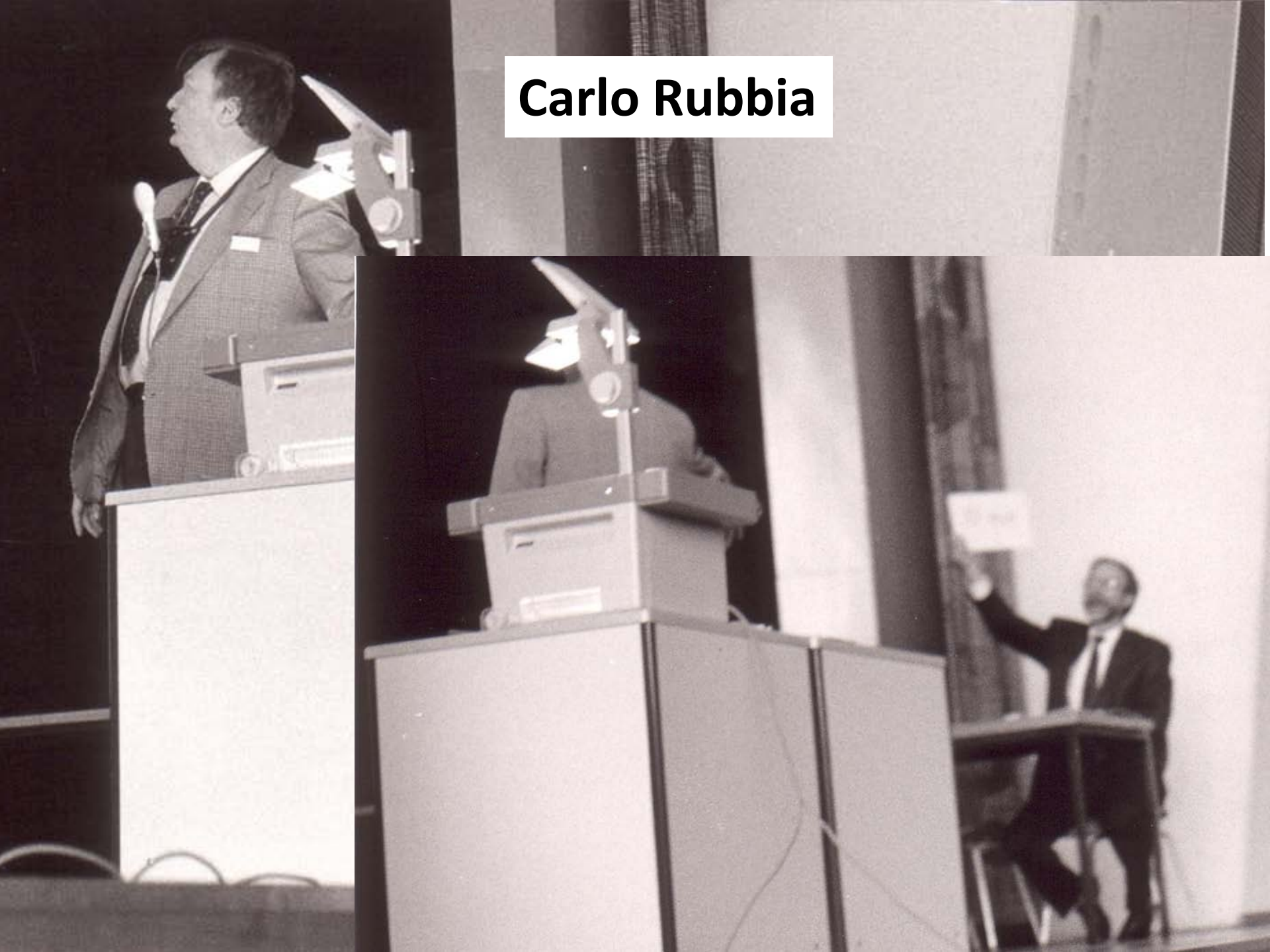
Large Hadron Collider Workshop

PROCEEDINGS
VOL. I

Editors: G. Jarlskog
D. Rein



Aachen, 4–9 October 1990


Carlo Rubbia

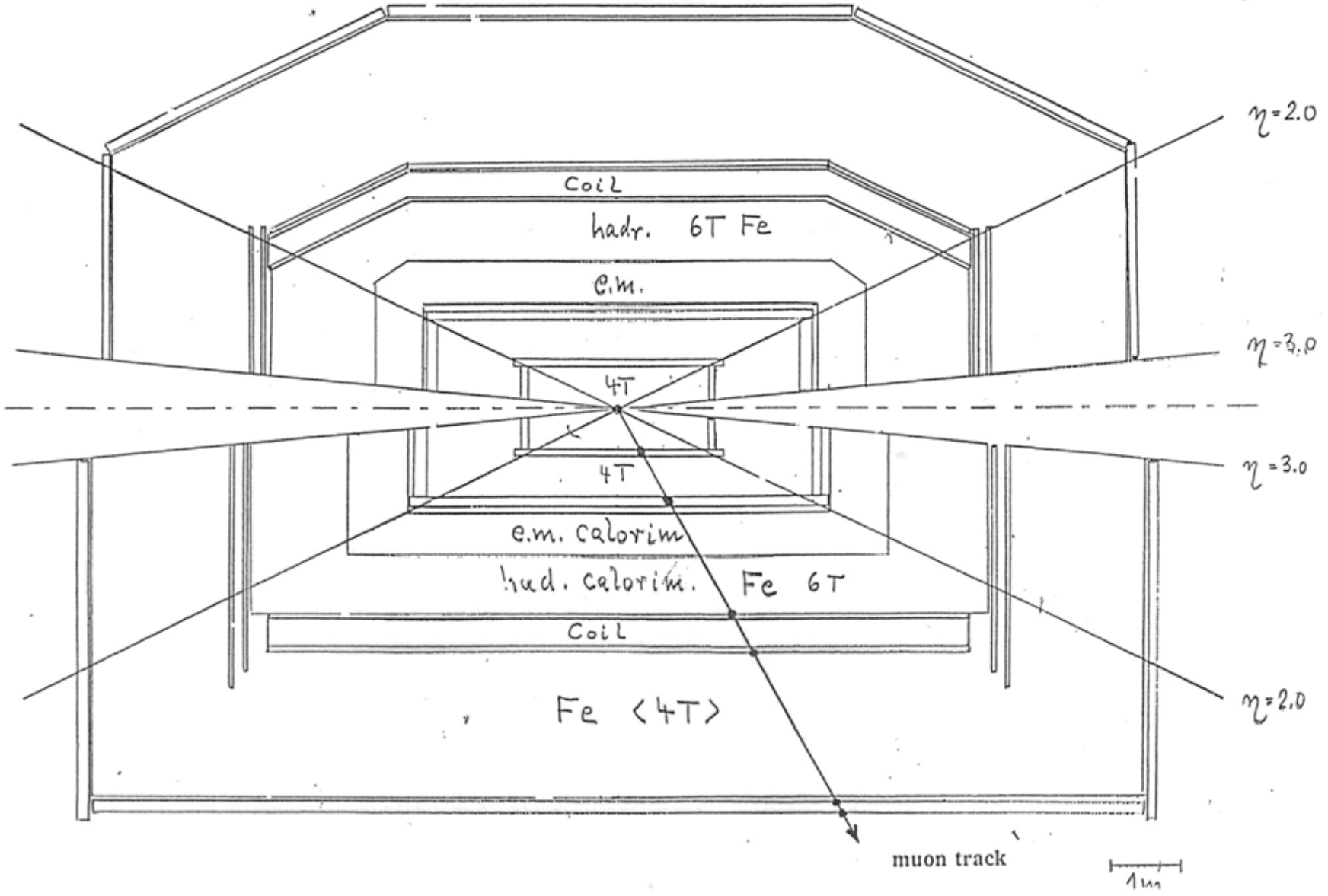

Raimund Honecker

Jan Hladky

A Compact Muon Detector For LHC

Karsten Eggert

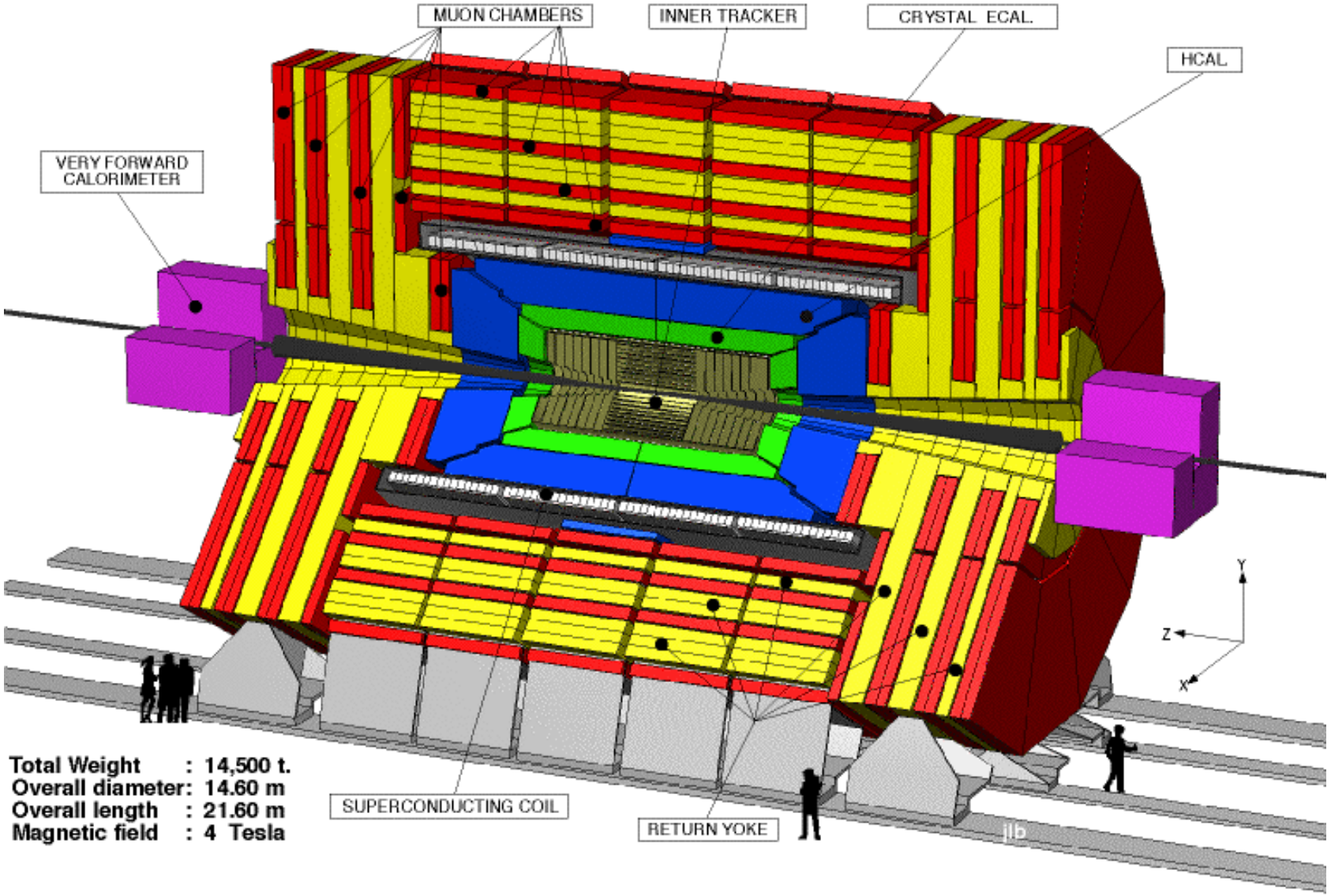
Michel Della Negra



LHC (Large Hadron Collider) im LEP-Tunnel
Proton-Proton-Beschleuniger Schwerpunktsenergie 14 000 GeV

CMS Compact Muon Solenoid: I. + III. Institut

(Martin Erdmann, G.F., Thomas Hebbeker, Joachim Mnich, Achim Stahl)



Beteiligung am CMS Detektor

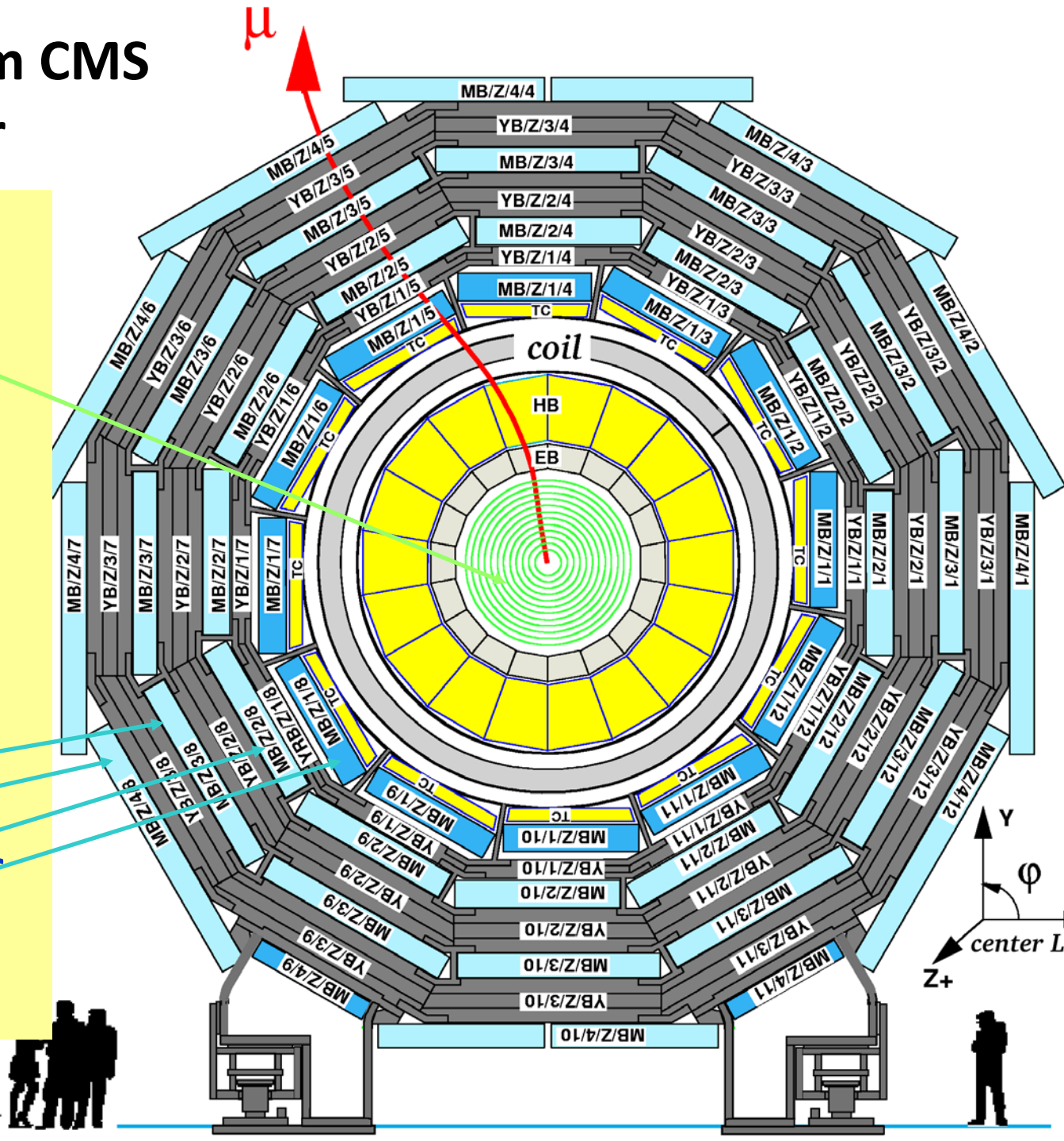
Innere Spur-kammern

I. (L. Feld, S. Schael)

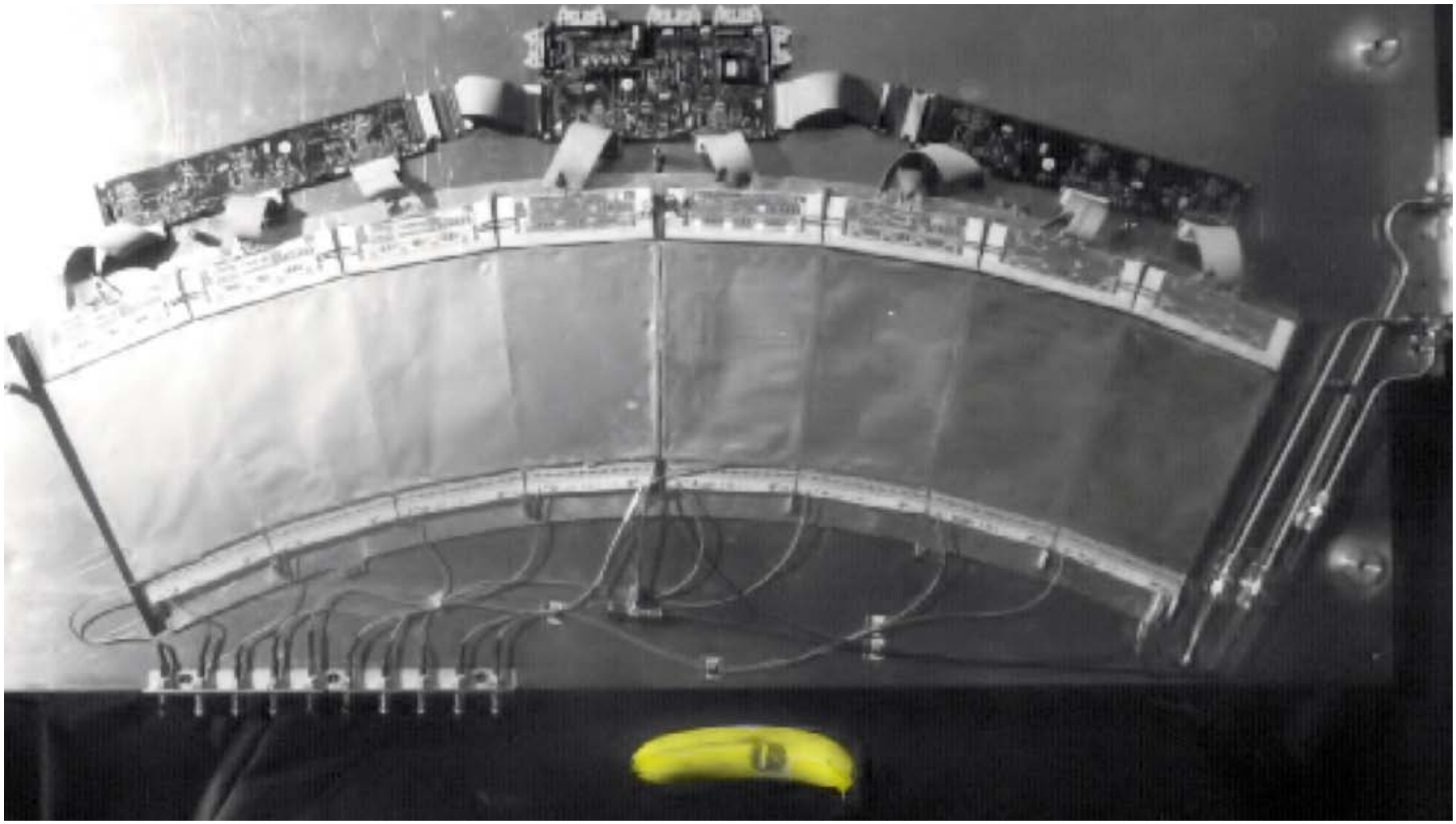
+ IIIB - Inst.

Myon-Detektor

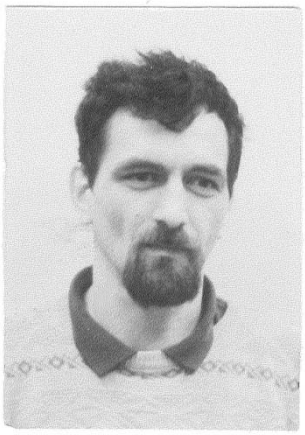
IIIA - Inst.



MSGC–Micro**S**trip **G**as **C**hamber: D. Macke, S. Bachmann u.a.

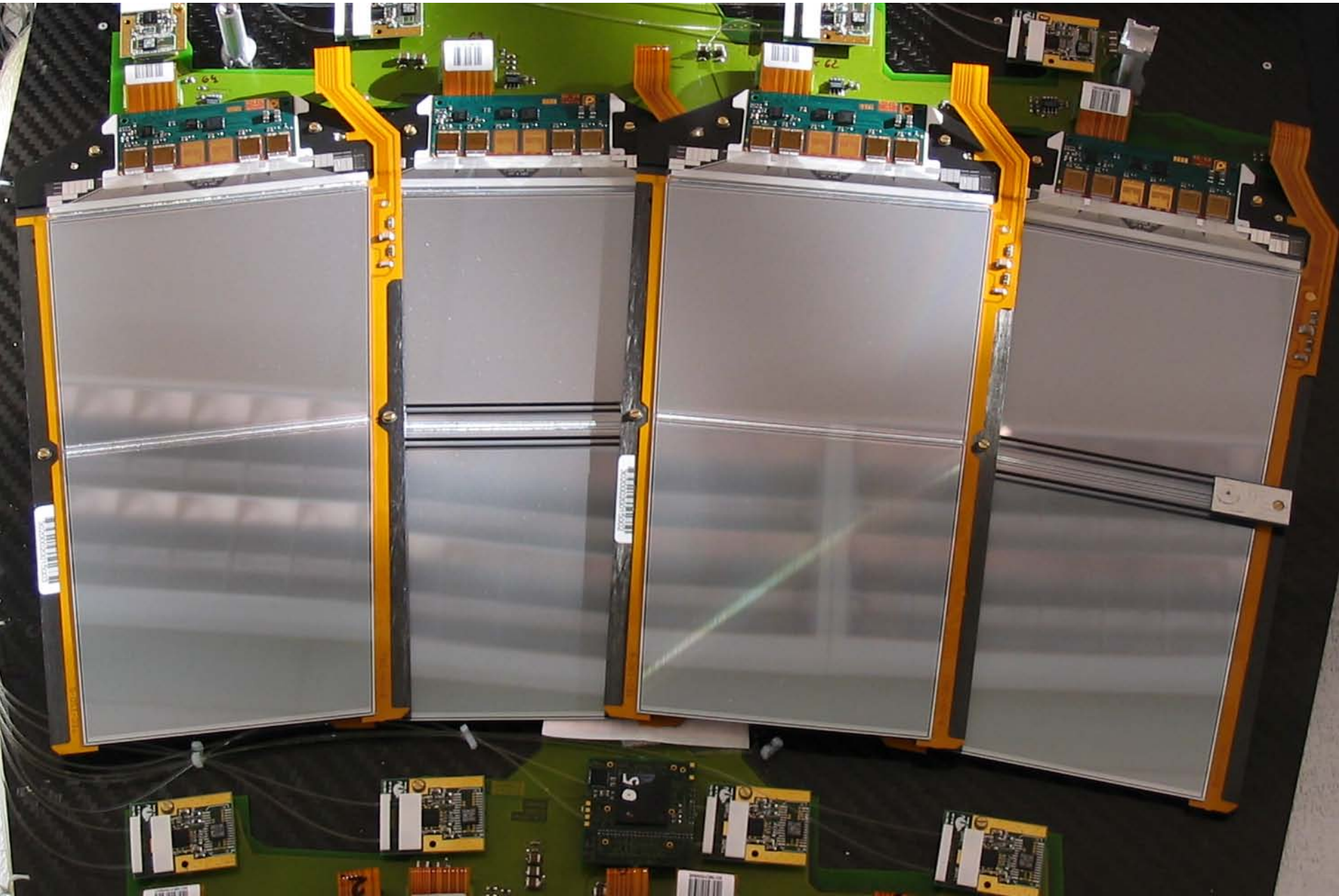



Sebastian Bachmann

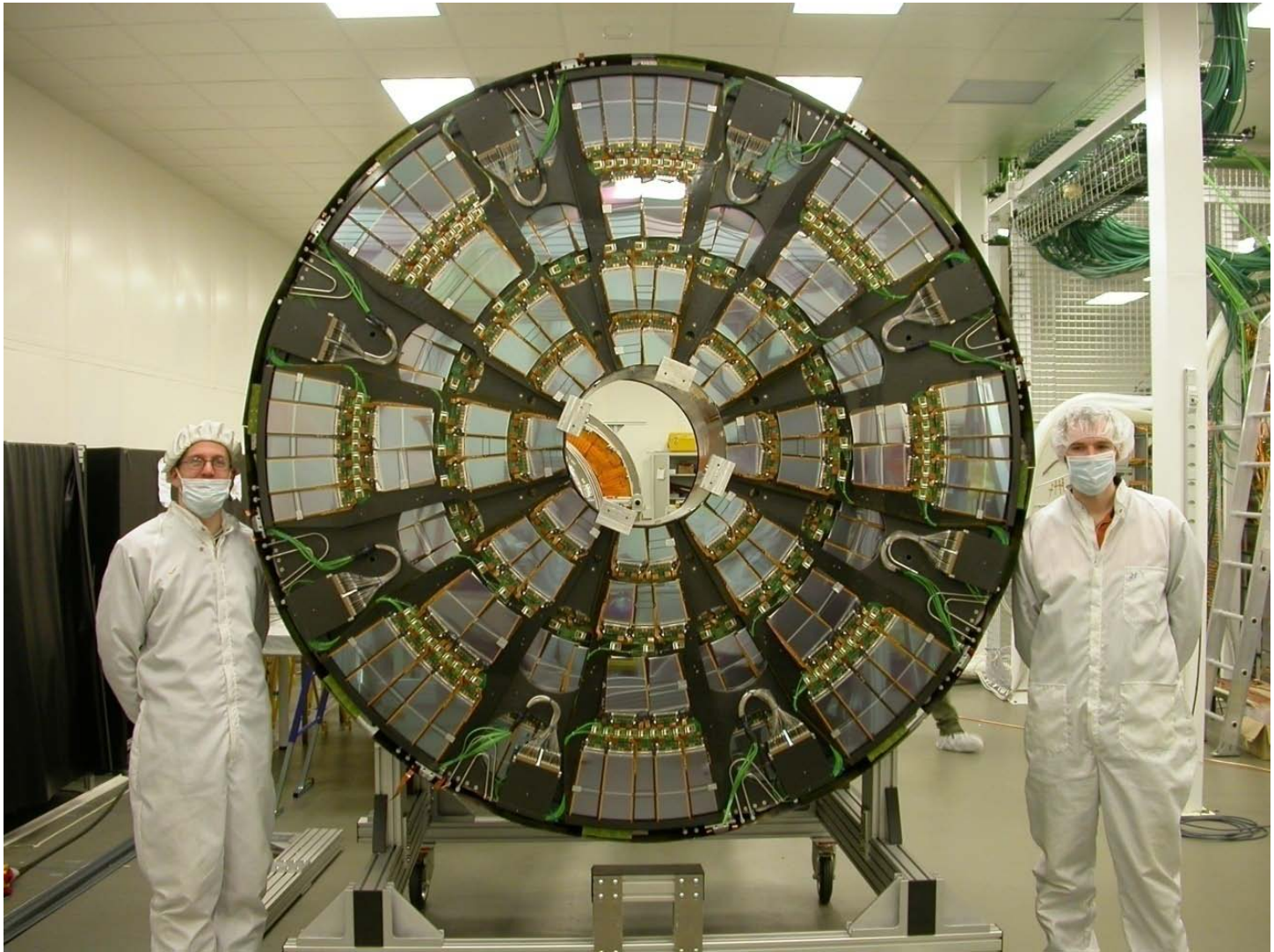


Franz Beißel, Markus Axer u.a.

Si-Streifen-Det.: I.+III. Inst. (O.Pooth u.a.)

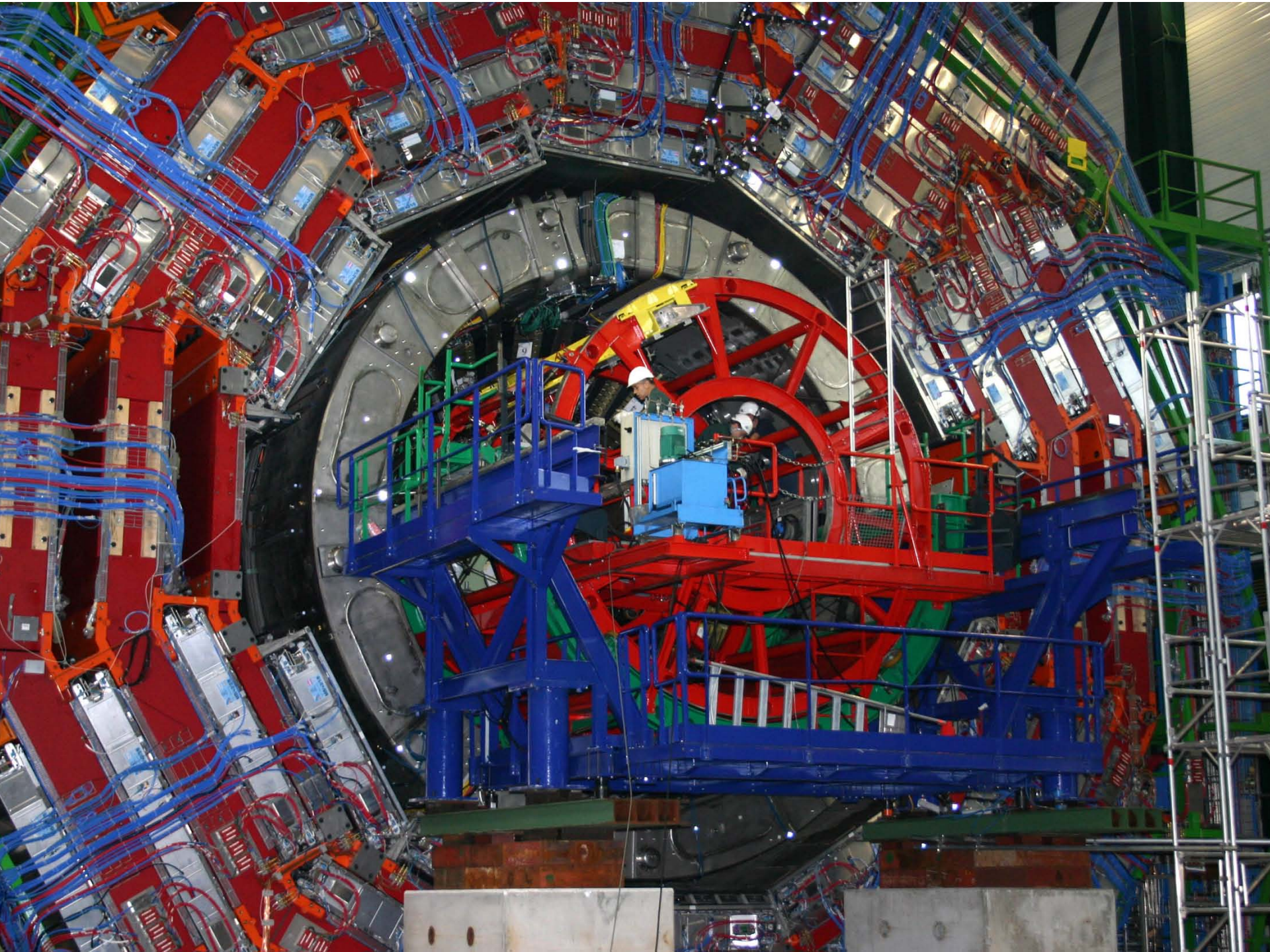


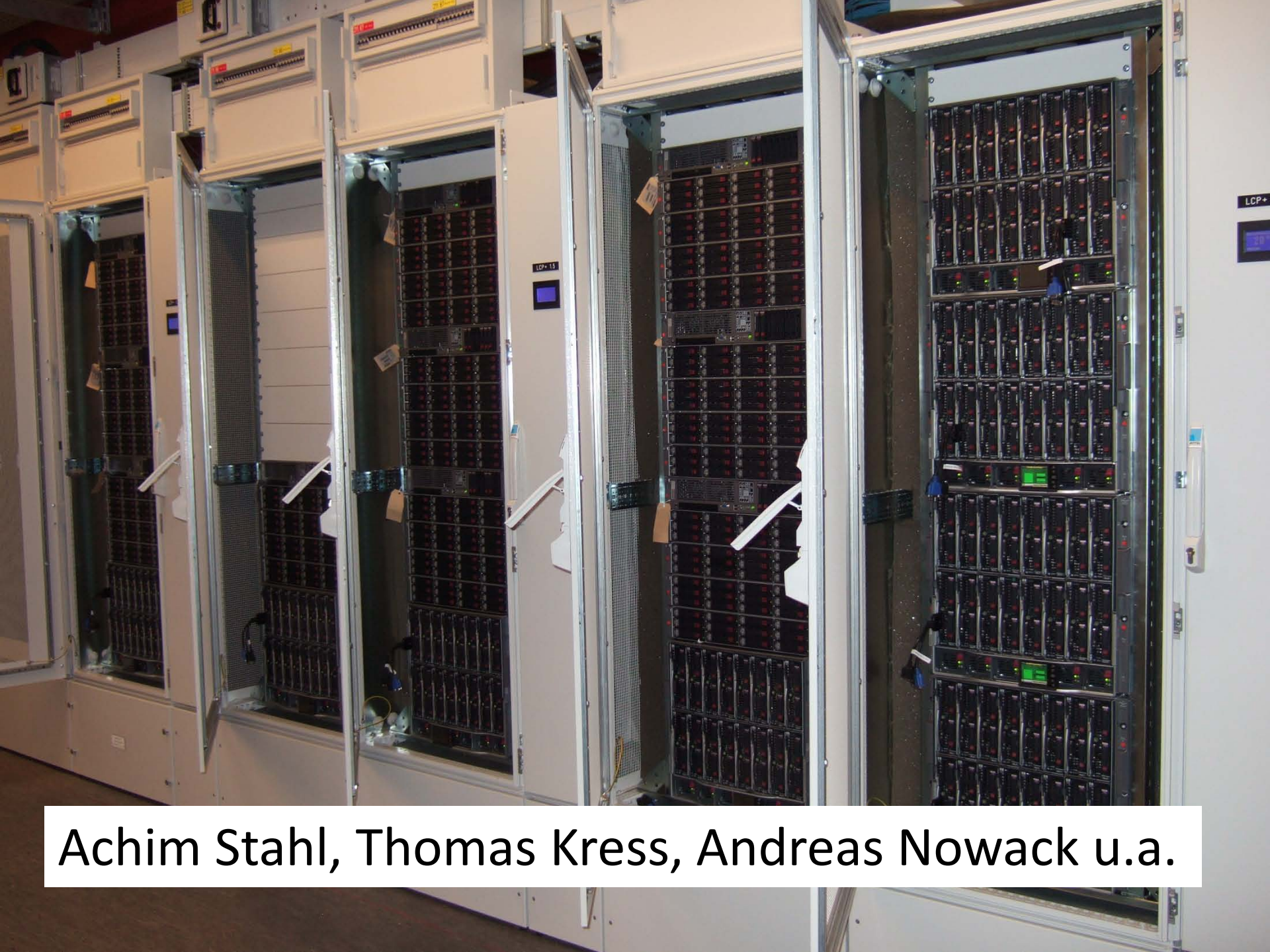
Endcap tracker gebaut in Aachen I + III fertig für die Installation



O.Pooth, G.Kaußen, D.Heydhausen, G.F., A. Linn, S.Fricke

Myon-Kammern: H. Reithler, K.Hoepfner, K. Bosseler, B. Philips, G.Hilgers, F. Zantis u.a.





Achim Stahl, Thomas Kress, Andreas Nowack u.a.

Klaus Boesebeck

Rolf Steinberg Peter Lauscher

Gerd Otter **Martin Deutschmann** Rudolf Rodenberg

Langjährige Zusammenarbeit CERN - RWTH

22. November 2004 – Aula I im Hauptgebäude, Templergraben 55, RWTH Aachen

Verleihung der Ehrendoktorwürde der RWTH

an

Prof. C. Rubbia und Prof. S.C.C. Ting

anlässlich des 50-jährigen Bestehens von CERN

Carlo Rubbia
Nobelpreis 1984

16:15
Prof. H. Schopper: 50 Jahre CERN – Wissenschaftliche Erfolge und Völkerverständigung

17:00
Prof. G. Flügge: Laudatio

17:20
Prof. B. Rauhut (Rektor der RWTH): Honorary Doctorate to C. Rubbia and S.C.C. Ting

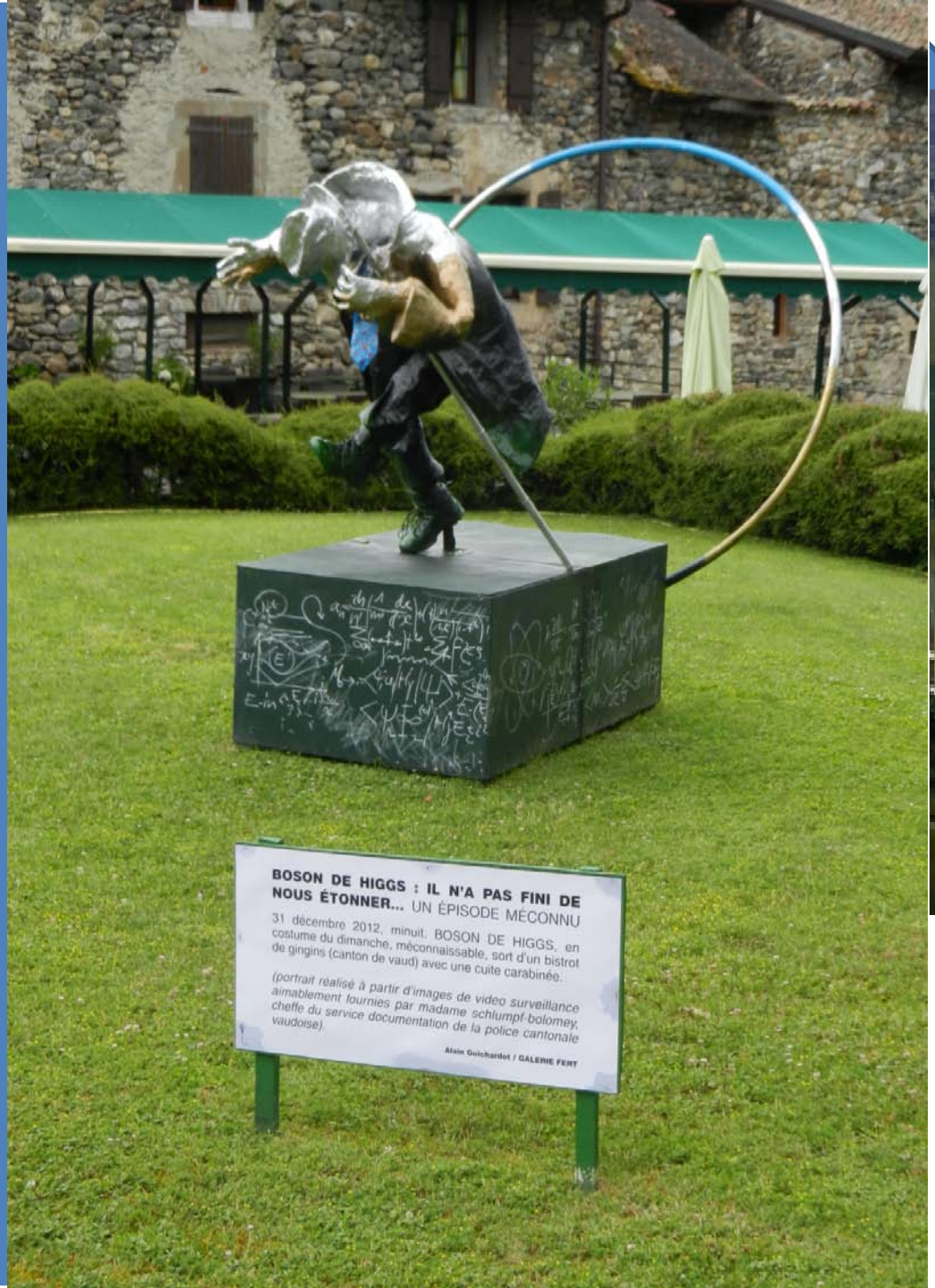
17:30
Prof. C. Rubbia: The Future of Energy

18:00
Prof. S.C.C. Ting: The Anti Matter Universe

Kontakt: Prof. G. Flügge

Samuel C.C. Ting
Nobelpreis 1976


Vom TEILCHENZOO zum STANDA
Jahr
Energie
wichtige Entdeckun
1960
1 GeV
Quark-Mod
Partoneu
1970
Neutrale Str
10 GeV
Charm-Qu
Tau - Le
Beauty-Q
1980
Gluoneu
Schwere Bo
100 GeV
Standar
(3 Fa
1990
heute
Top-Quark (U
2000
1000 GeV
Higgs-Bosonen?
Supersymmetrie
SUSY


BOSON DE HIGGS : IL N'A PAS FINI DE NOUS ÉTONNER... UN ÉPISODE MÉCONNU
31 décembre 2012, minuit. BOSON DE HIGGS, en costume du dimanche, méconnaissable, sort d'un bistrot de gingins (canton de vaud) avec une cuite carabinée.
(portrait réalisé à partir d'images de video surveillance aimablement fournies par madame schlumpf-bolomey, cheffe du service documentation de la police cantonale vaudoise).
Alain Guichardot / GALERIE FERT

III. Physikalisches Institut