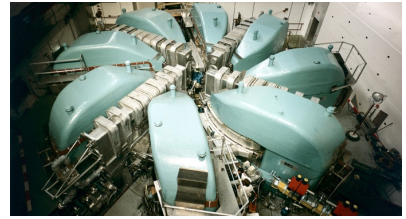


L P A P laboratory article accelerator physics

Lenny Rivkin, EPFL & PSI

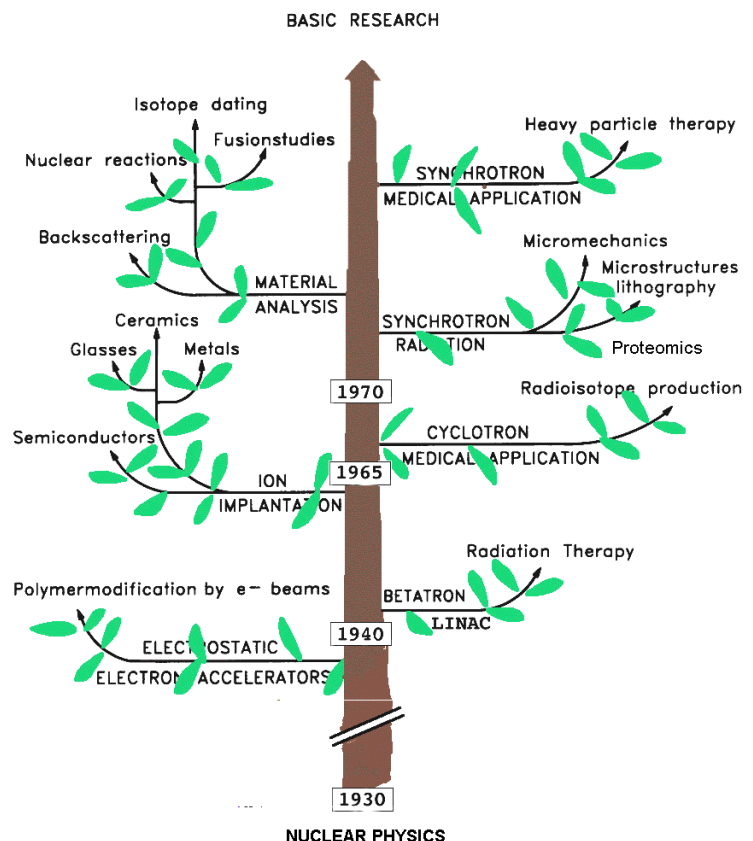
<http://lpap.epfl.ch>



The Role of Accelerators in Physical and Life Sciences

"It is an historical fact that scientific revolutions are more often driven by new tools than by new concepts"

Freeman Dyson



Possibilities for TPs, Master thesis

PSI (several postdocs, graduate students)

- SwissFEL: future X-Ray Free Electron Laser
- Swiss Light Source (SLS)
- neutrons, muons beams
- Hadron therapy

CERN (16 EPFL doctoral students)

- LHC and its upgrades, injectors
- future linear colliders R&D
- neutrino beams



Other accelerator labs in the world (SLAC, MAXLab, etc)



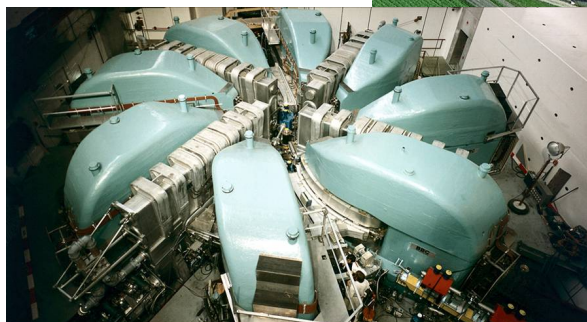
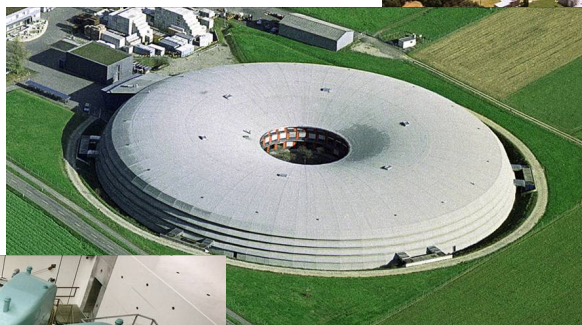
Accelerators at PSI

SwissFEL
2005 - 2016

Synchrotron Light Source
1990 - 2000

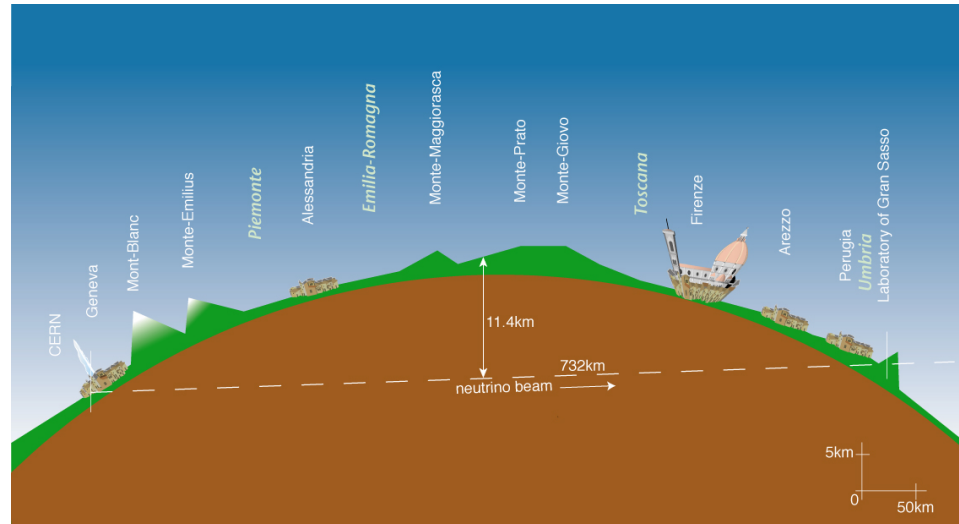


Proton Cyclotron
1980 - 1990



Examples of TPs

CERN neutrino beams steering, LHC new injector beam
CLIC Test Facility etc.

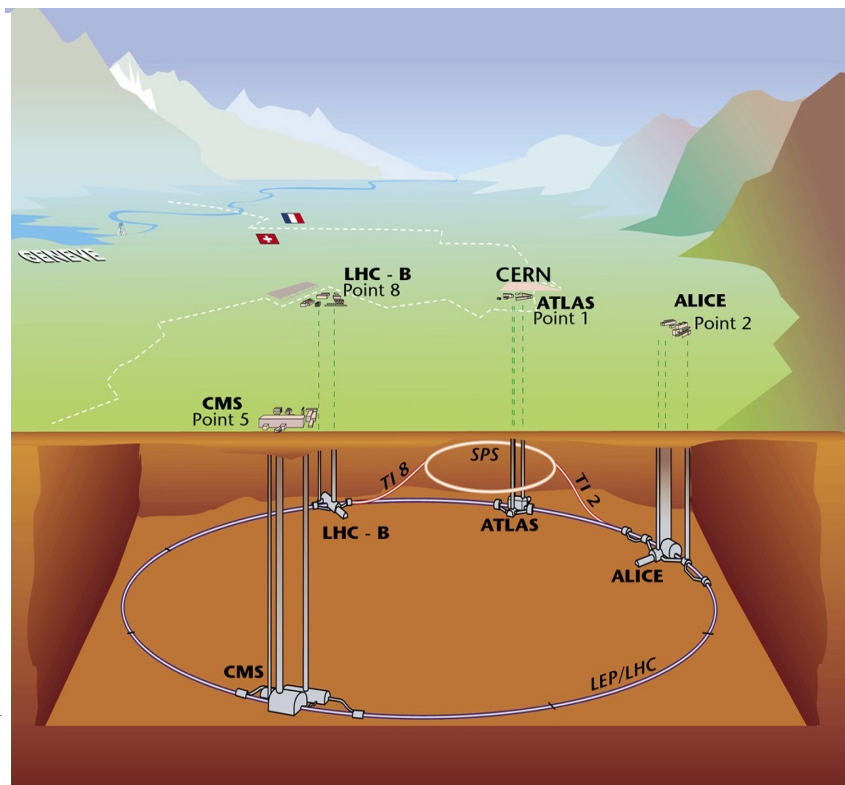


27 km „tunnel with the future“

LHC
7+7 TeV

protons
on
protons

$$L = 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$$



High energy frontier: 80 km tunnel?

Depending on the achievable magnetic field

- 42 TeV with 8.3 T (present LHC magnets)
- 80 TeV with 16 T (new technology, Nb₃Sn)
- 100 TeV with 20 T (high temp sc magnets)

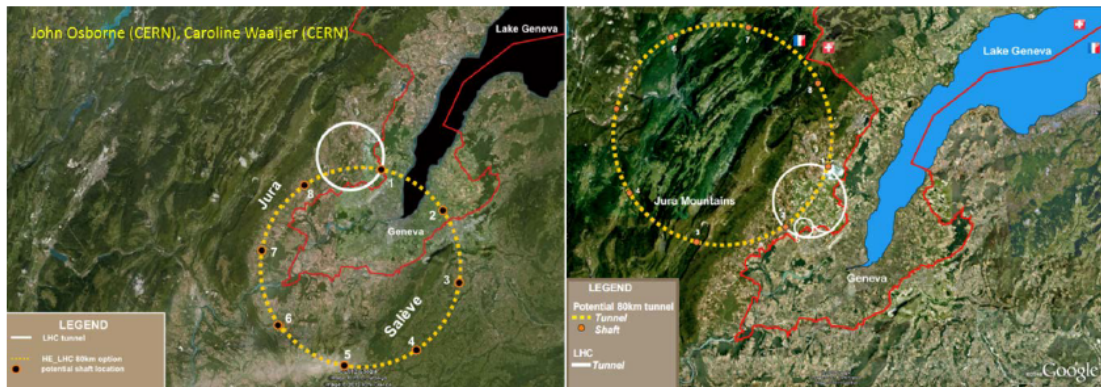
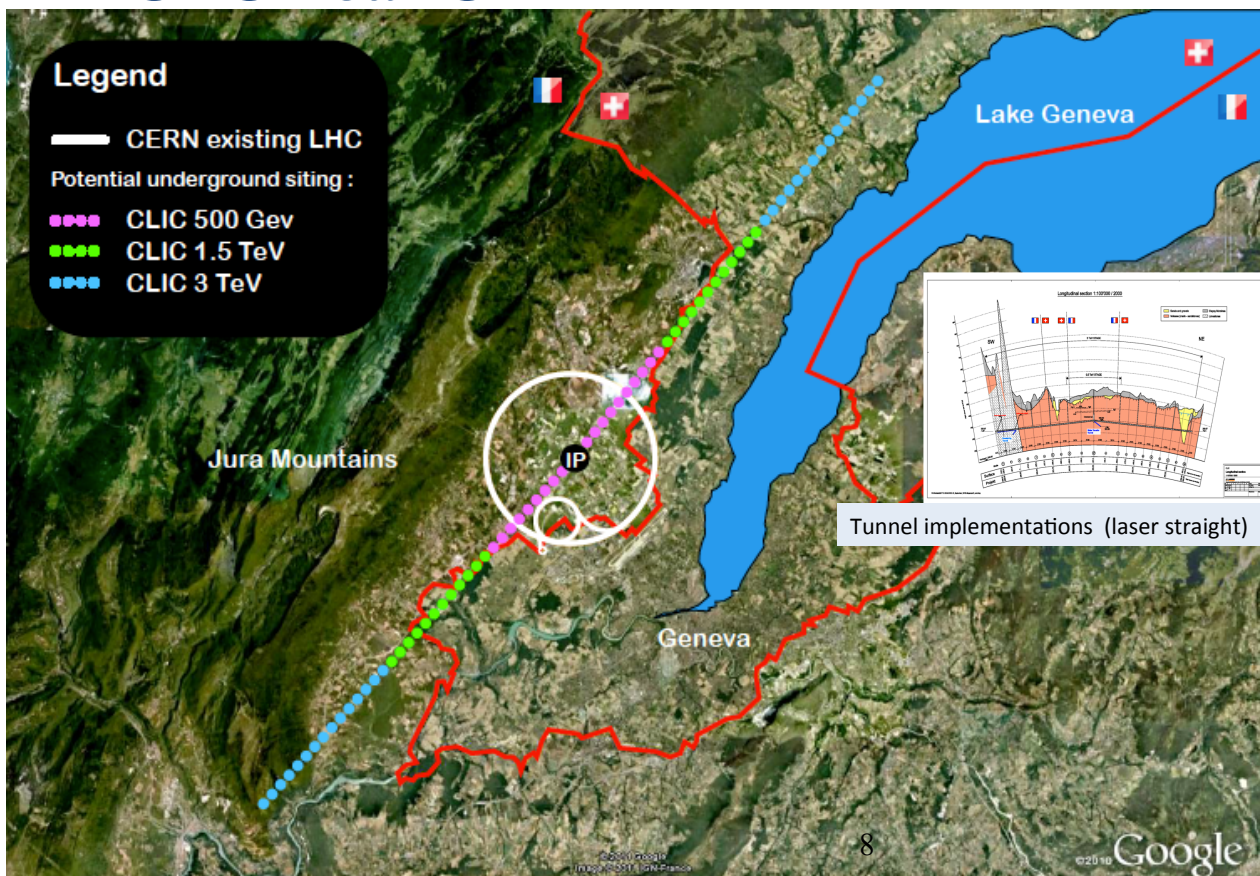


Figure 9. Two possible location, upon geological study, of the 80 km ring for a Super HE-LHC (option at left is strongly preferred)

CLIC near CERN



Accelerator R&D

LHC and its upgrades

e^+e^- linear colliders: ILC and CLIC

Neutrino beams, factory; Muon collider

Synchrotron light sources, Free Electron Lasers

Neutron sources

Advanced accelerator concepts

Medical applications (e.g. hadron therapy)



END

