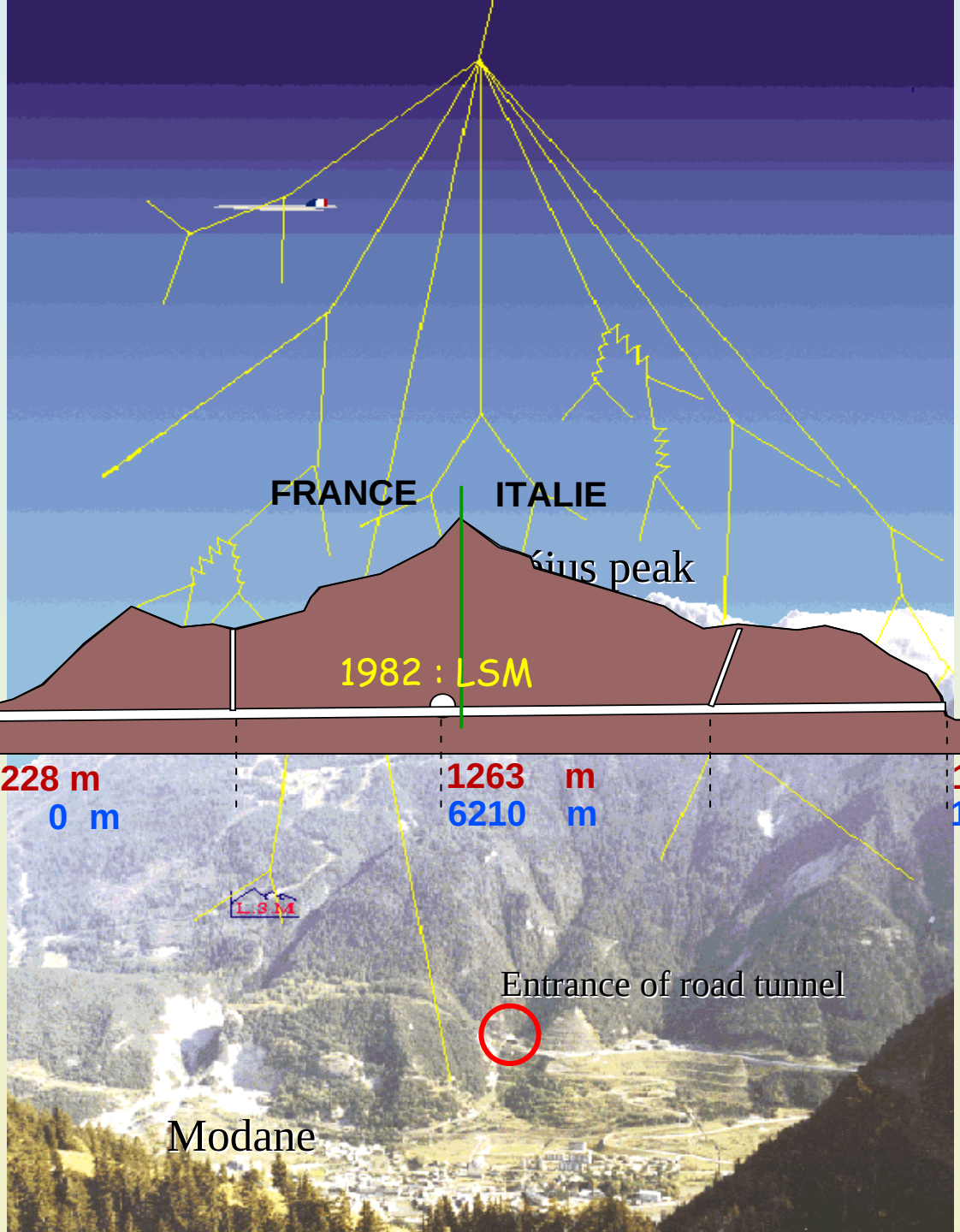
Laboratoire Souterrain de Modane

Past - present - future

Gilles Gerbier
CEA/LSM

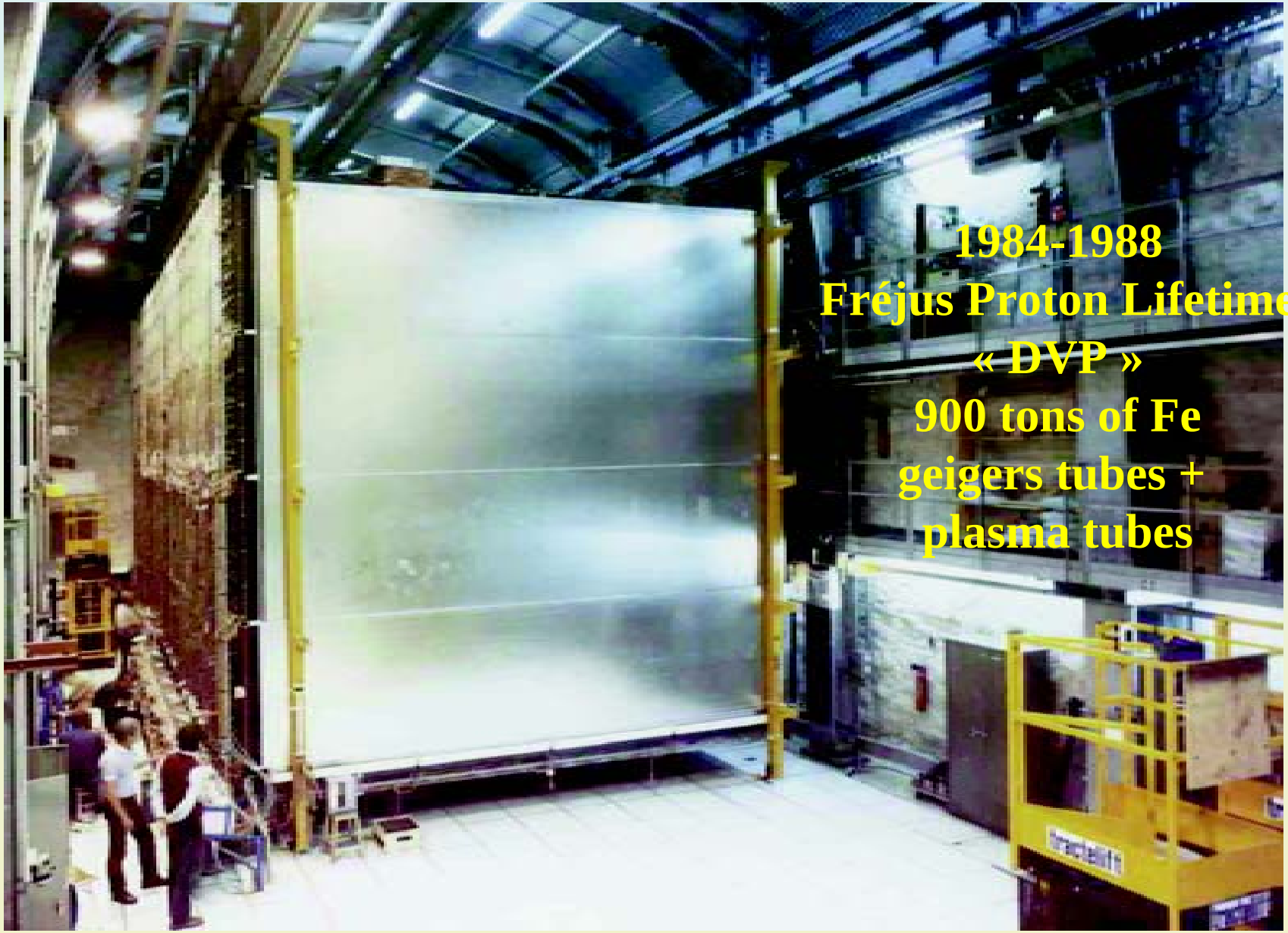


COMMISSARIAT À L'ÉNERGIE ATOMIQUE

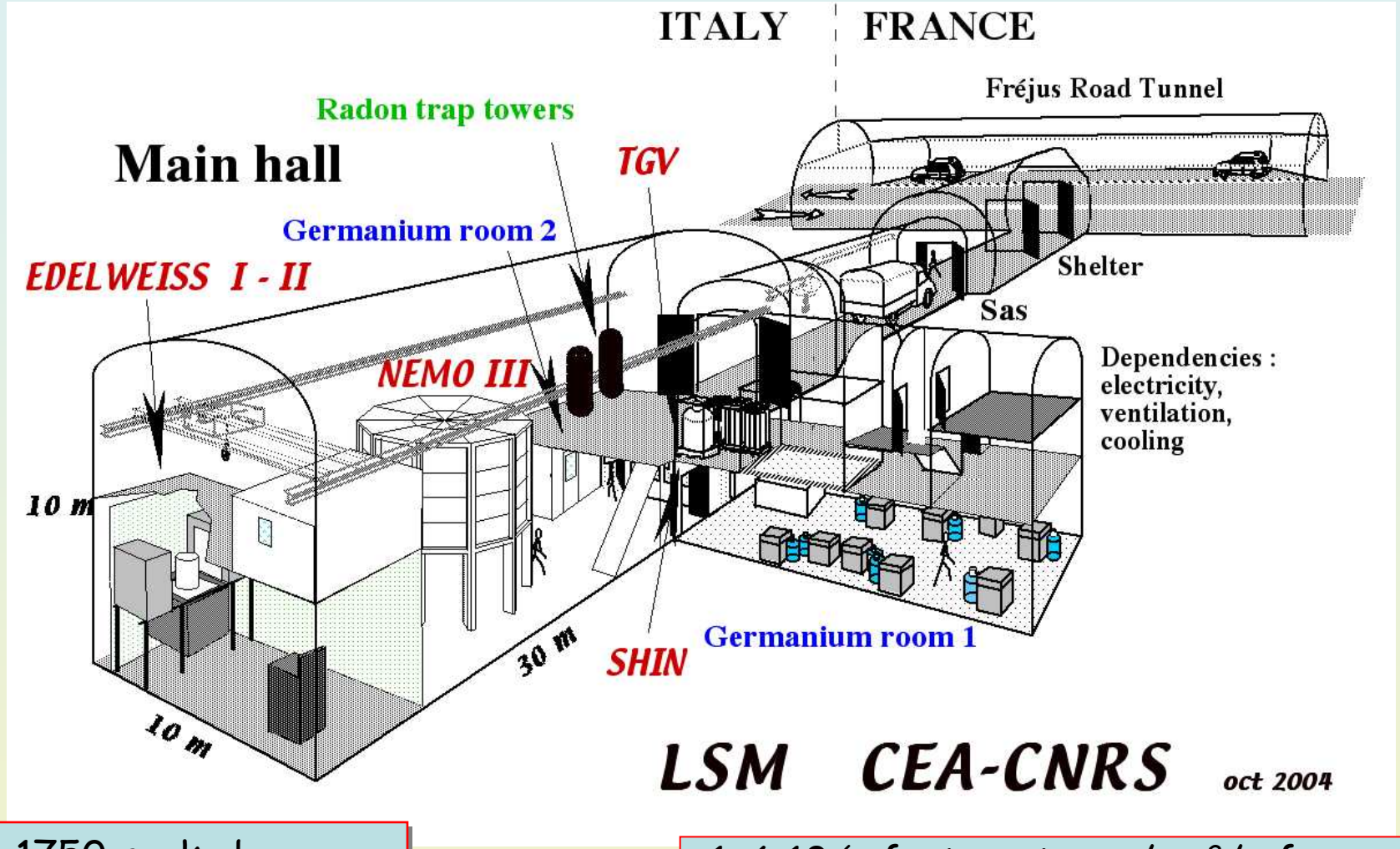
DIRECTION DES SCIENCES DE LA MATIÈRE

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

INSTITUT NATIONAL DE PHYSIQUE NUCLÉAIRE ET DE PHYSIQUE DES PARTICULES


1984-1988
Fréjus Proton Lifetime
« DVP »
900 tons of Fe
geigers tubes +
plasma tubes

The lab now

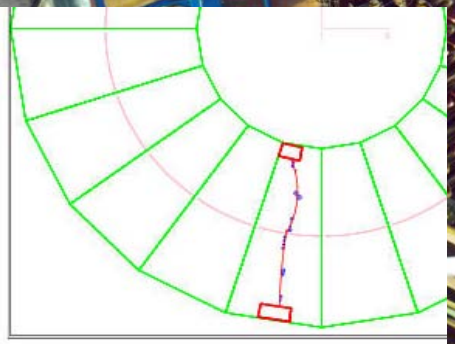


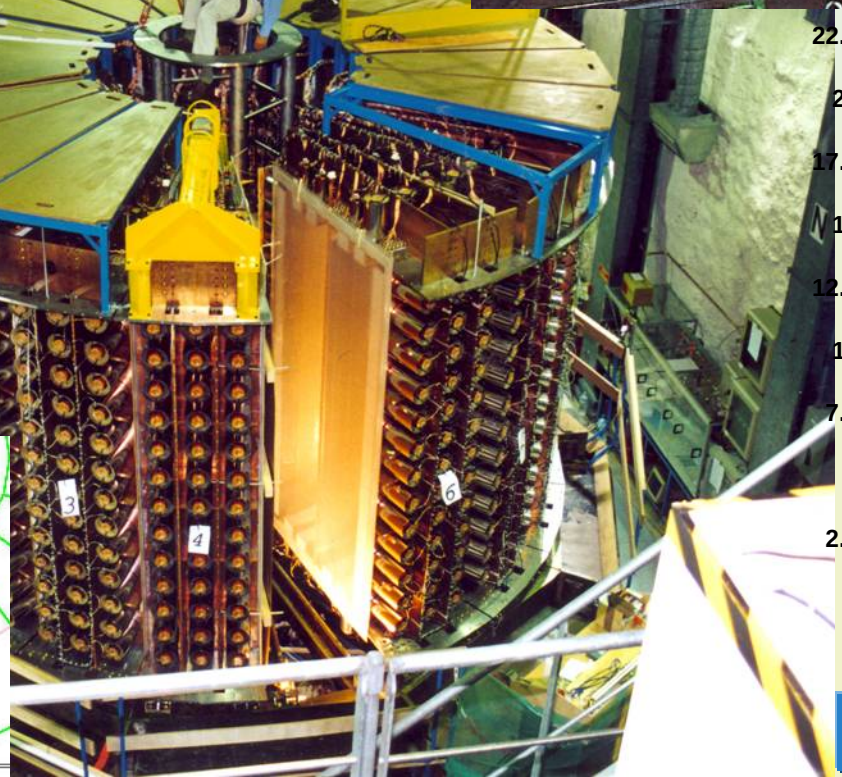
- 1750 rock above
- 4800 mwe
- Dry and warm (32 °)
- 4 muons /m^2/ day

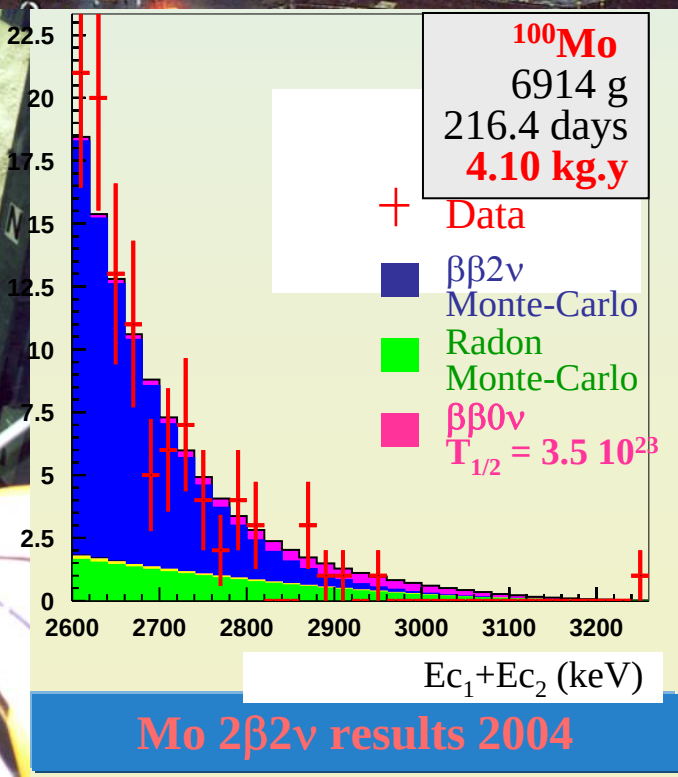
- 1 .6 10^{-6} fast neutrons/cm^2/s from rock/concrete radioactivity
- air continuously renewed : 1.5 vol/hour
- very low Rn concentration 5-15 Bq/ m^3

NEMO 3

ββ expt with ^{100}Mo
IN2P3, Dubna, Moscou, Prague







Mo 2β2ν results 2004

NEMO3 – january 2005

Detector enclosed in tent

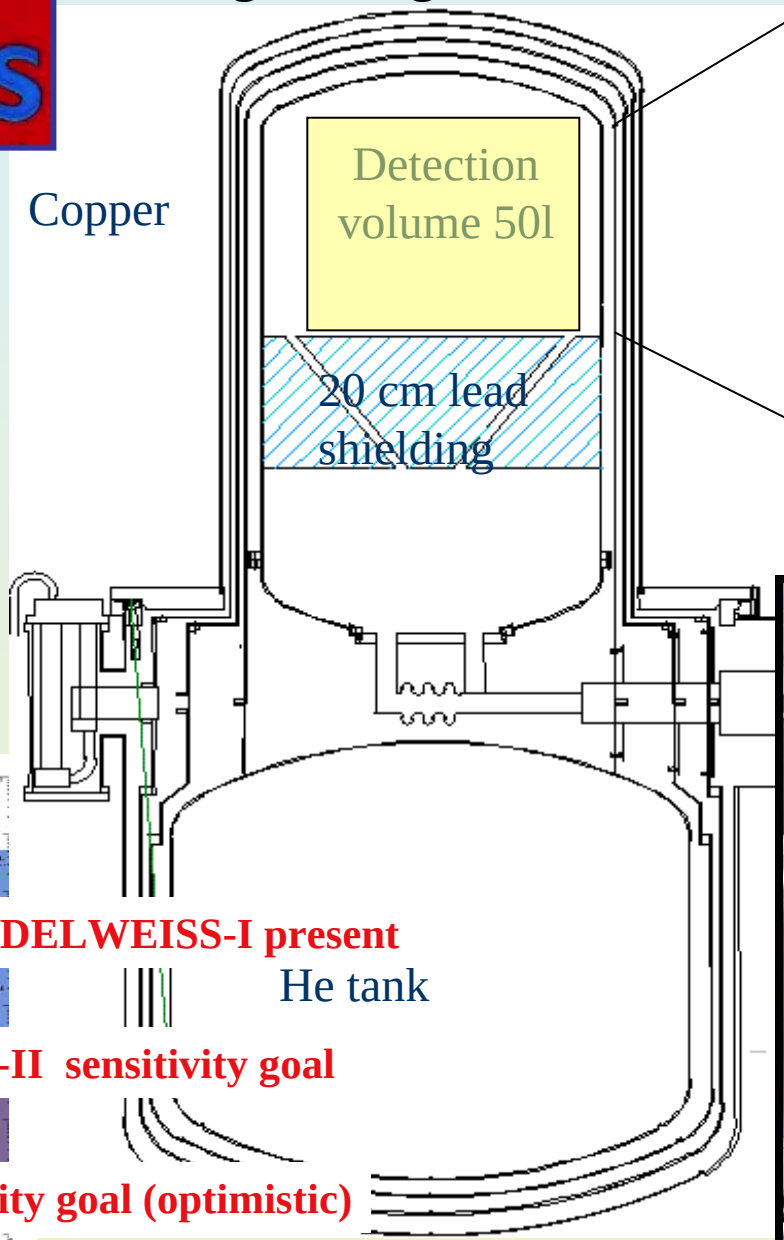
Radon trapping facility =>
150 m^3/h : reduction from
10 to 0.02 Bq/m^3 de radon

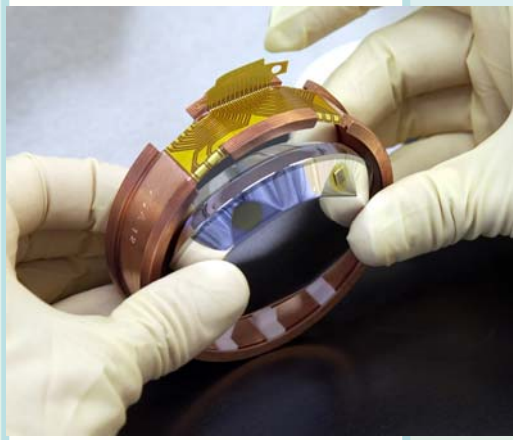
Data taking for 5 years =>
eff mass < 0.3 eV

Hunting for galactic dark matter WIMP's

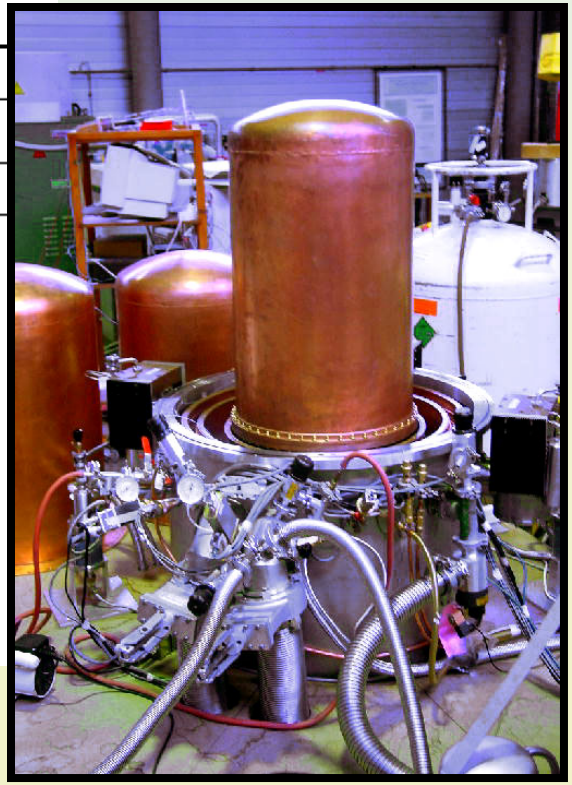
EDELWEISS II

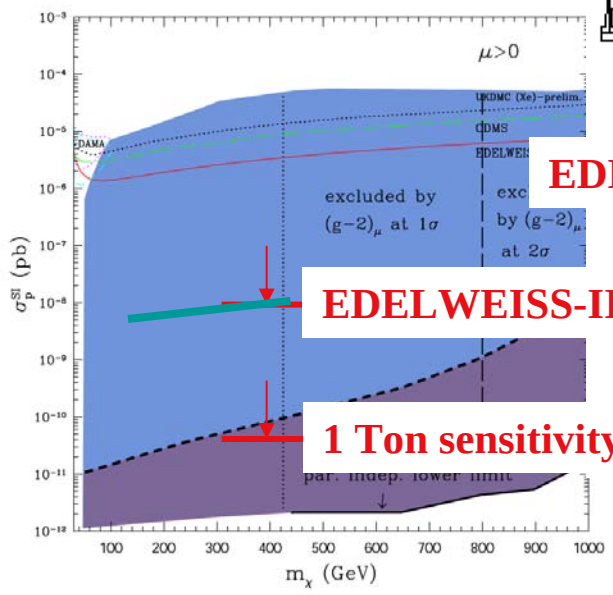
Start installation jan 2005
Data taking: autumn 2005
w. 28 detectors (9 kg)
Upgrade possible up to 36 kg





10 layers of
12 detectors of 320 g





EDELWEISS-I present

EDELWEISS-II sensitivity goal

1 Ton sensitivity goal (optimistic)

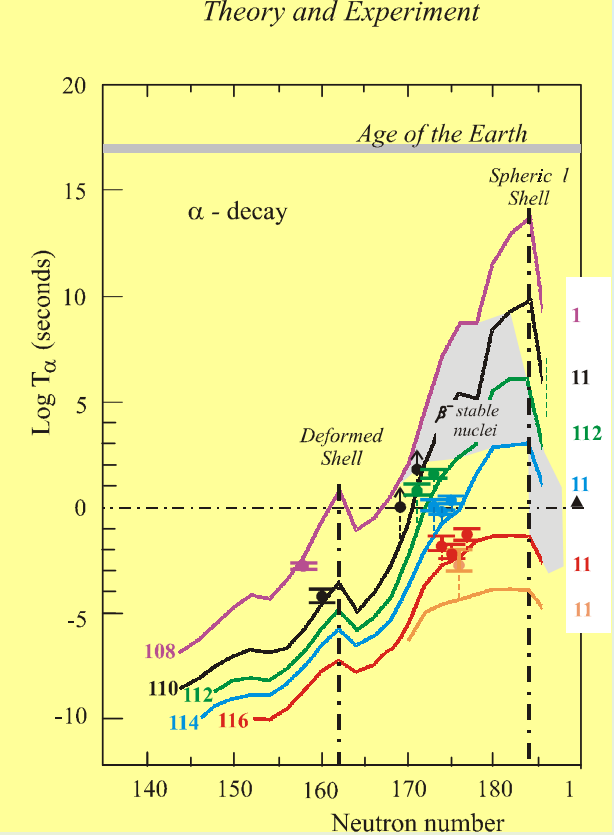
Polyethylen shield mounting
March 2005

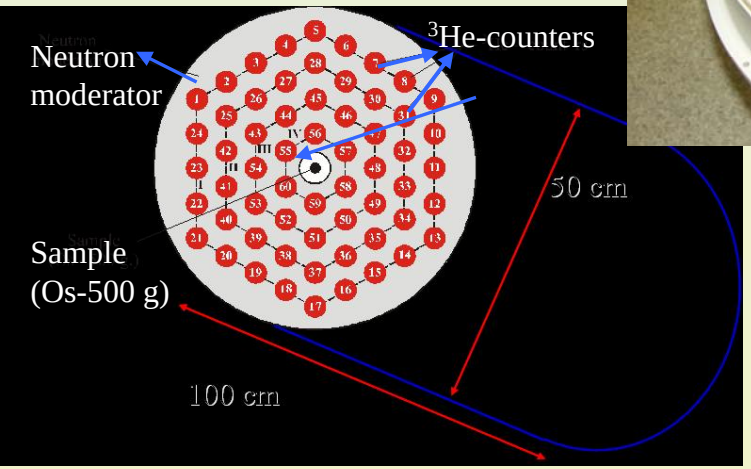
Super Heavy elements In Nature
Dubna –CSNSM expt

Eka-osmium (Z 108, A 286)

Detecting decay by multi neutron evt from Os sample in neutron detector with 60 3He counters

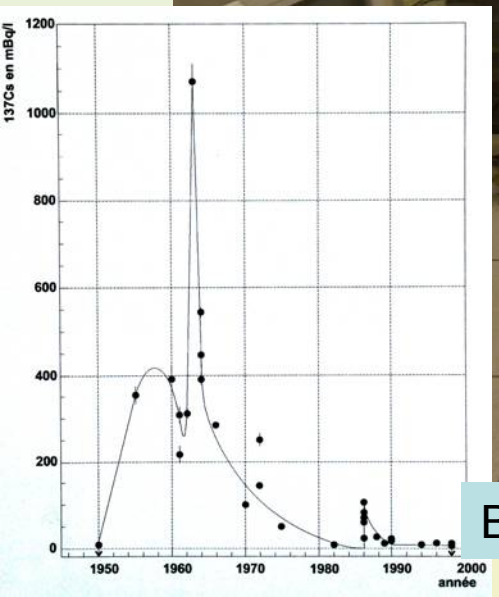
Goal :Sensitivity 10^{-22} g/g





Installed at LSM since 2004

Germaniums – 13 detectors (unique world wide) for low level radioactive counting



Bordeaux wine dating with ^{137}Cs

About 150 physicists, engineers, techs from enlarged Europe come to LSM + few from US and Japan

The EU Deep Underground Labs

IUS

Institute of Underground Science, Boulby Mine, UK

Pyhasalmi lab

Finland

LSM

Laboratoire Souterrain de Modane, France

LSC

Laboratorio Subterraneo de Canfranc, Spain

LNGS

Laboratori Nazionali del Gran Sasso, Italy

Running the lab : people

Partially in Modane

Chargé mission MégT
Luigi Mosca

Directeur
Gilles Gerbier

Adjoint directeur
JL Reyss

IUAS Postdoc
Pia Loaiza

Safety control

Sécurité IN2P3
Cyril Thieffry

Sécurité DAPNIA
Alain Le Saux

Dir technique et adm
Michel Zampaolo

Magali Zampieri

Jean Louis Margueron

Thierry Zampieri

Aurélien Rojas

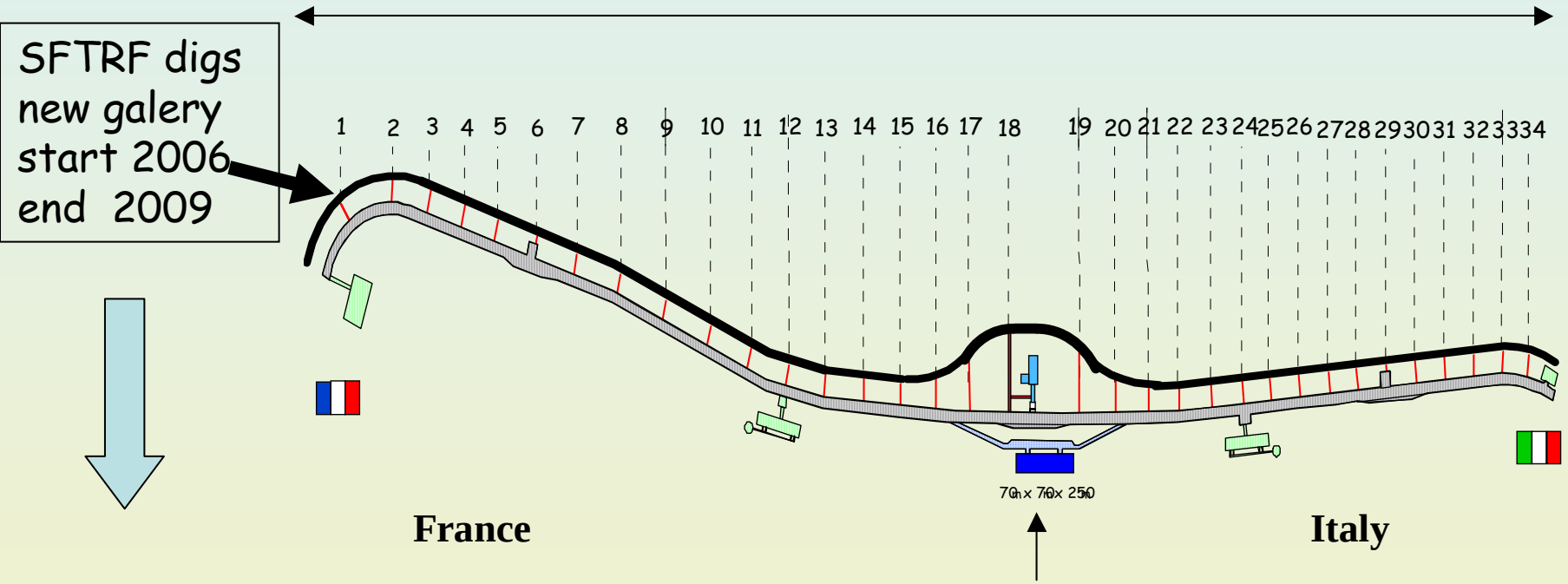
Pierre Brun

Charlotte Riccio

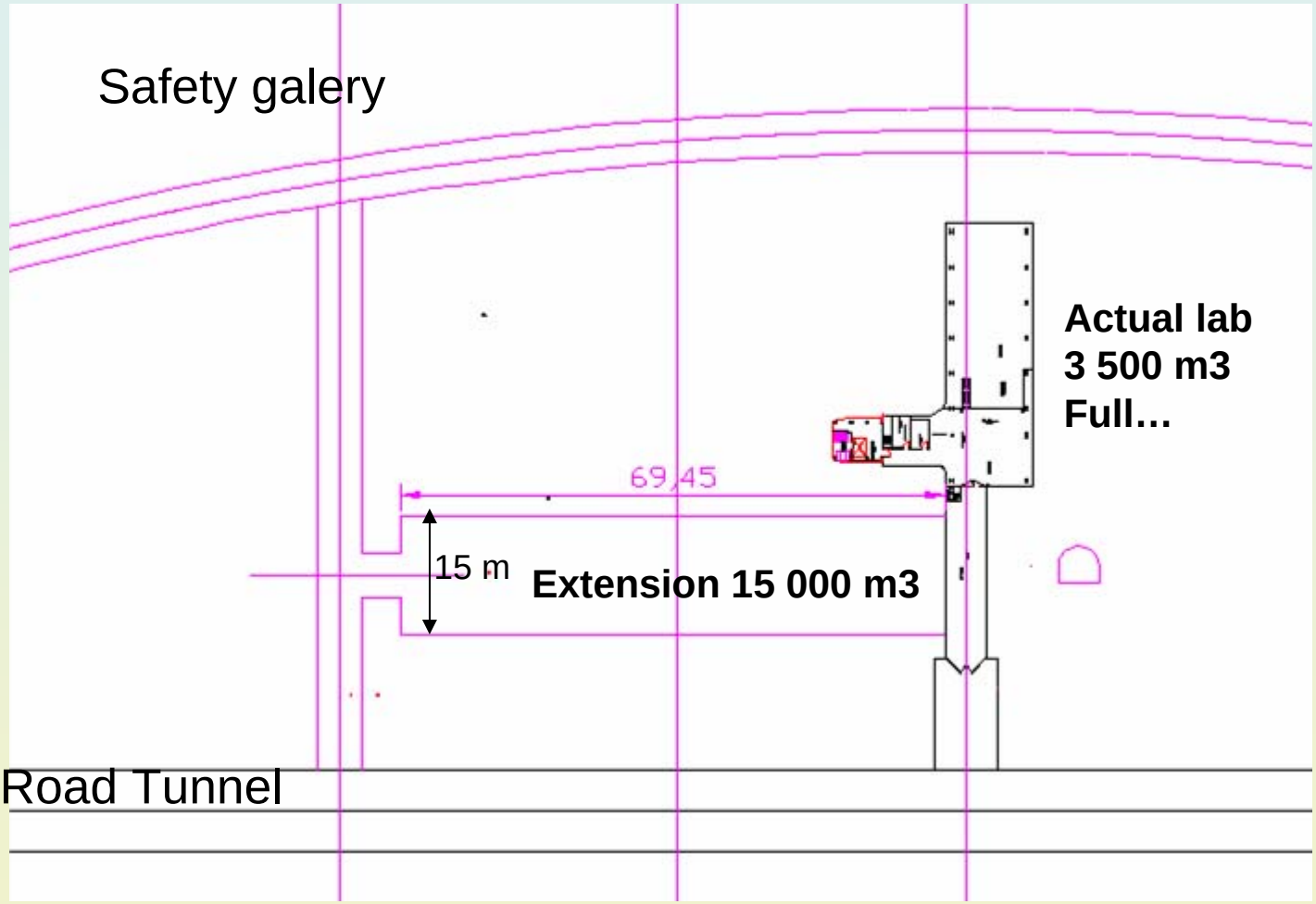
Team in Modane

New safety galery

- **13 km** (12 870 m)



Mid 2009 : the two digging machines meet at LSM location =>possibility of 15 000 m^3 extension



Benefits of infrastruture for digging and excavating
Little impact on total excavation (< 7 %) => low cost

What for ?

- NB : 15 000 m^3 = 40 % of 1 Gran Sasso hall
  = 1.5 % of Megaton cavity
- Well adapted for
  - Third generation $\beta\beta$ and dark matter WIMP searches (100 kg to 1T) looking for deep sites
  - « Small » size neutrino detectors
  - Dedicated low level radioactive environment (integrated neutron shield/μ veto, radon reduced atmosphere)
- SuperNemo $\beta\beta$ (10 000 m^3), Eureca DM (2 000 m^3), neutrino coherent detection (1 000 m^3), LXe,…

LABORATOIRE SOUTERRAIN DE MODANE

Hopefully completed by spring 2007

VUE N°02 - Etat futur

CONSTRUCTION D'UN NOUVEAU BATIMENT POUR LE LSM A MODANE

Conclusion

- New physics results in coming 5-7 years
- New generation experiments coming on-line
- Local infrastructure ready to welcome ambitious program

- Welcome to the afternoon visits
- Welcome back for physics together in few years …