7th Beta-beam Task Meeting
May 19th, 2008

CEA Saclay – INSTN

Welcome adress

DAPNIA changes name to become the IRFU

- The new name of IRFU retains the essence of our activity:
- Laboratoire de Recherche sur les Lois Fondamentales de l'Univers.
- Laboratory for Research into the Fundamental laws of Universe
- The name change will have no other consequenses on the institute.
- It affects neither its internal structure nor its operational capabilities (CERN Courier , March 2008)

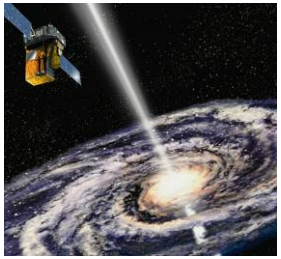
IRFU structure

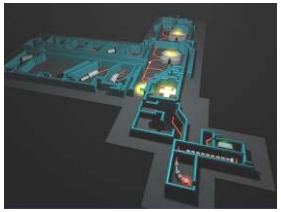
Organigramme
[09/2007]

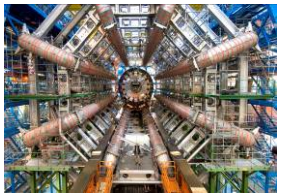
Directeur de l'Institut
J.Zinn-Justin

Adjoints
N. Alamanos
P.Micolon
P.Rebourgeard

Assistant chargé des projets	P.Bourgeois
Assistante Gestion Budgétaire	N. Judas
Assistante Ressources Humaines	A.C.Gouze
Groupe Documentation	A.Sené
Ingénieur Sécurité	A.Le Saux
Assistant Qualité	D.Bédérède







SAP
Astrophysique
P.O.Lagage

SPhN
Physique Nucléaire
M. Garçon

SPP
Physique des Particules
U. Bassler

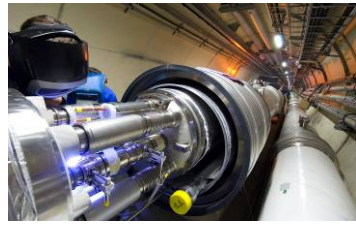
SACM
Accélérateurs, Cryogénie et Magnétisme
A.Dael

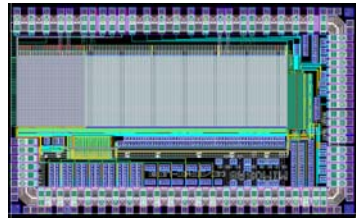
SEDI
Electronique, Détecteurs et Informatique
M.Mur

SIS
Ingénierie des Systèmes
P.Y.Chaffard

SENAC
Expertises Nucléaires
en Assainissement et Conception
G. Cordero

SIIEV
Ingénierie IFMIF EVEDA
A. Mosnier





Summary

- IRFU/SACM is developing and realizing particle accelerators, cryogenic systems and superconducting magnets for the scientific programs of IRFU and more widely of CEA.
- IRFU/SACM is mainly involved in large scale projects.
- These projects are managed within the IRFU project organisation and rely on the skills and activities of all the IRFU groups.
- In March 2008, 71 engineers and 52 technicians or administrative staff belongs to the division.

The division is organized in four laboratories:

- **LEDA** *(Laboratoire d'études et de développement pour les accélérateurs)*
- **LESAR** *(Laboratoire d'études des structures accélératrices et des radiofréquences)*
- **LEAS** *(Laboratoire d'études des aimants supraconducteurs)*
- **LCSE** *(Laboratoire cryogénie et stations d'essais)*

List of projects with institutions and funding agencies

DSM/IRFU

Contribution Exceptionnelle de la France

Nb3Sn Quadrupôle (R&D)	Spiral2 Injector (GANIL)
R3B GLAD Spectrometer (GSI)	Spiral2 Cryomodules (GANIL)
ATLAS & CMS (CERN)	IPHI (CEA/CNRS/CERN)
SOPHI – SELMA	CARE HIPPI (FP6)
W7X test station (MPI)	CARE SRF (FP6)
Neurospin ISEULT (DSV/DSM)	CLIC CTF3 CALIFES
Clean room and chemical facility (investment)	SUPRATECH/Cryo HF Test station (CNRS/CEA)
SOLEILCryomodules (contract)	IFMIF Injector (« B.A.»)
XFEL Cryomodules (« in kind contribution »)	IFMIF DTL (« B.A.»)

FP6

FP7

Pôle Accélérateur CNRS/CEA

Sesame

CC3D

BA

Agences ANR,ASTRE

Plateforme SUPRATECH (Sesame)

All

CSTS

XFEL + FAIR

P2I

W7X: summary of coil tests (14/03/08)

Complete test done	58
Total test on NCR	203
Validated coils by Saclay	37
Non validated coils by Saclay	2
Coils on testing at Saclay	4
Coils on storage at Saclay	6
Different coils receipt at Saclay	50

This project is very demanding in schedule and quality organization.

These tests give us a large experience in fusion magnet technology

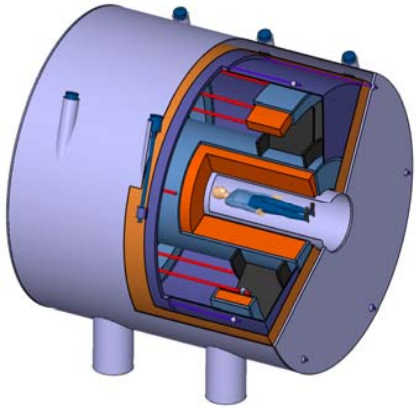
Push the limits

- Medical MRI : 0,1-1,5 teslas
  - MRI « research »: 3 – 5 teslas
    - MRI « high field » : 7 teslas and more
      - MRI « very high fields » : 11.75 teslas

Magnet 1.5T (GE) SHFJ/CEA

Magnet 3.0T (Bruker) SHFJ

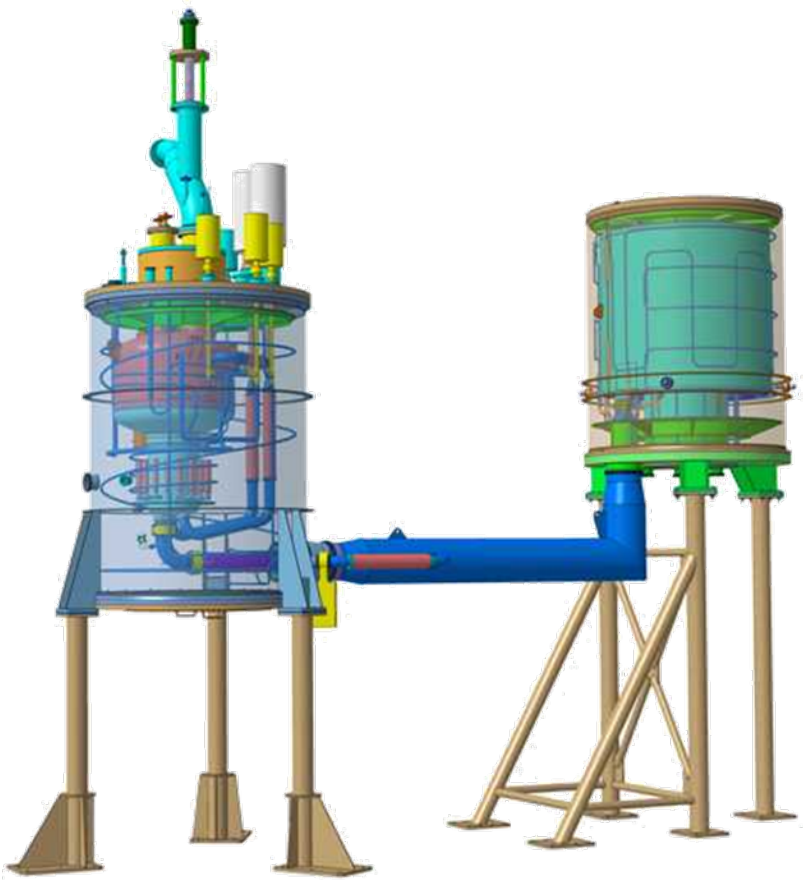
Magnet 9.4 T GE 600 mm (USA)



B0 11.7 T

Test Station SEHT

- Target: test of the working conditions and operational modes of the ISEULT Magnet with 1.8K satellite and existing 8 teslas coil

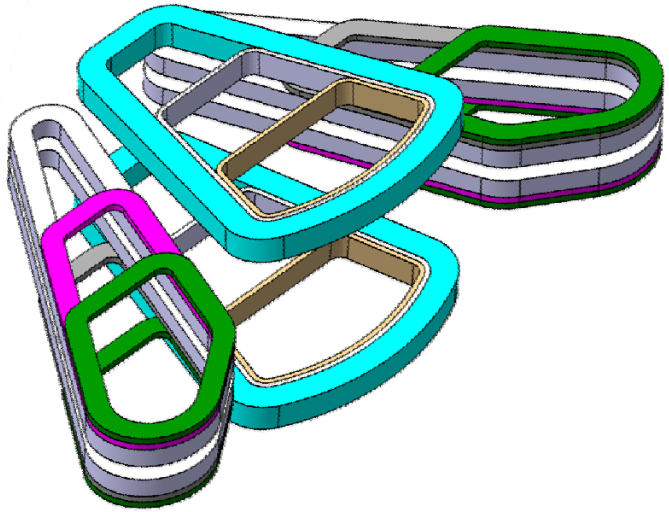


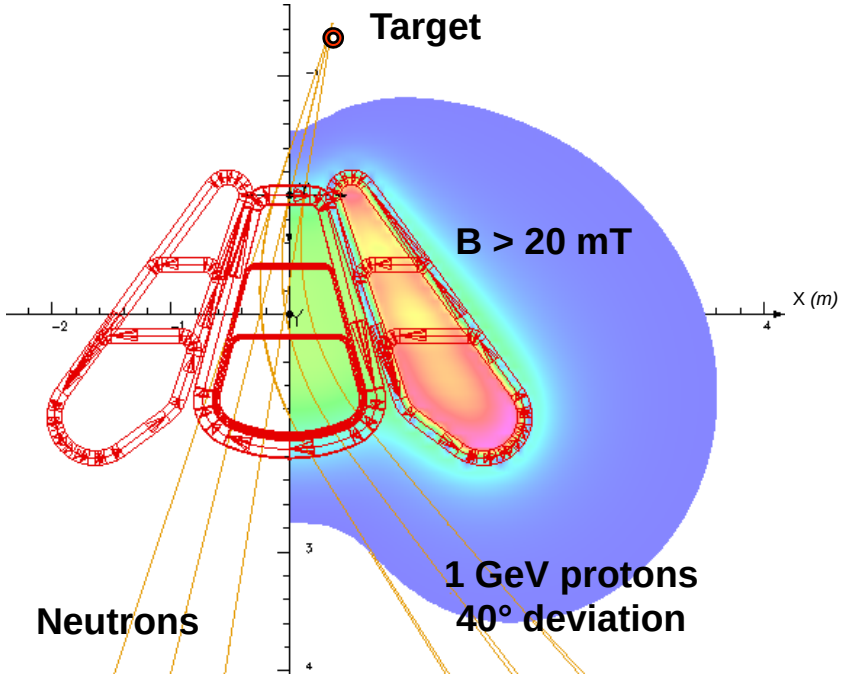
➢Refurbishing of 8T-600 mm bore magnet

R3B-GLAD

Reactions with Relativistic Radioactive ions Beams (R^3B)

GSI Large Acceptance Dipole (Glad)



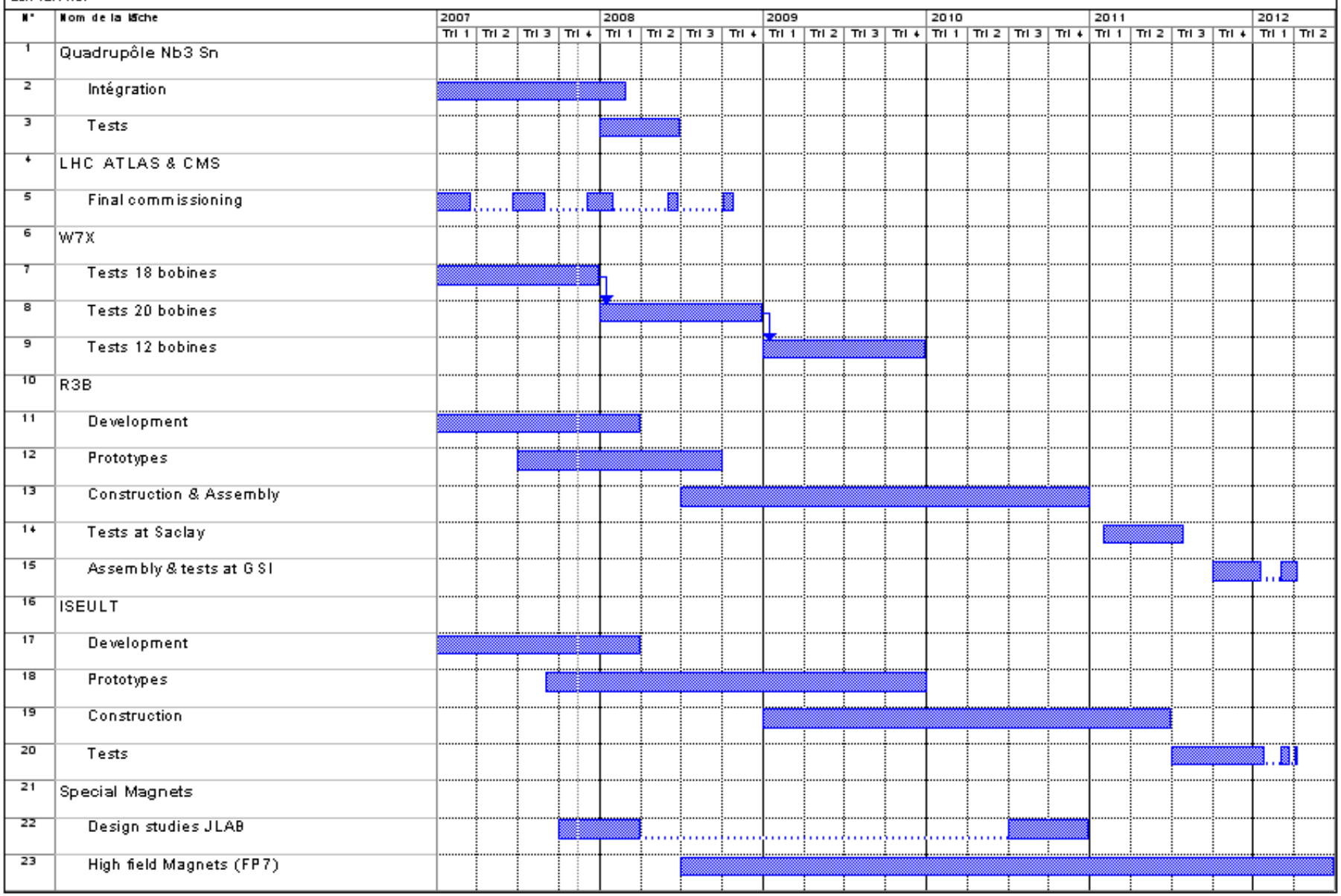


Active shielding magnet design

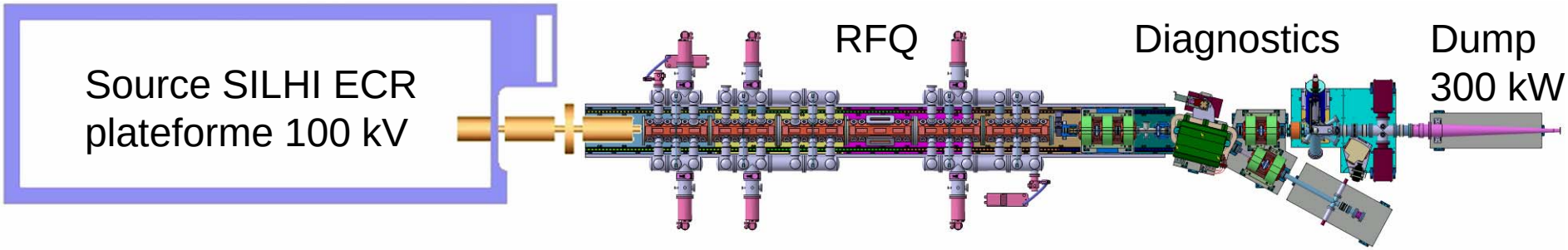
4.8 Tm - 24 MJ

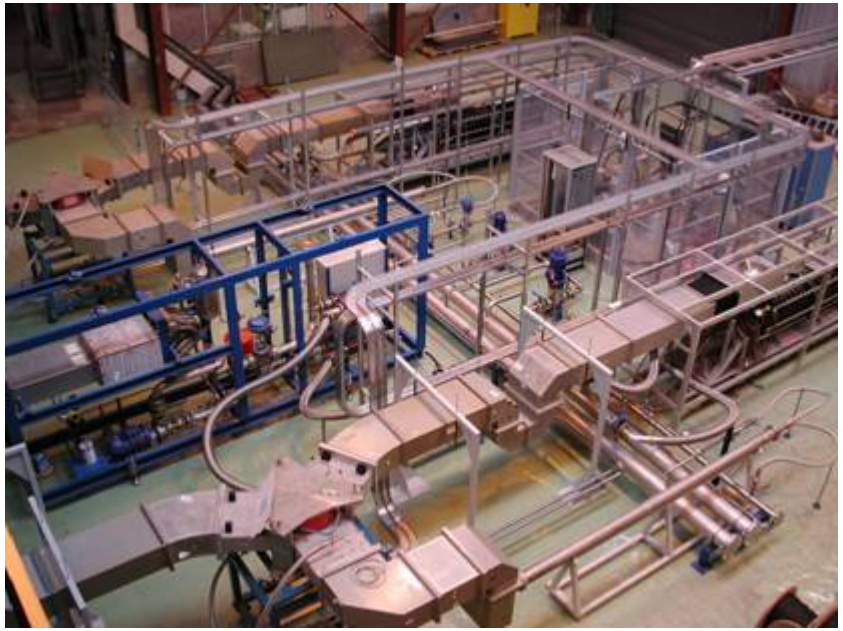
GdProjets.mpp
Lun 12/11/07

SUPERCONDUCTING MAGNET & TESTS STATIONS



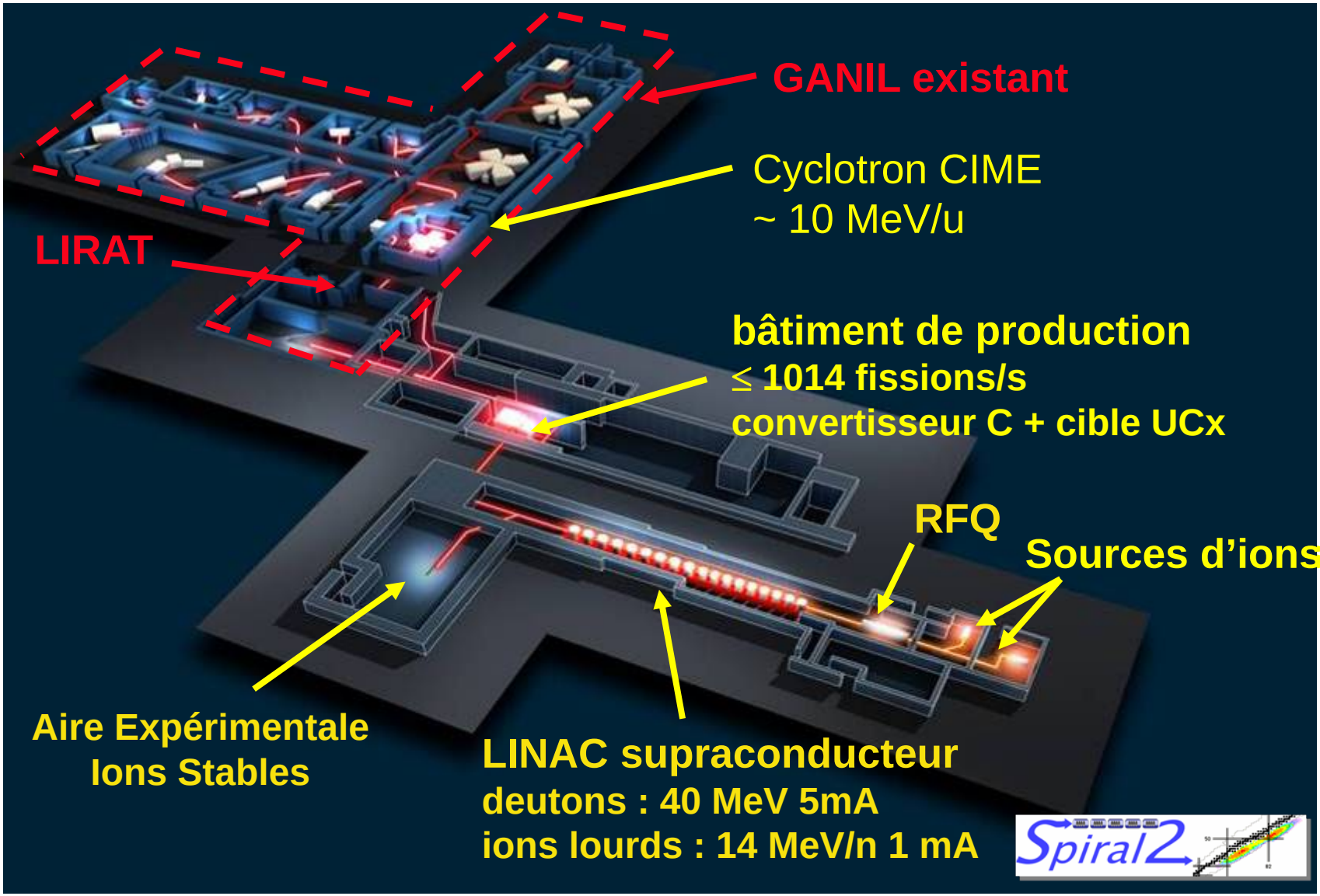
IPHI (Injecteur de Protons Haute Intensité)



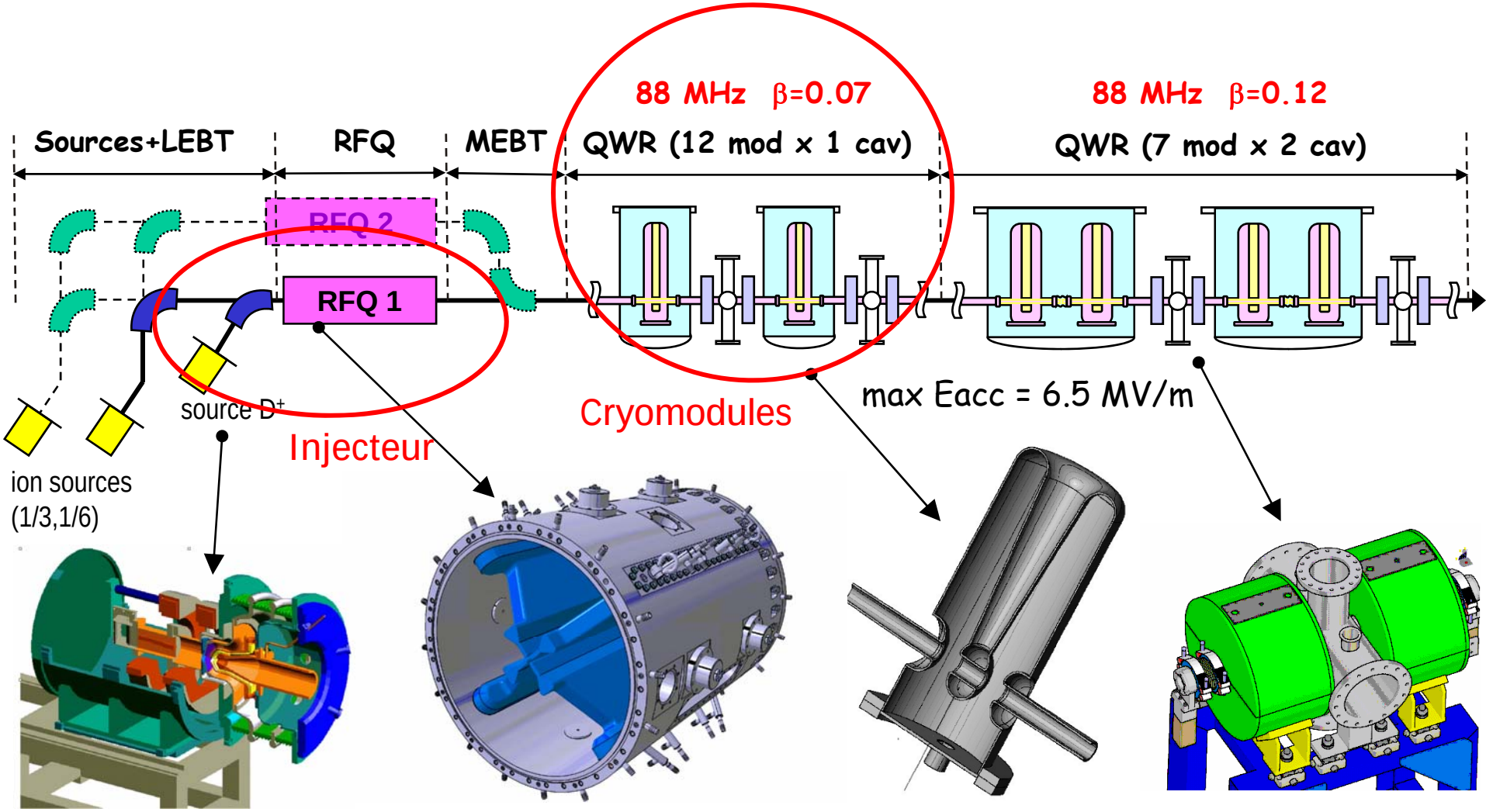


Proton beam 3 MeV 100 mA, commissioning end of 2008.

The chain of accelerators for SPIRAL 2

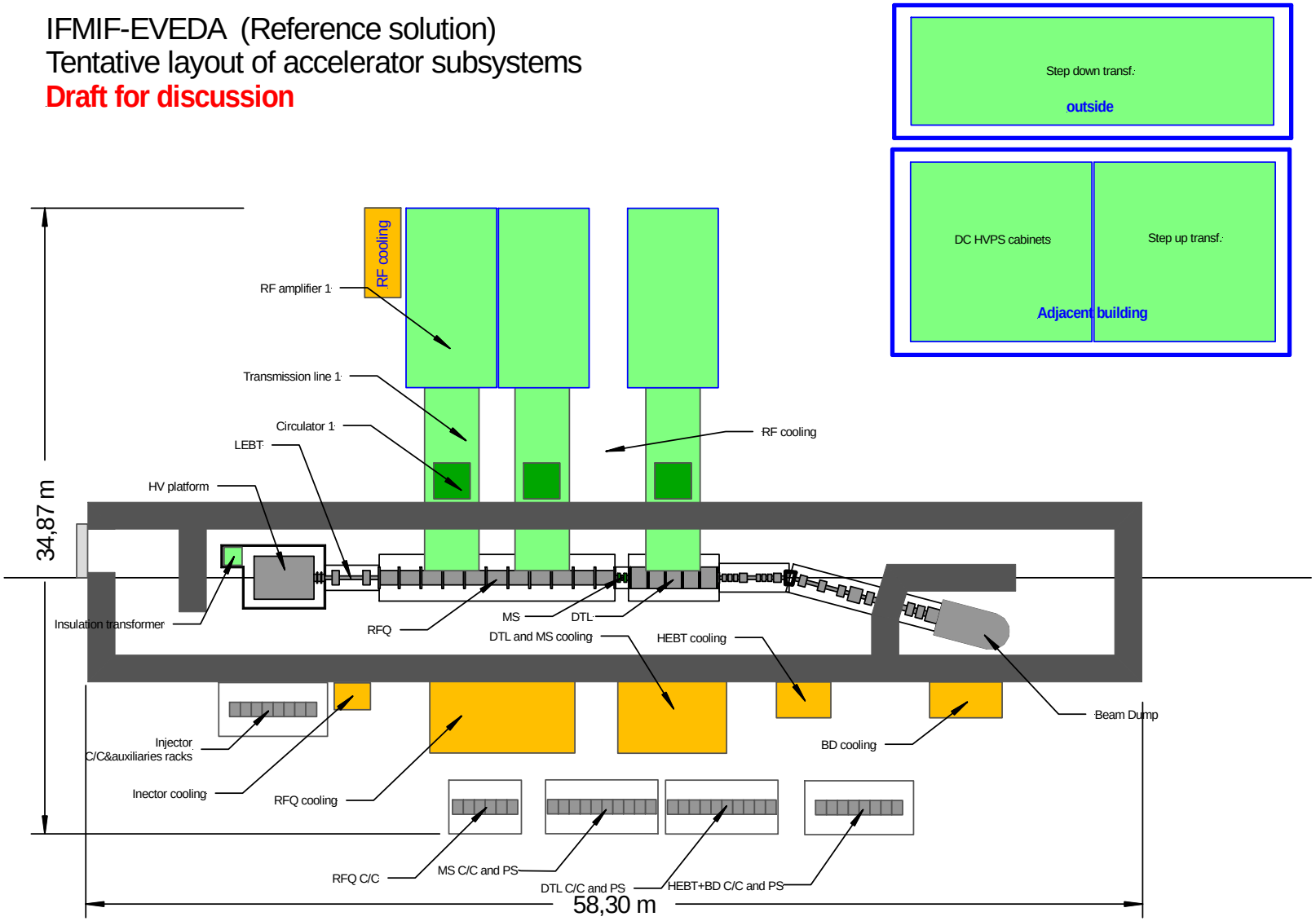


DAPNIA tasks in SPIRAL 2 accelerator

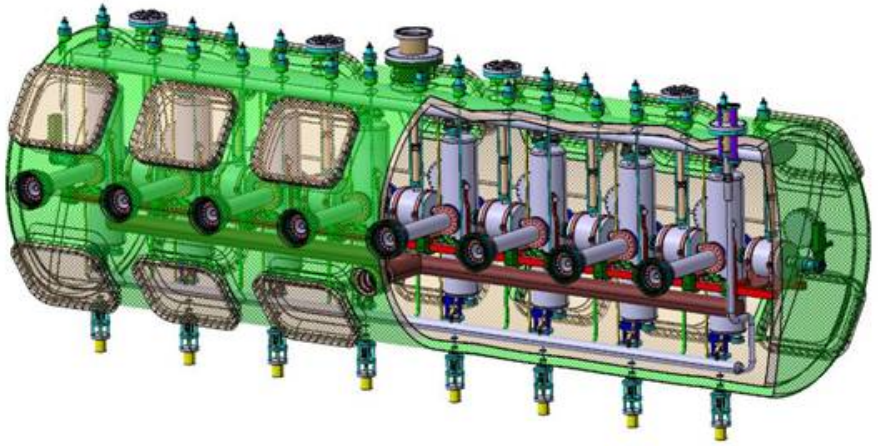


IFMIF-EVEDA Project: 125mA,9MeV,deutons

IFMIF-EVEDA (Reference solution)
Tentative layout of accelerator subsystems
Draft for discussion

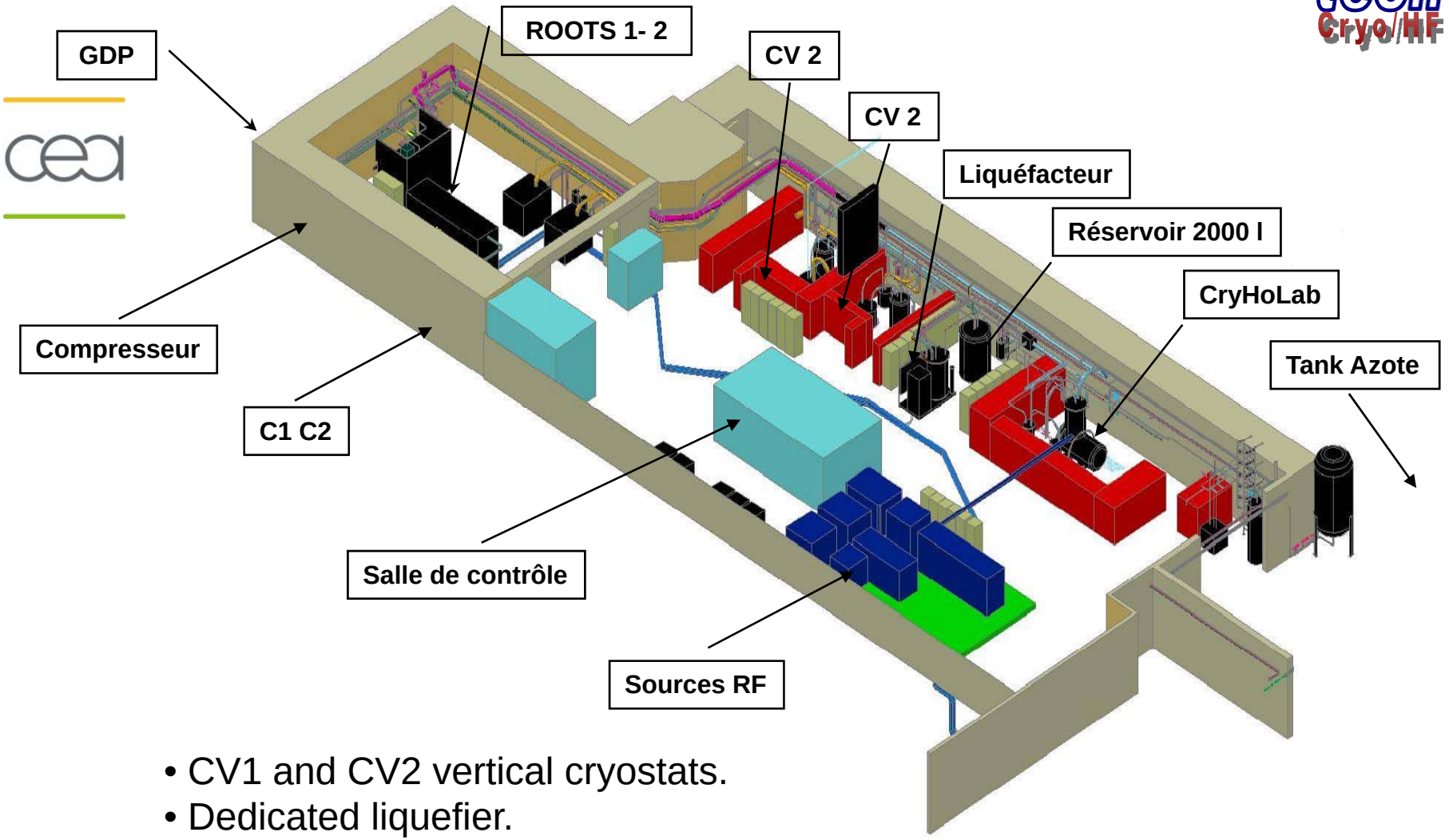


Artist view of the Rokkasho site



Artist view of the Cryomodule

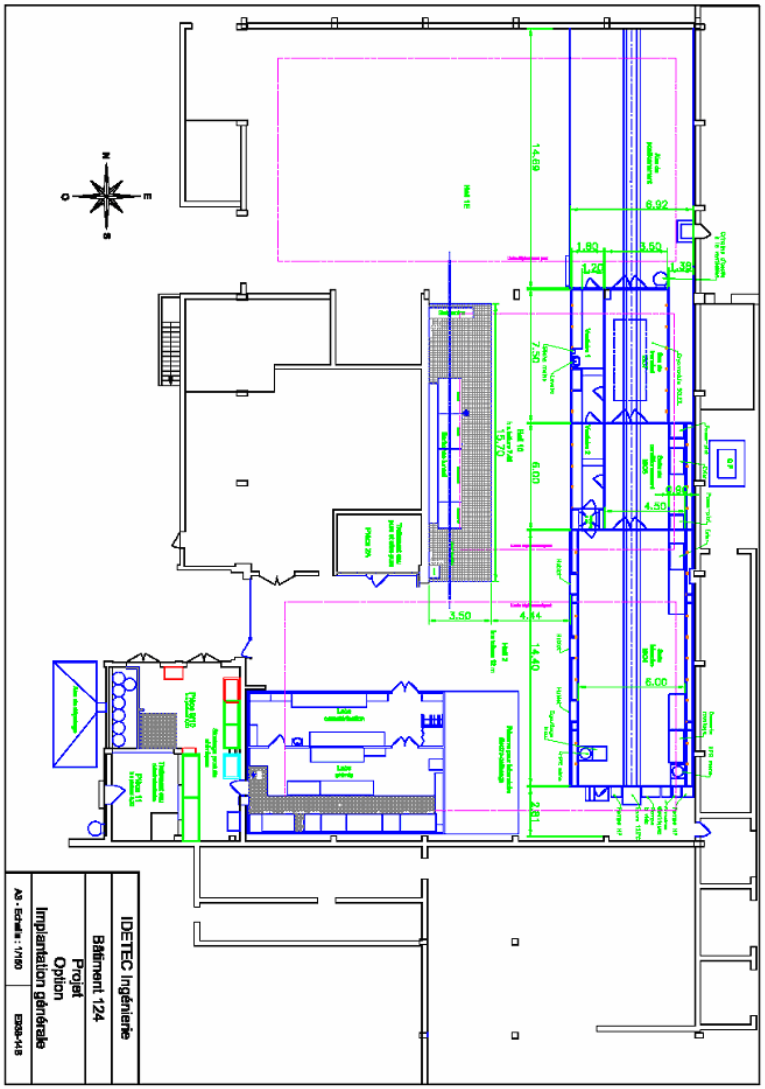
The cryo-HF test station for SC cavities



- CV1 and CV2 vertical cryostats.
- Dedicated liquefier.
- Cryholab horizontal cryostat.
- RF sources

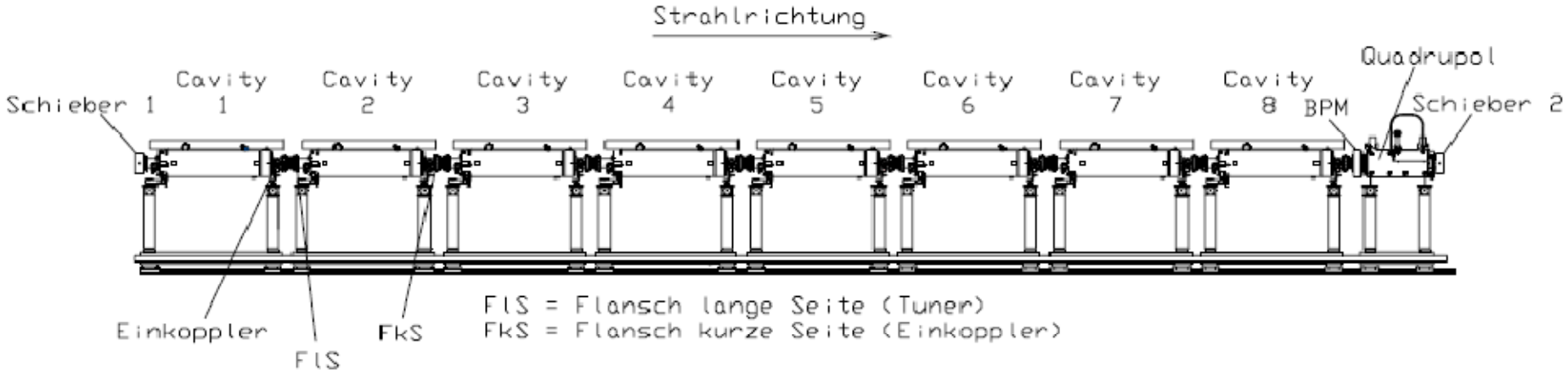
Clean room, chemistry, XFEL cryomodules

- IRFU has launched a large investment for a new clean room at XFEL standard(12m*7m in class10)
- IRFU is also preparing a « cryostating area »
- In last September XFEL project management has asked Saclay to be the unique site for assembly of 101 cavities strings and 101 cryomodules
- Operation will be executed by industrial company under the supervision of IRFU agents.



XFEL : Assemblage Cavités

Réception : 8 Cavités - 8 Coupleurs - 8 Soufflets - 1 BPM - 1 Qpole - 2 Vannes …



Nettoyages

Cavités sous vide avec antenne RF

Montage coupleur (partie froide) Test He + RGA

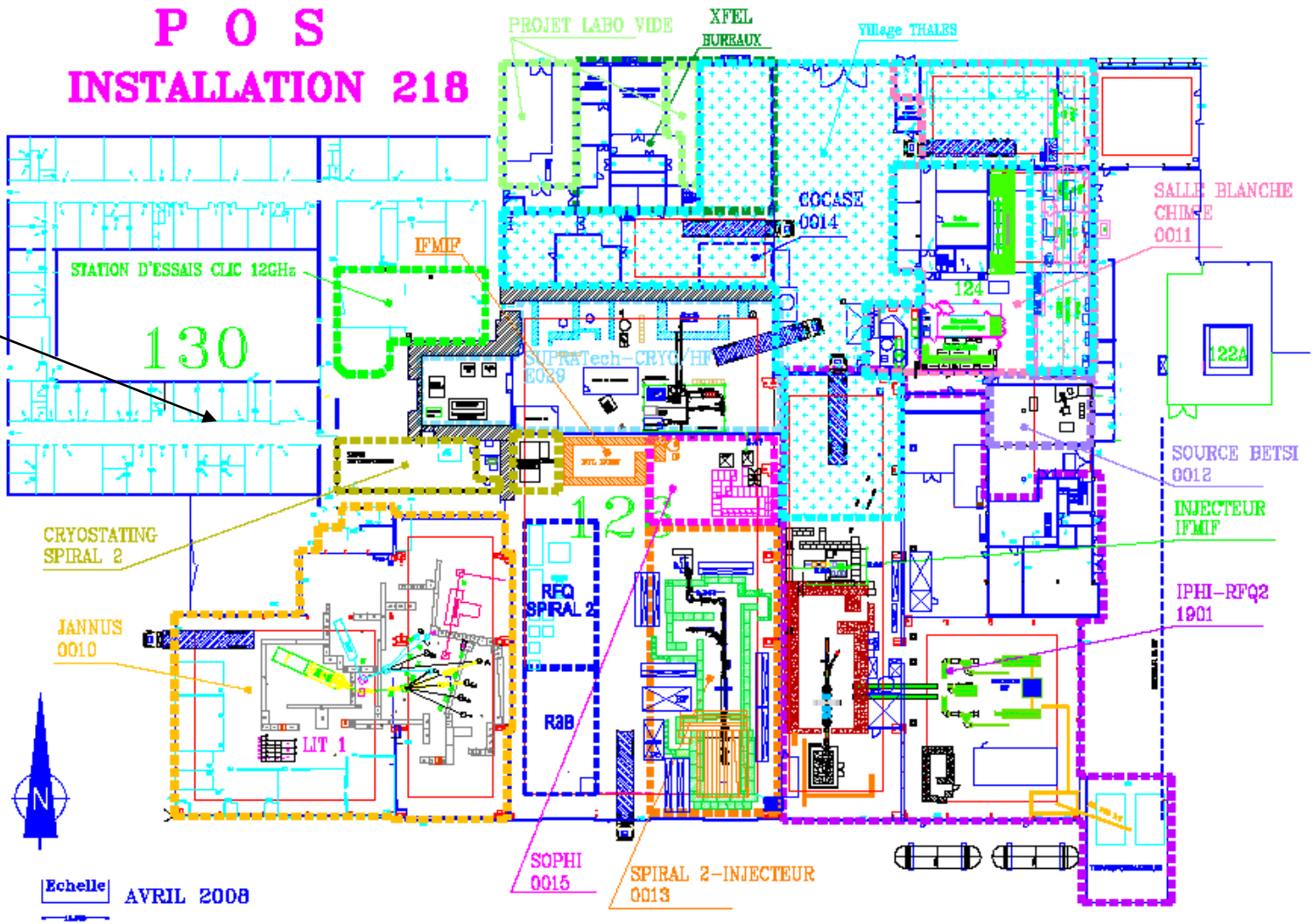
Accelerator Platform planning

Planning_Synergium1.mpp
Jeu 13/09/07

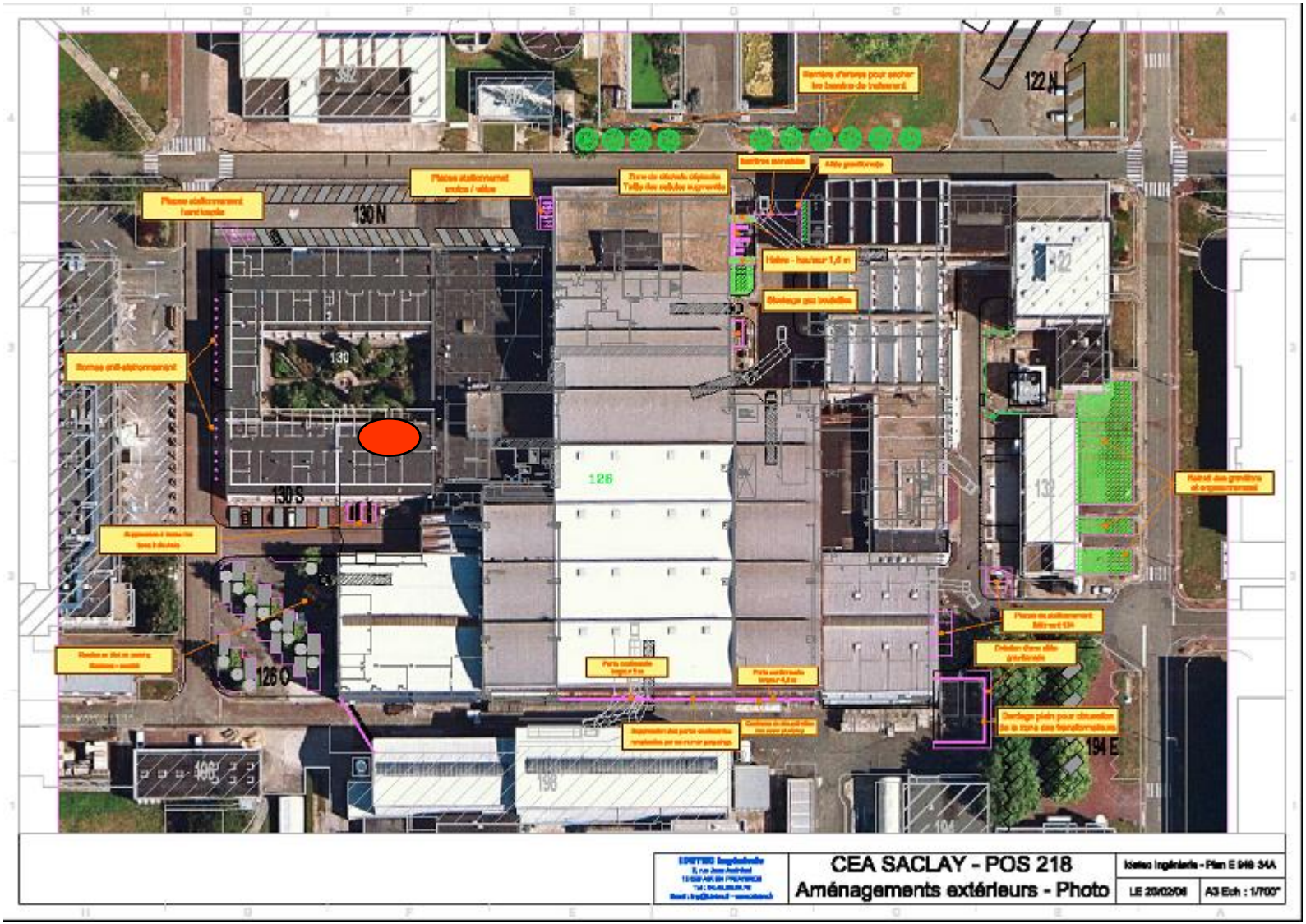
N°	Nom de la tâche	2007				2008				2009				2010				2011				2012			
		Tri 1	Tri 2	Tri 3	Tri 4	Tri 1	Tri 2	Tri 3	Tri 4	Tri 1	Tri 2	Tri 3	Tri 4	Tri 1	Tri 2	Tri 3	Tri 4	Tri 1	Tri 2	Tri 3	Tri 4	Tri 1	Tri 2	Tri 3	Tri 4
1	**Plate-forme Accélérateurs**																								
2	**Accélérateur SOPHI**																								
3	Installation																								
4	Tests																								
5	Exploitation																								
6	**SUPRATECH cryo HF**																								
7	Installation																								
8	Tests																								
9	Exploitation																								
10	**SUPRATECH chimie salle blanche**																								
11	construction																								
12	Exploitation																								
13	**IPHI**																								
14	Installation																								
15	Tests																								
16	Exploitation																								
17	**IFMIF**																								
18	Préparation																								
19	Tests																								
20	**SPIRAL 2 cryomodules**																								
21	Intégration																								
22	Tests																								
23	**SPIRAL 2 Injecteur**																								
24	Intégration																								
25	Tests																								
26	**XFEL cryomodules**																								
27	Préparation																								
28	Intégration																								
29	**Réhabilitation Bâtiments**																								
30	Diagnostic et schéma directeur				01/10																				
31	Sécurité, infrastructures																								
32	Electricité, Bureaux, Labo vide																								
33	Aménagement intérieur																								
34	Aménagement extérieur																								
35	Finitions intérieures																								

Perspectives 2008 – 2012 « Synergium »

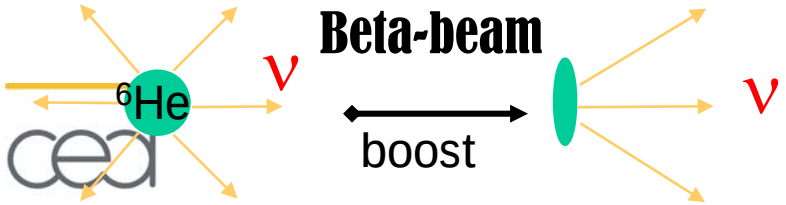
Intellectual Activities



Satellite view of IRFU/SACM buildings



“Beta-beams” de basse énergie



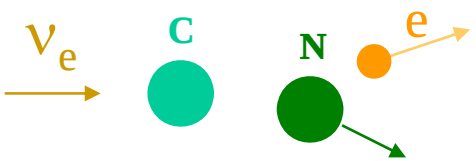
C. Volpe, hep-ph/0303222.

LA PROPOSITION

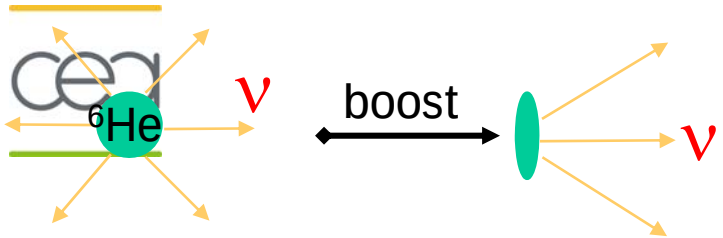
Utiliser le concept des “beta-beam” pour produire des faisceaux intenses et purs de neutrinos de basse énergie.

POTENTIALITÉS

→ Étude des réactions neutrino-noyau



→ Propriétés des neutrinos.



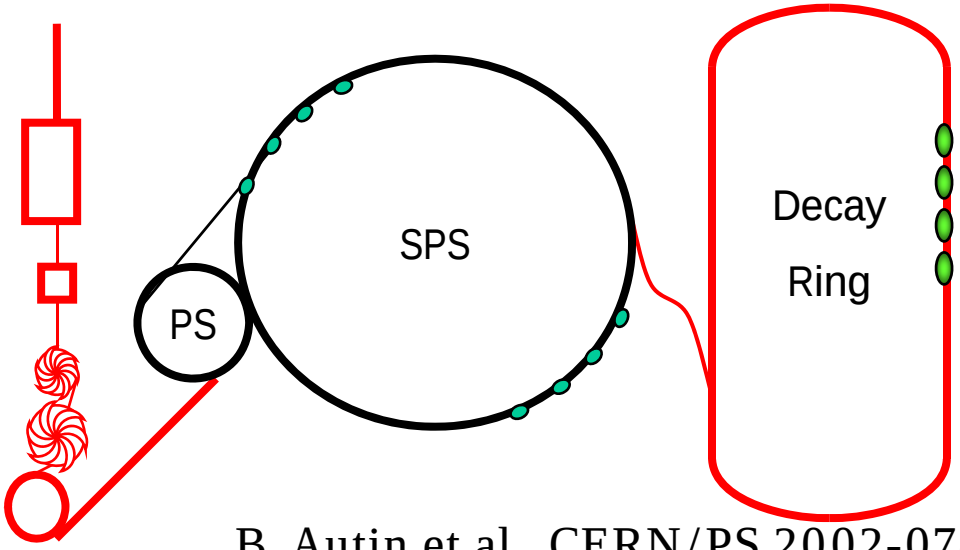
"Beta-beam" :

Une nouvelle méthode pour la production de faisceau ν.

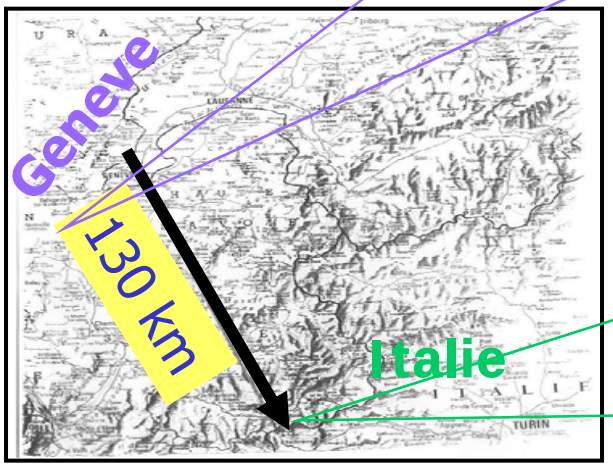
P. Zucchelli, PLB 2002

Le projet "Beta-beam" au CERN

EURISOL



B. Autin et al., CERN/PS 2002-078.



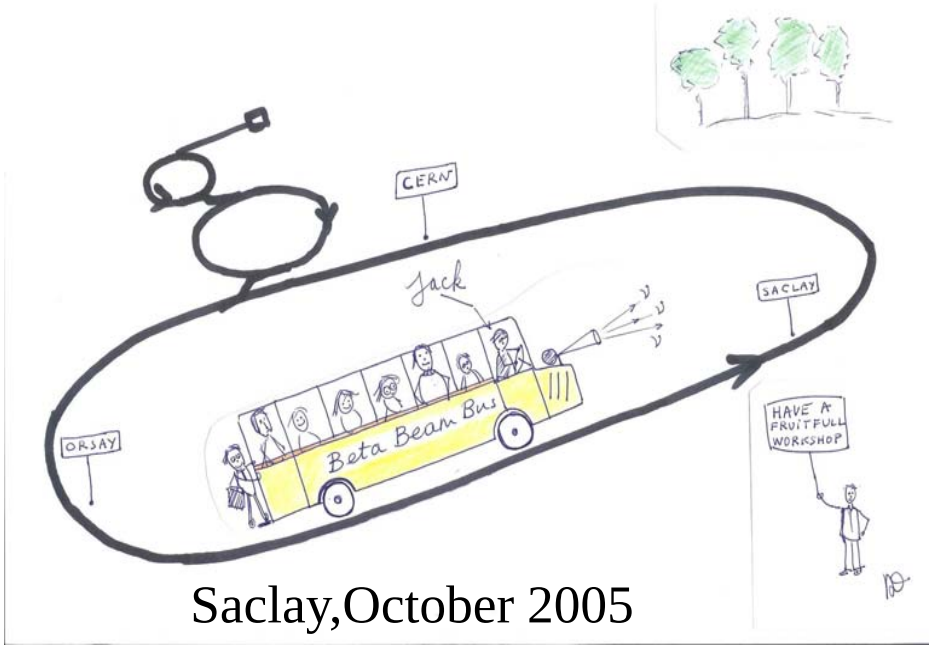
UNO

Have a fruit full meeting !

Final stage of studies on:

- **Rapid cycling synchrotrons**
- **Cooling ring**
- **Decay ring**
- **Collimation….**

Saclay,May 2008



Saclay,October 2005