Welcome to CERN

Dr. Sascha Marc Schmeling
IT/CO

Your Visit @ CERN

- Introduction to CERN and HEP
- Movie about LHC
- Presentation on Controls
- Visit of an Accelerator Control Room and the CMS Construction Site

Overview

- Introduction to CERN and HEP
  - The Organization
  - The Laboratory
  - **H**igh **E**nergy **P**hysics
  - The Accelerators
  - The Experiments
  - Spin-Offs

History

- 1949
  Fi eld of nuclear ph
- 195
  E
  C cléaire
  ur
- Octob
  Choice of Geneva as labor cation
- July 1st, 1953
  Signature of the CERN Conventio
- 1955
  End of the ratification process in the 12 initial member states

Belgium, Danmark, France, Germany, Greece, Italy, Netherlands, Norway, Sweden, Switzerland, United Kingdom, and Yugoslavia

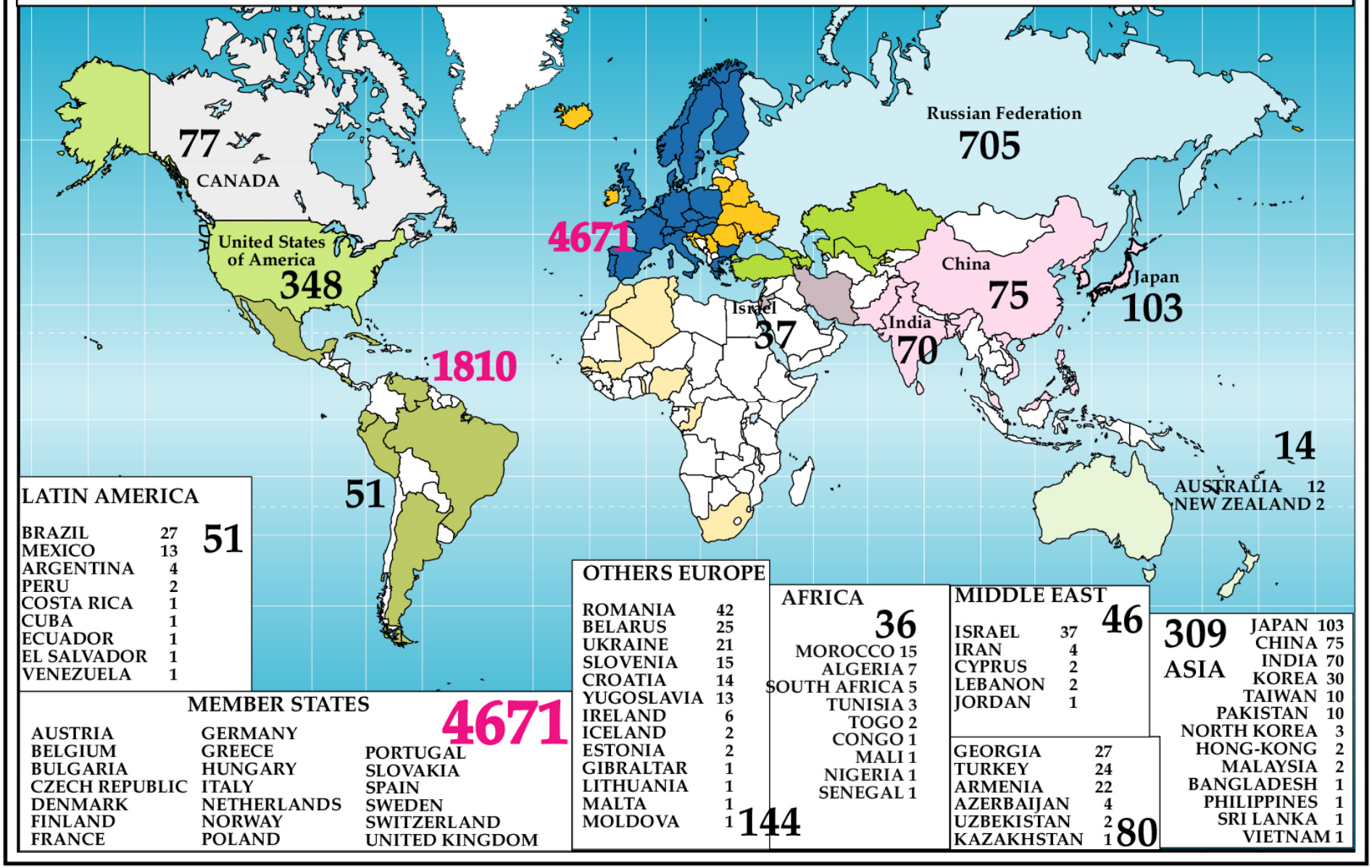
The Twenty Member States of CERN

Member States (Dates of Accession)

- AUSTRIA (1959)
- BELGIUM (1953)
- BULGARIA (1999)
- CZECH FR (1993)
- DENMARK (1953)
- FINLAND (1991)
- FRANCE (1953)
- GERMANY (1953)
- GREECE (1953)
- HUNGARY (1992)
- ITALY (1953)
- NETHERLANDS (1953)
- NORWAY (1953)
- POLAND (1991)
- PORTUGAL (1986)
- SLOVAK FR (1993)
- SPAIN (1/1961-12/1968-1/1983)
- SWEDEN (1953)
- SWITZERLAND (1953)
- UNITED KINGDOM (1953)

CERN AC/DI/MM - ES36B 1999 - 15/6/99

Distribution of All CERN Users by Nationality on May 1, 2001



LATIN AMERICA 51

BRAZIL	27
MEXICO	13
ARGENTINA	4
PERU	2
COSTA RICA	1
CUBA	1
ECUADOR	1
EL SALVADOR	1
VENEZUELA	1

MEMBER STATES 4671

AUSTRIA, BELGIUM, BULGARIA, CZECH REPUBLIC, DENMARK, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, ITALY, NETHERLANDS, NORWAY, POLAND, PORTUGAL, SLOVAKIA, SPAIN, SWEDEN, SWITZERLAND, UNITED KINGDOM

OTHERS EUROPE 144

ROMANIA	42
BELARUS	25
UKRAINE	21
SLOVENIA	15
CROATIA	14
YUGOSLAVIA	13
IRELAND	6
ICELAND	2
ESTONIA	2
GIBRALTAR	1
LITHUANIA	1
MALTA	1
MOLDOVA	1

AFRICA 36

MOROCCO	15
ALGERIA	7
SOUTH AFRICA	5
TUNISIA	3
TOGO	2
CONGO	1
MALI	1
NIGERIA	1
SENEGAL	1

MIDDLE EAST 46

ISRAEL	37
IRAN	4
CYPRUS	2
LEBANON	2
JORDAN	1

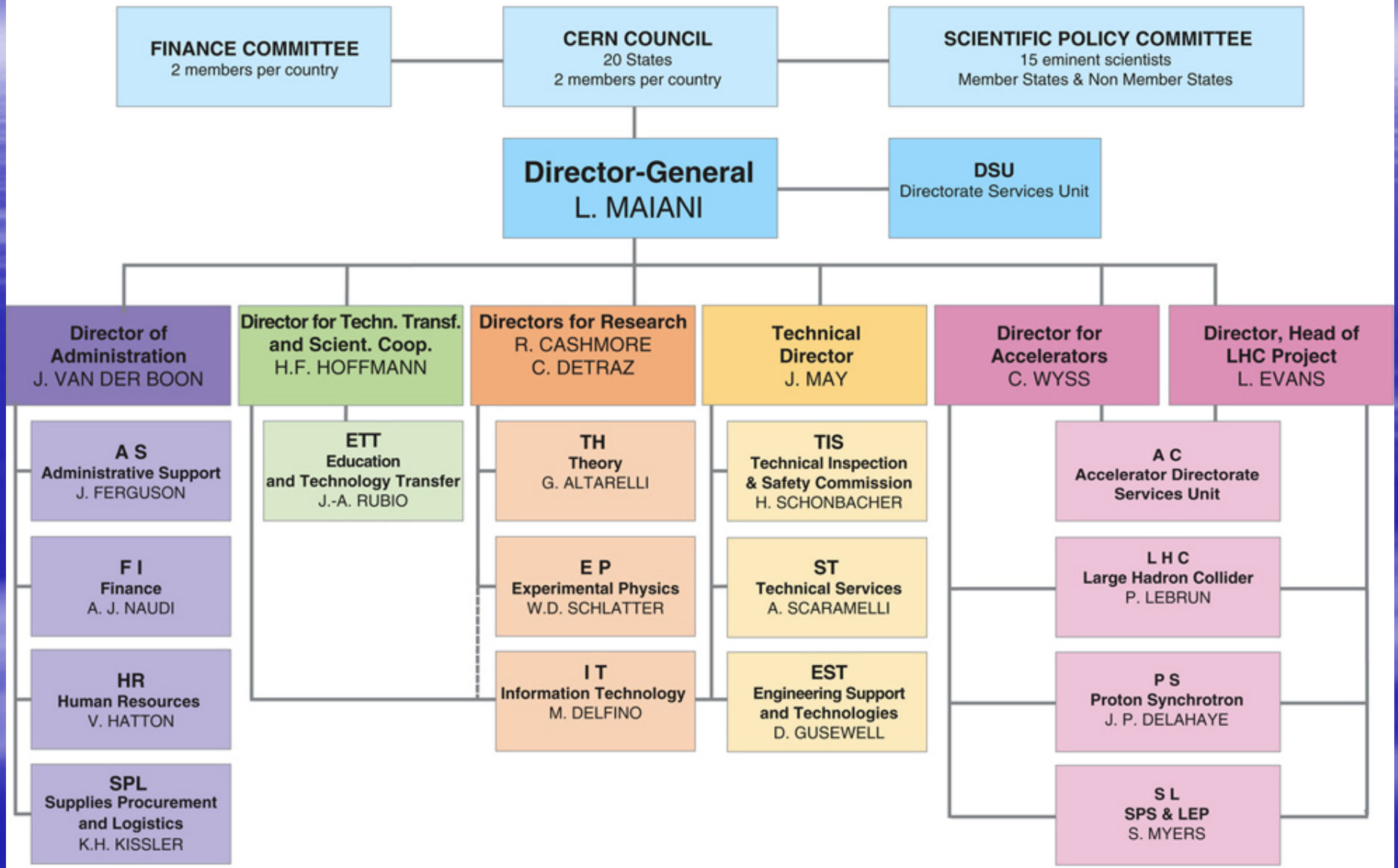
GEORGIA	27
TURKEY	24
ARMENIA	22
AZERBAIJAN	4
UZBEKISTAN	2
KAZAKHSTAN	1

80

ASIA 309

JAPAN	103
CHINA	75
INDIA	70
KOREA	30
TAIWAN	10
PAKISTAN	10
NORTH KOREA	3
HONG-KONG	2
MALAYSIA	2
BANGLADESH	1
PHILIPPINES	1
SRI LANKA	1
VIETNAM	1

CERN ORGANISATIONAL CHART 07/2001



High Energy Physics

- Research to discover the principles that keep the world together.

- Search for
  - elementary particles
  - forces
  - symmetries

Physique des Particules

Physique Nucléaire

Physique du Solide

Chimie - Biologie

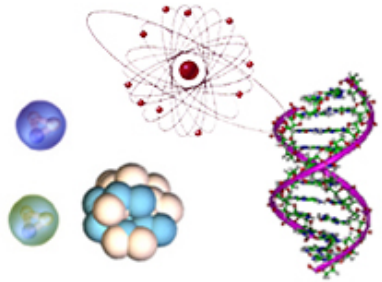
Mécanique

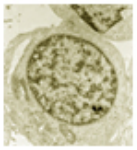
Géophysique

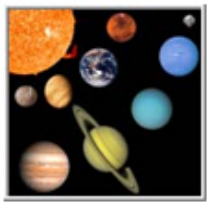
Astronomie

Astrophysique

Cosmologie





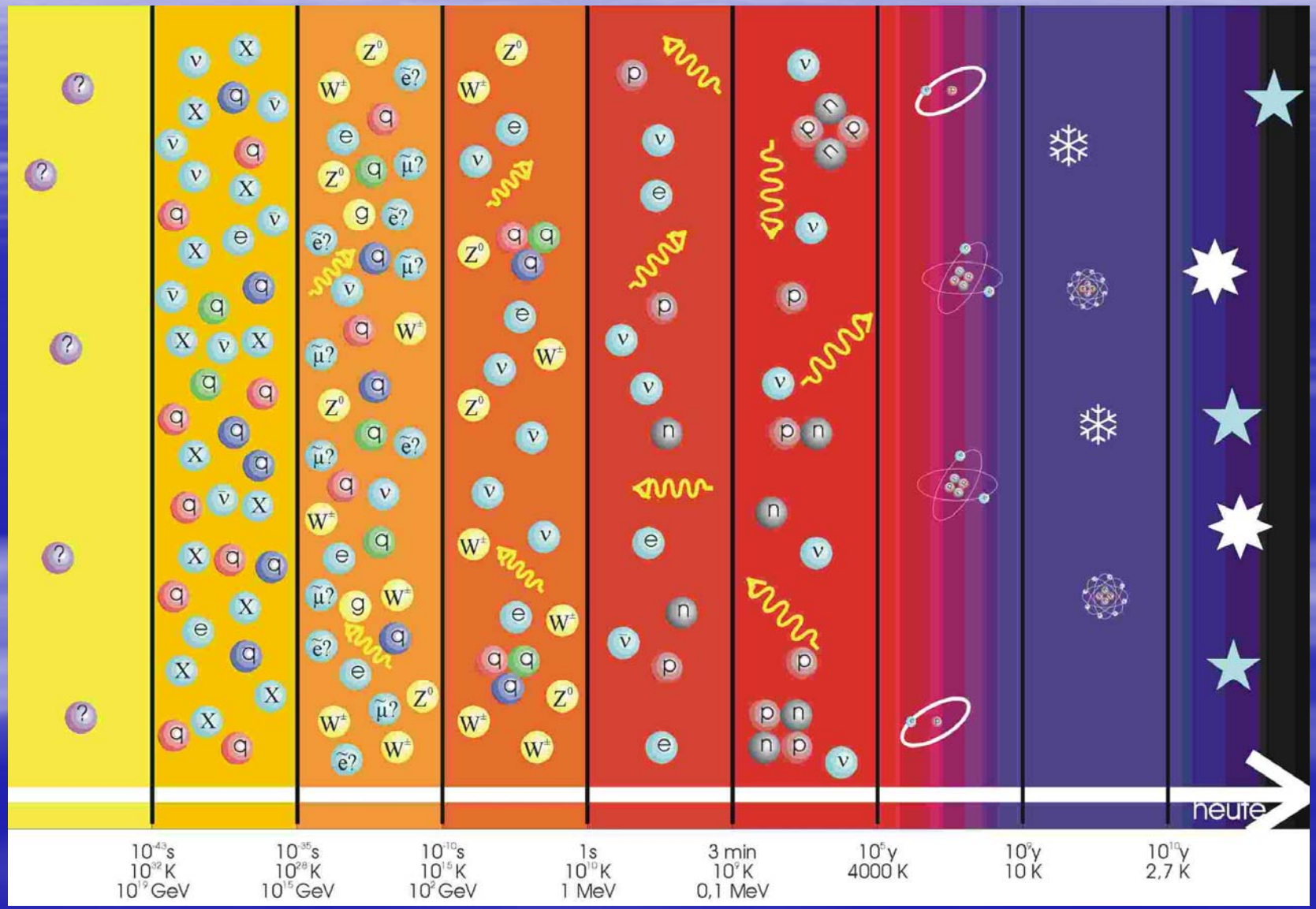


10^{-15} 10^{-12} 10^{-9} 10^{-6} 10^{-3} 1 10^{3} 10^{6} 10^{9} 10^{12} 10^{15} 10^{18} 10^{21} 10^{24}

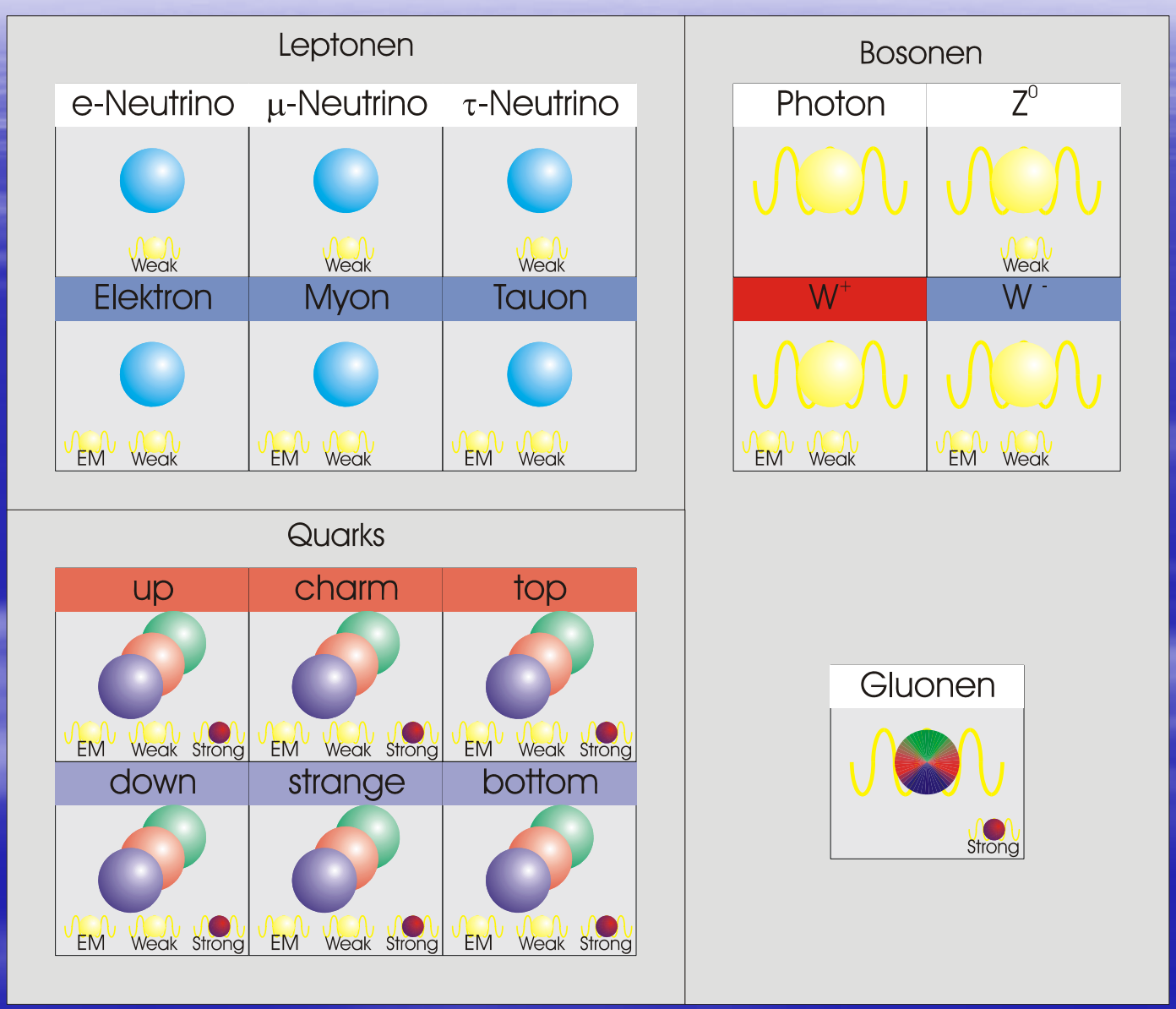
fm pm nm μm mm m km Mm Gm Tm Pm Em

10^{-15} m = 0,000 000 000 000 001 m

History of the Universe



Standard Model

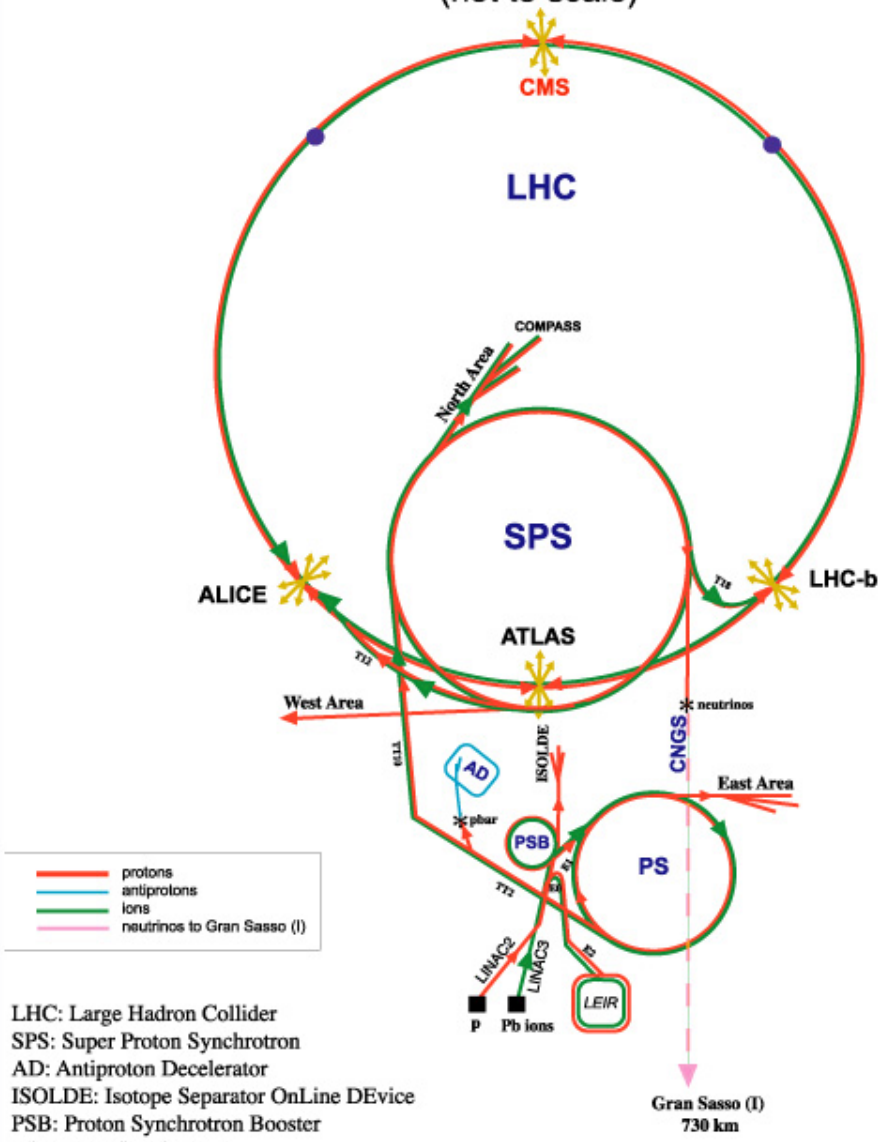


Methods of HEP

- Reach high energies with accelerators
  - natural accelerators
    - Astroparticle Physics
  - artificial accelerators
    - Particle Physics
- Probing of interactions of matter and antimatter with detectors

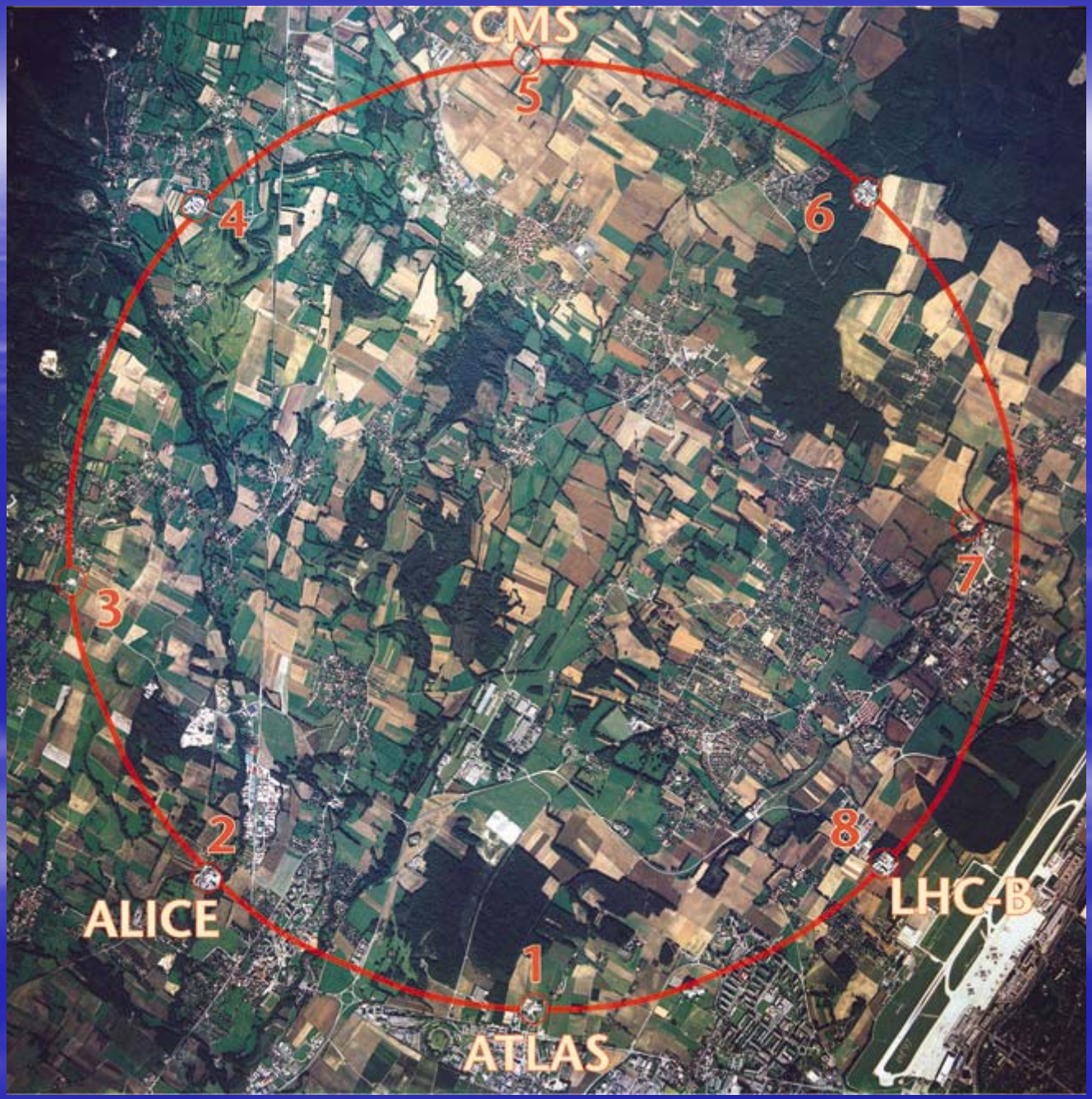
CERN Accelerators

(not to scale)



LHC: Large Hadron Collider
SPS: Super Proton Synchrotron
AD: Antiproton Decelerator
ISOLDE: Isotope Separator OnLine DEvice
PSB: Proton Synchrotron Booster
PS: Proton Synchrotron
LINAC: LINear ACcelerator
LEIR: Low Energy Ion Ring
CNGS: Cern Neutrinos to Gran Sasso

Rudolf LEY, PS Division, CERN, 02.09.96
Revised and adapted by Antonella Del Rosso, ETT Div
in collaboration with B. Desforges, SL Div., and
D. Manglunki, PS Div. CERN, 23.05.01

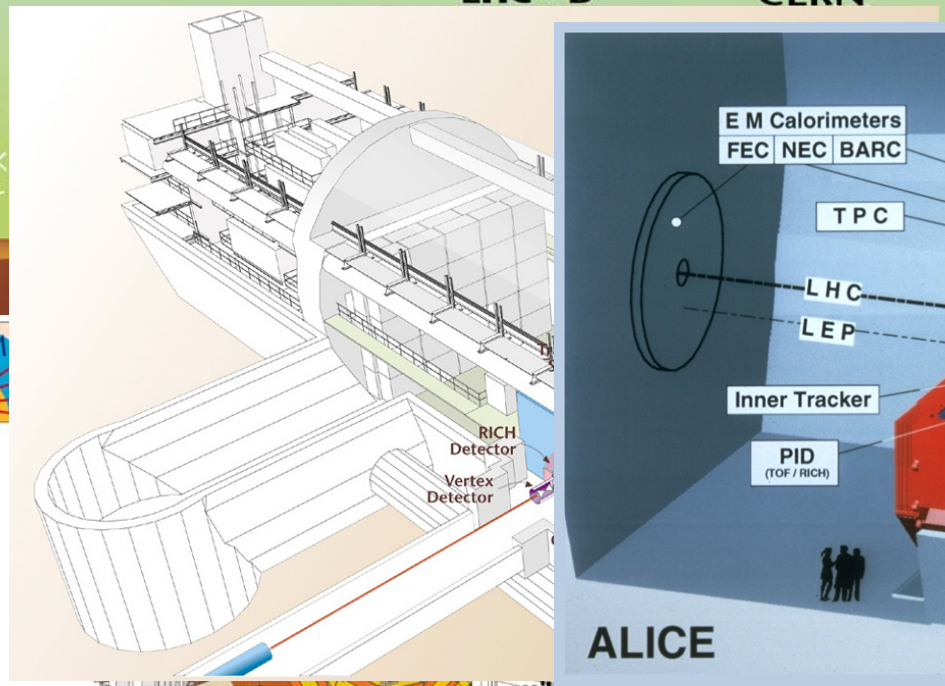

CMS
5
4
6
3
7
2
8
ALICE
LHC-B
1
ATLAS

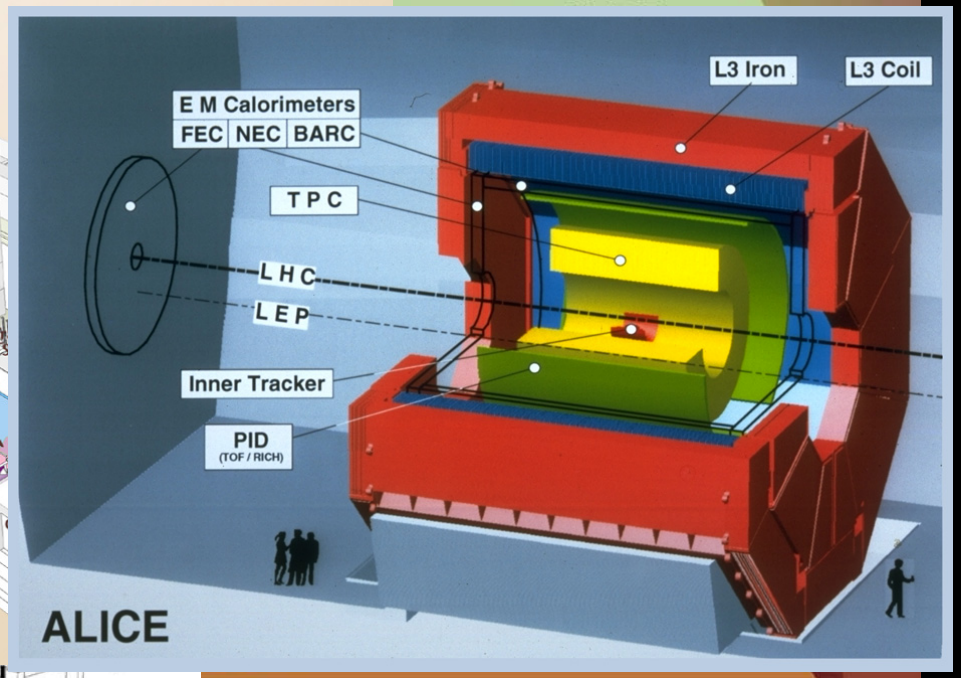
Overall view of the LHC experiments.

GENEVE

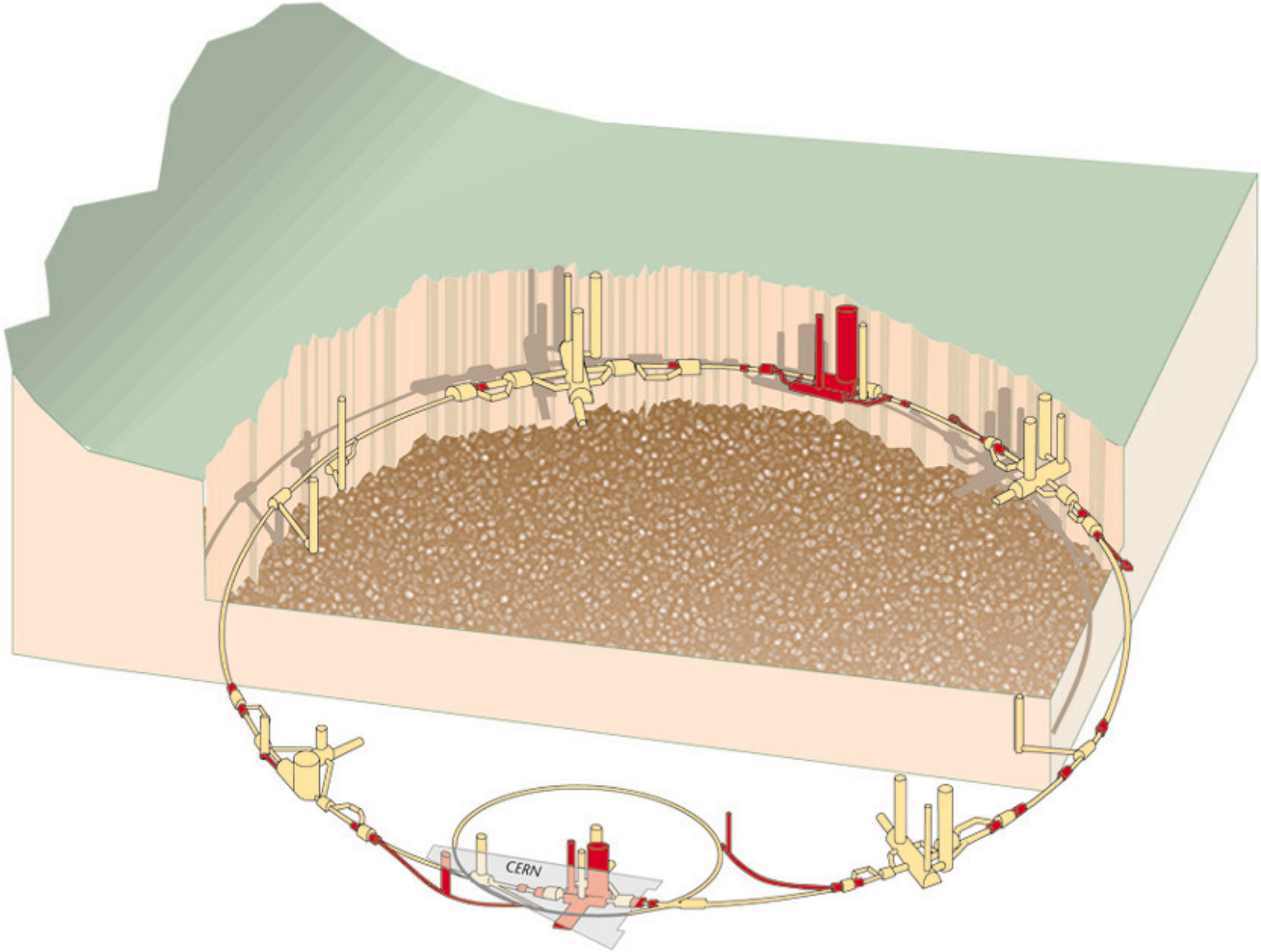
LHC - B

CERN

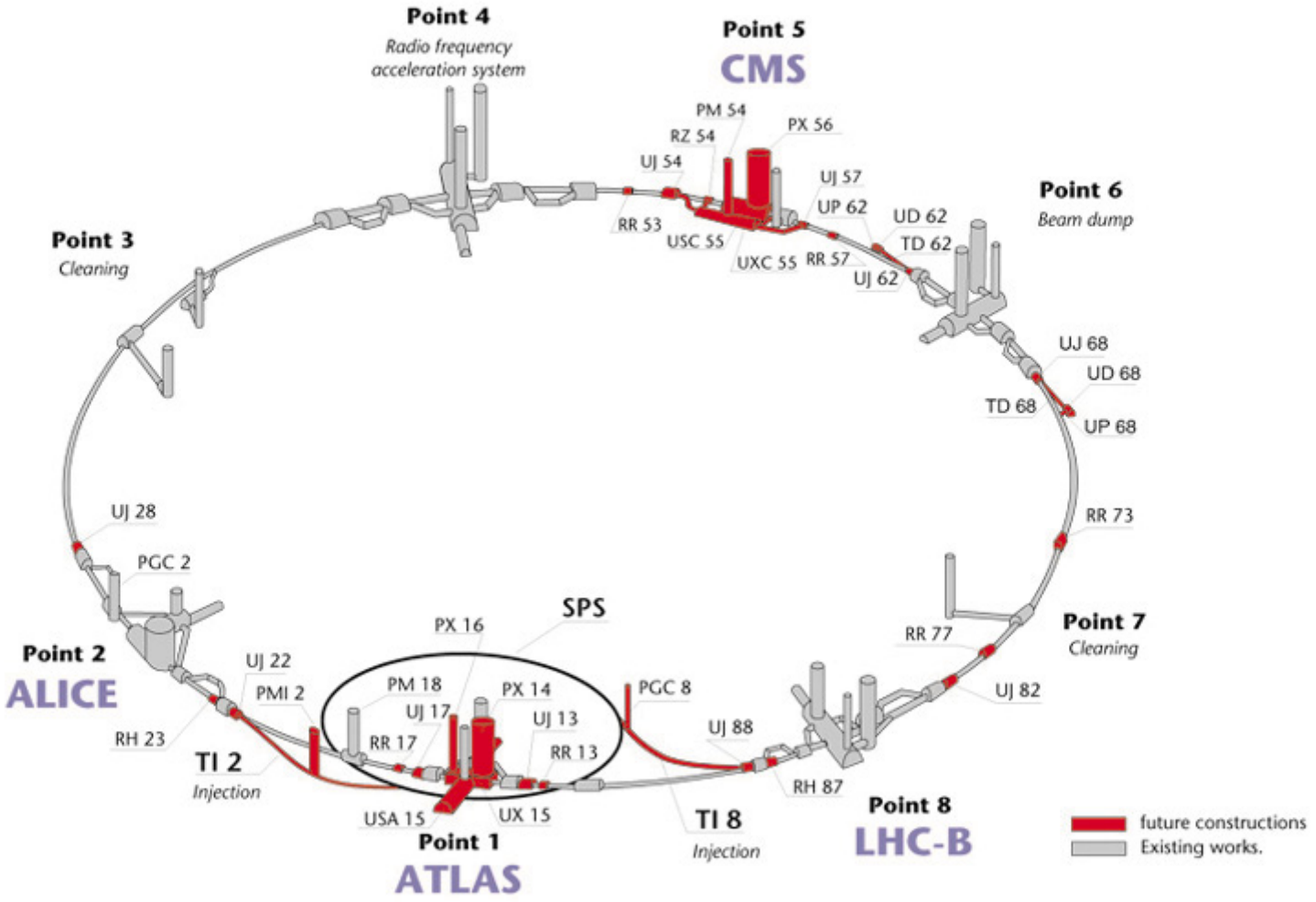




E540 - V10/09/97


CERN

Layout of the LEP tunnel including future LHC infrastructures.



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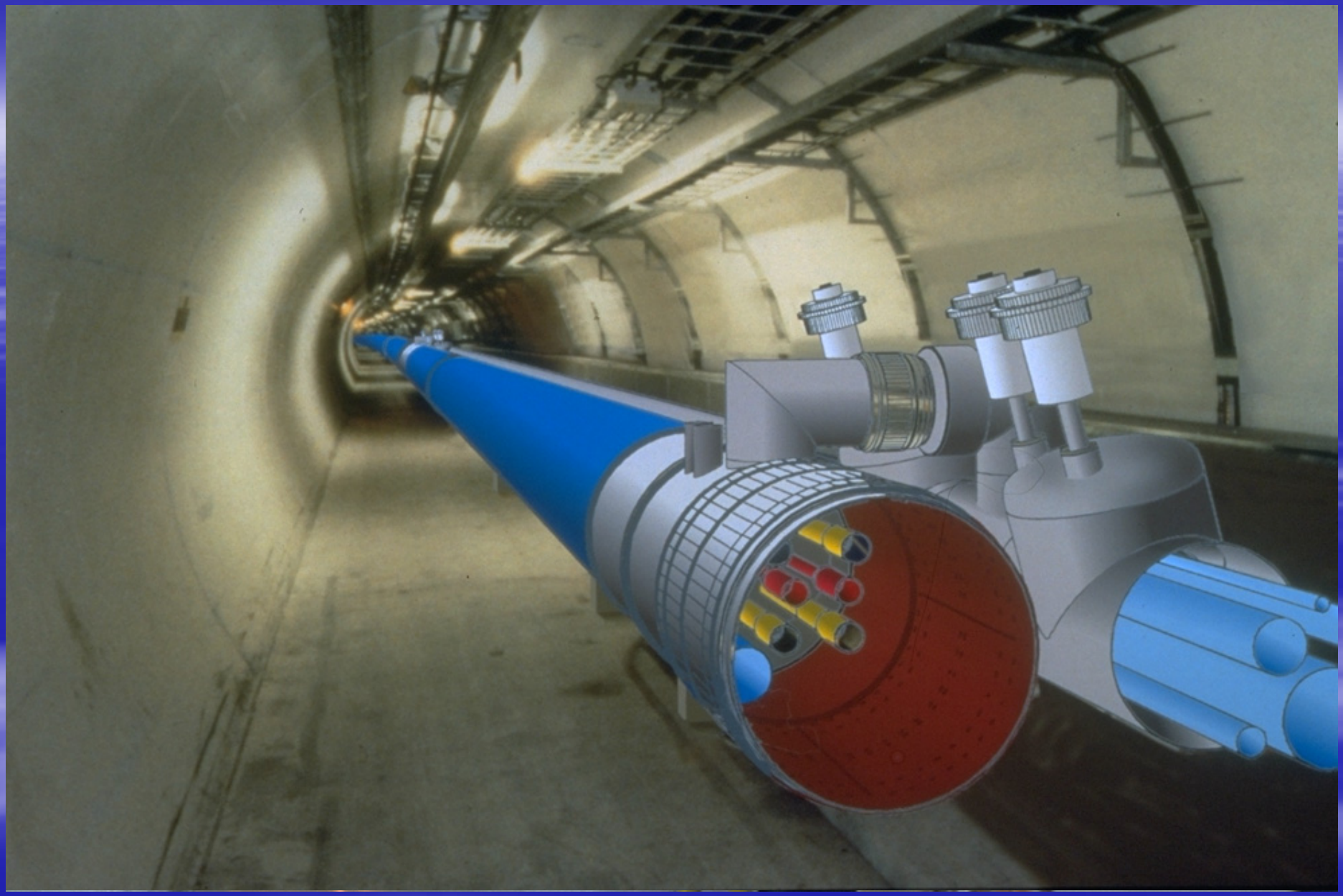
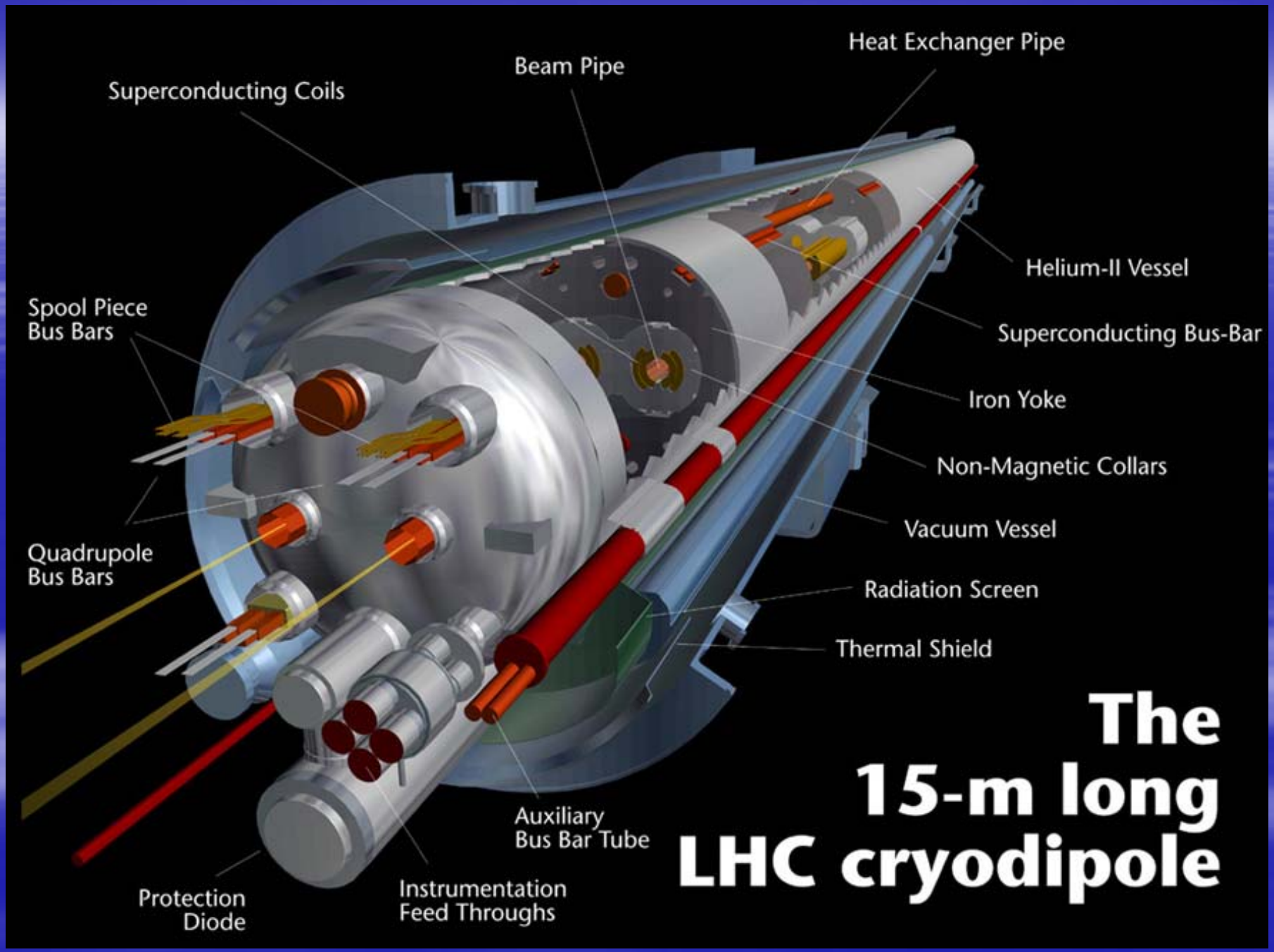
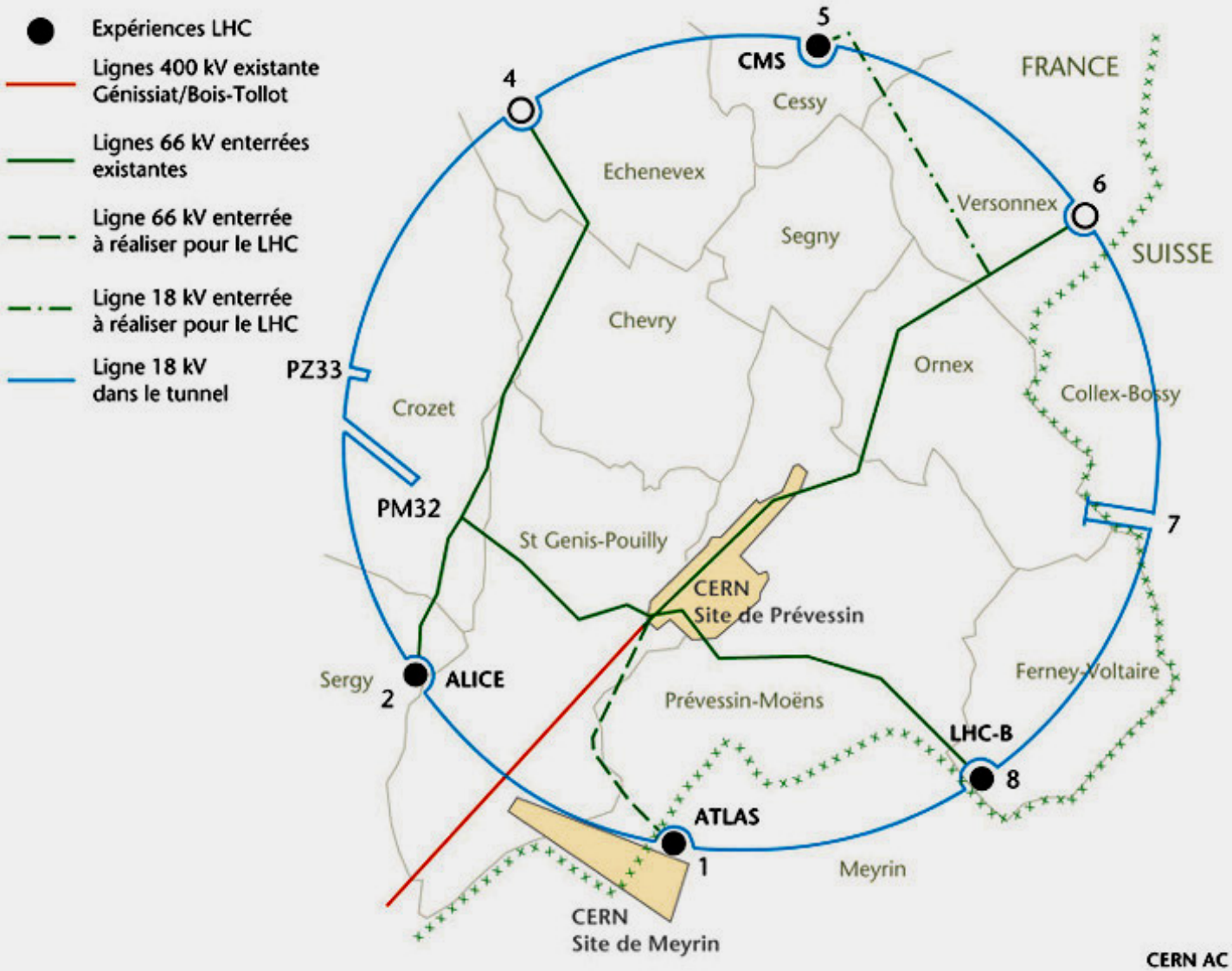
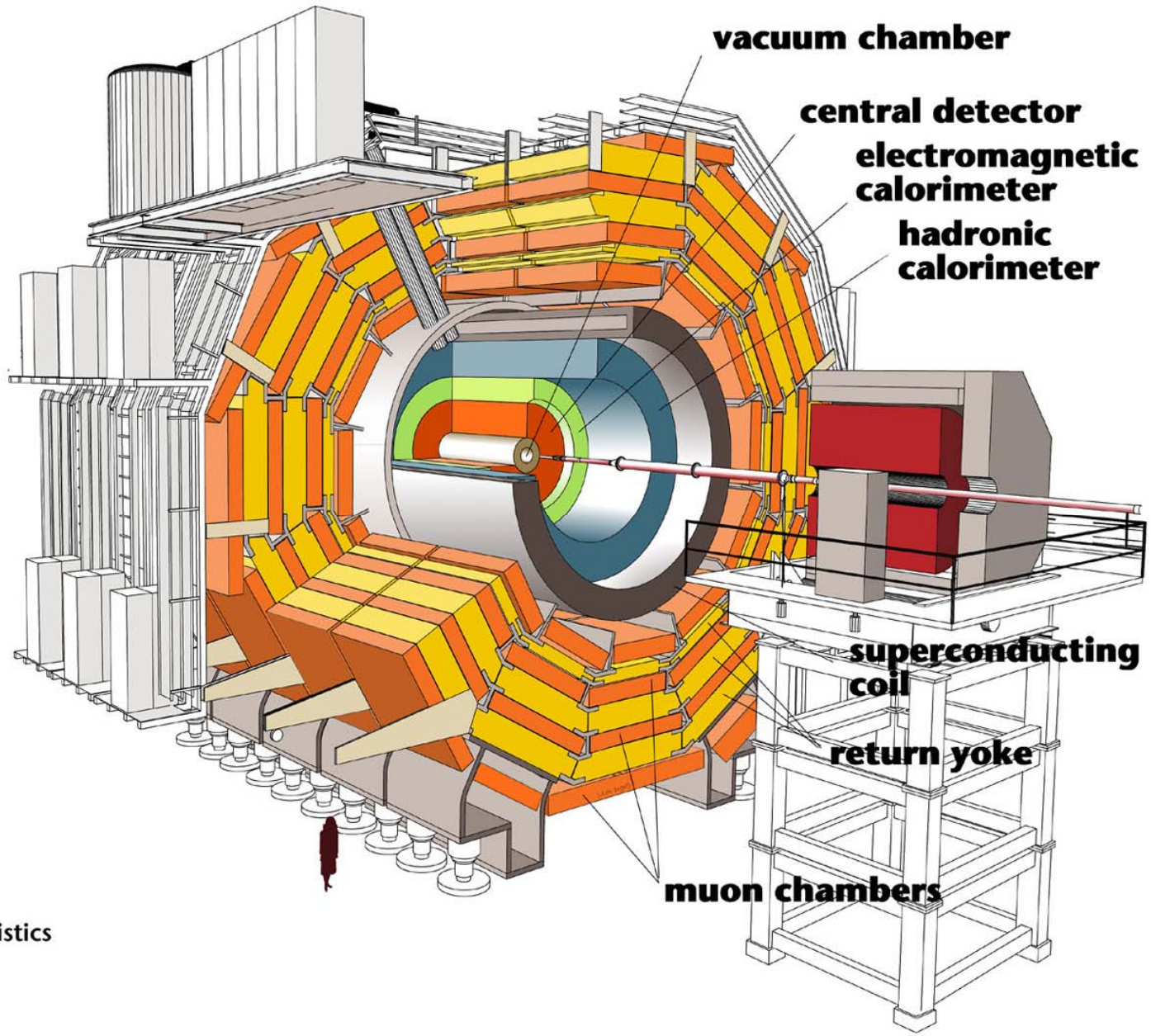



Heat Exchanger Pipe
Beam Pipe
Superconducting Coils
Helium-II Vessel
Spool Piece
Bus Bars
Superconducting Bus-Bar
Iron Yoke
Non-Magnetic Collars
Quadrupole
Bus Bars
Vacuum Vessel
Radiation Screen
Thermal Shield
The
15-m long
LHC cryodipole
Auxiliary
Bus Bar Tube
Protection
Diode
Instrumentation
Feed Throughs

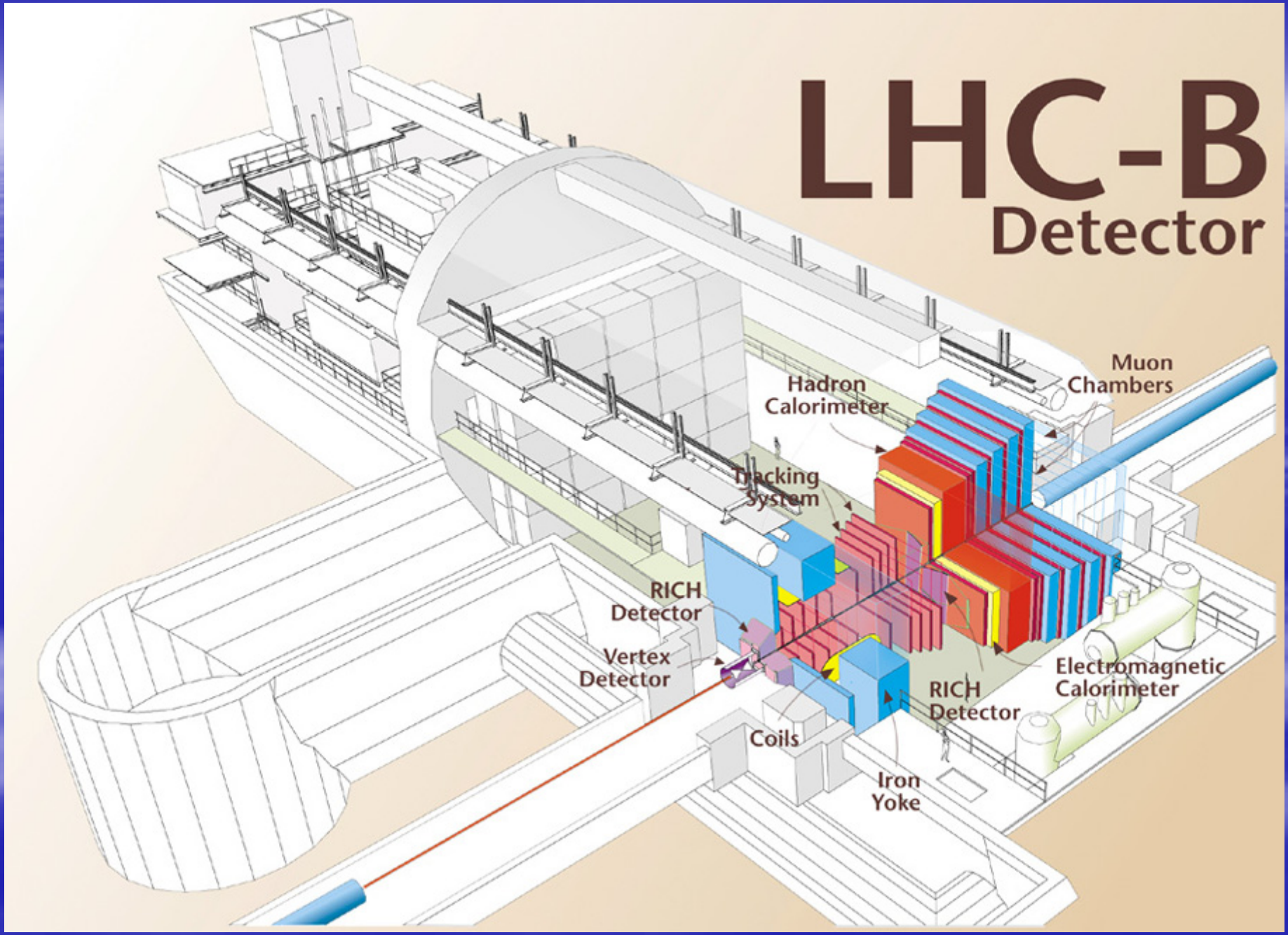
Plan schématique des liaisons électriques enterrées LEP/LHC



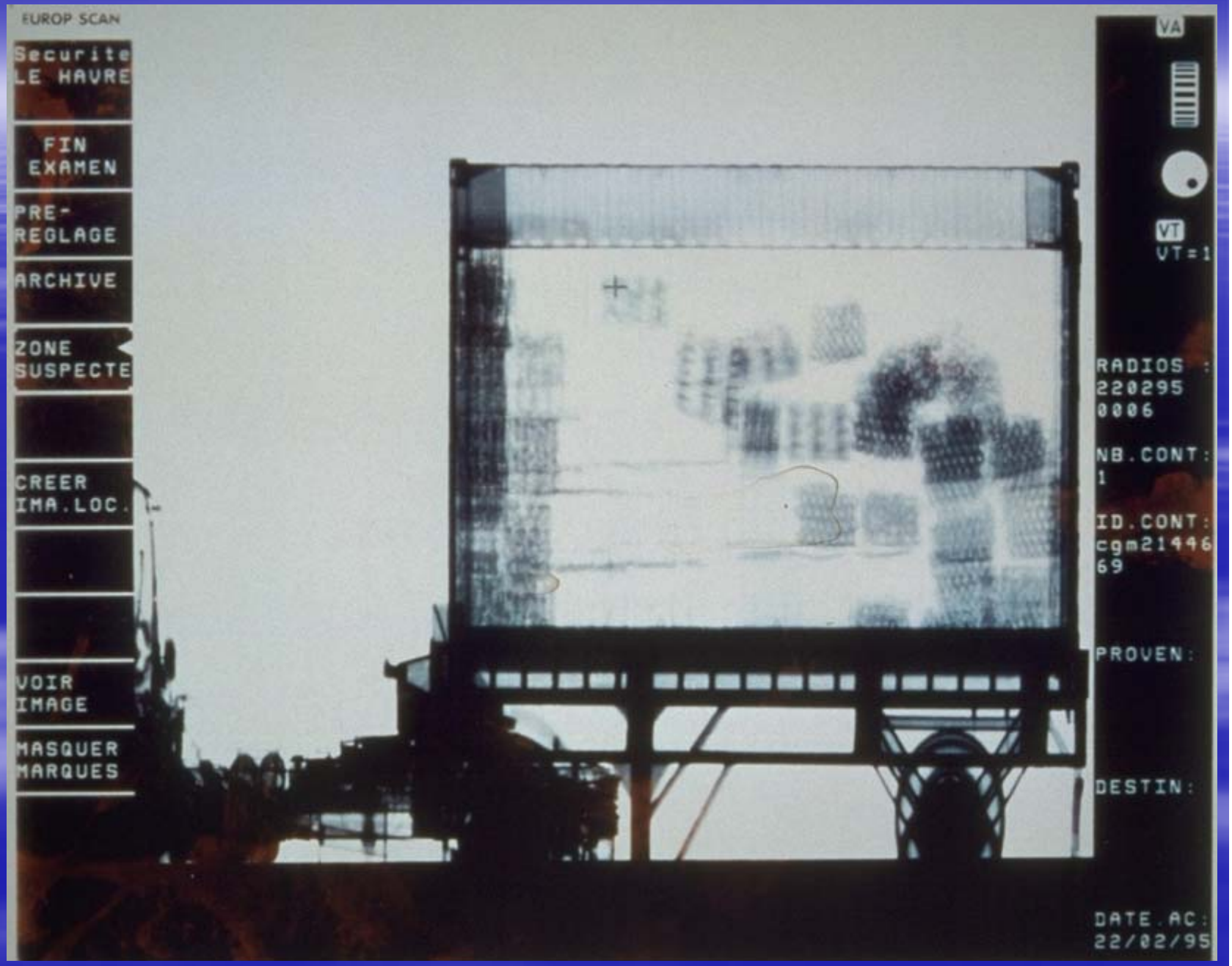


Detector characteristics

Width: 22m
Diameter: 15m
Weight: 14'500t


LHC-B
Detector
Muon
Chambers
Hadron
Calorimeter
Tracking
System
RICH
Detector
Vertex
Detector
Electromagnetic
Calorimeter
RICH
Detector
Coils
Iron
Yoke


NCSA
MOSAIC
NCSA Mosaic Flavors
Starting Points
WORLD WIDE WEB
the Virtual Tourist
Network Growth - Asia-Pacific Top 7
Networks Connected
1993
1994
Japan
Australia
Taiwan
CERN
The Chinese University of Hong Kong
World Wide Web Server


EUROP SCAN
Securite
LE HAVRE
FIN
EXAMEN
PRE-
REGLAGE
ARCHIVE
ZONE
SUSPECTE
CREER
IMA.LOC.
VOIR
IMAGE
MASQUER
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PROVEN:
DESTIN:
DATE.AC:
22/02/95