Movable test bench: mechanical design and magnets

Reference to:

G. Bellodi - User Specification for Linac4 Test Bench Diagnostics,

EDMS document 1004908

Characterize the beam properties at 3 MeV:

- At the RFQ exit in the Linac4 Test Stand (April 2011)
- At the chopper line output in the Linac4 Test Stand (June 2011)

- At the chopper line output in the Linac4 Tunnel (July 2012)

Characterize the beam properties at 12 MeV:

- At the DTL tank1 output in the Linac4 Tunnel (July – August 2012)

Transverse plane	Longitudinal plane
• Beam profiles • Beam emittances • Beam position • Transverse halo	• Transmission • Average beam energy • Energy spread • Bunch shape profile • Chopping efficiency (time resolved and integrated)

From: G. Bellodi - User Specification for Linac4 Test Bench Diagnostics

In addition we want to test some measurement techniques and devices that could be later on adopted during the Linac4 commissioning, like:

- Time of flight characterization of the average beam energy
- The Feshenko bunch shape monitor
- Laser photoneutralization technique for beam profile monitoring (?)

Transverse plane	Longitudinal plane
• Beam profiles • Beam emittances • Beam position • Transverse halo	• Transmission • Average beam energy • Energy spread • Bunch shape profile • Chopping efficiency (time resolved and integrated)

From: G. Bellodi - User Specification for Linac4 Test Bench Diagnostics

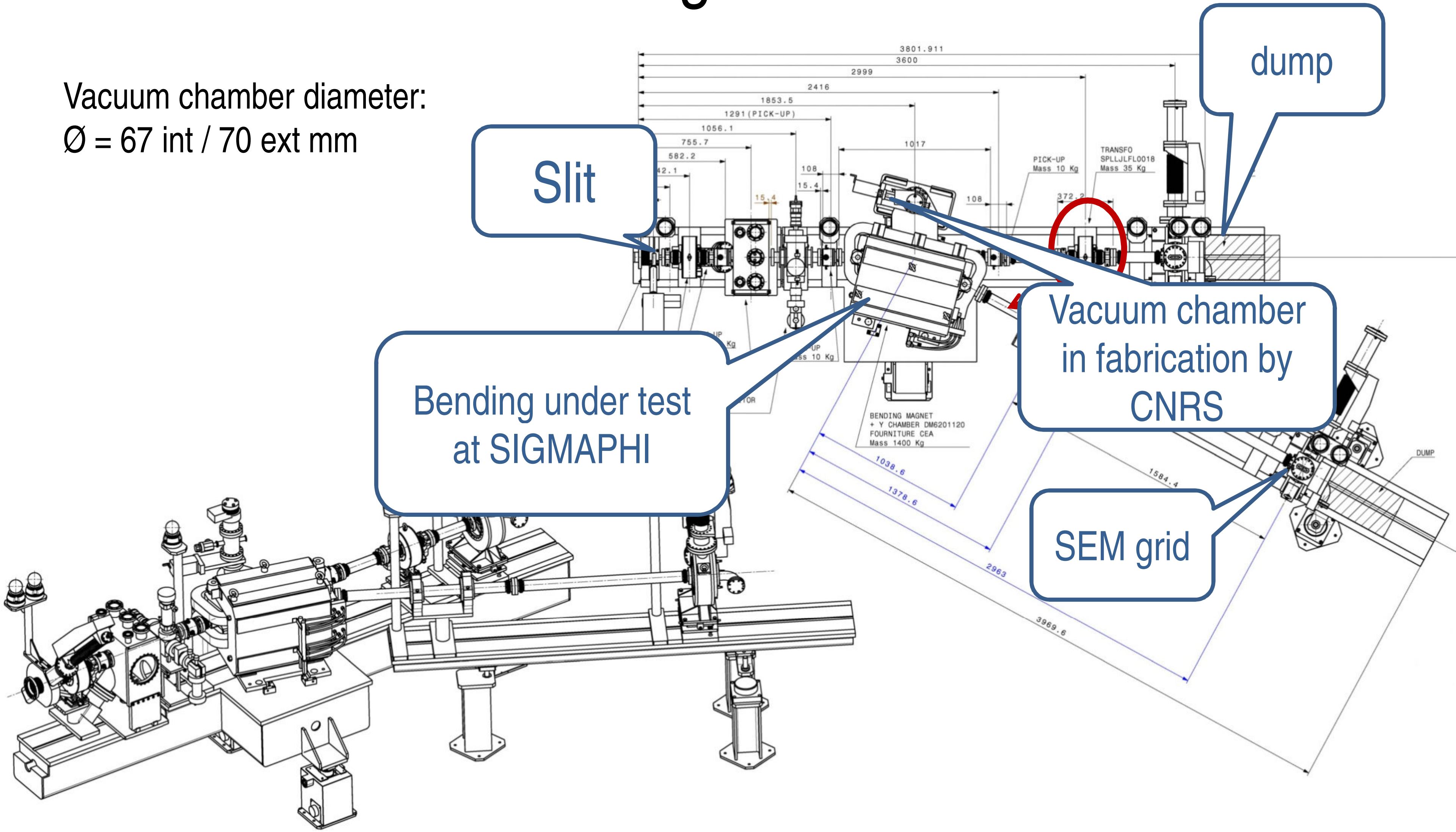
One dipole sector magnet is used in the spectrometer line, coming from the IPHI collaboration with CEA and CNRS. The required power supply will be provided by CERN.

Four quadrupoles (with respective power supplies) are required in total, coming from the Linac stock:

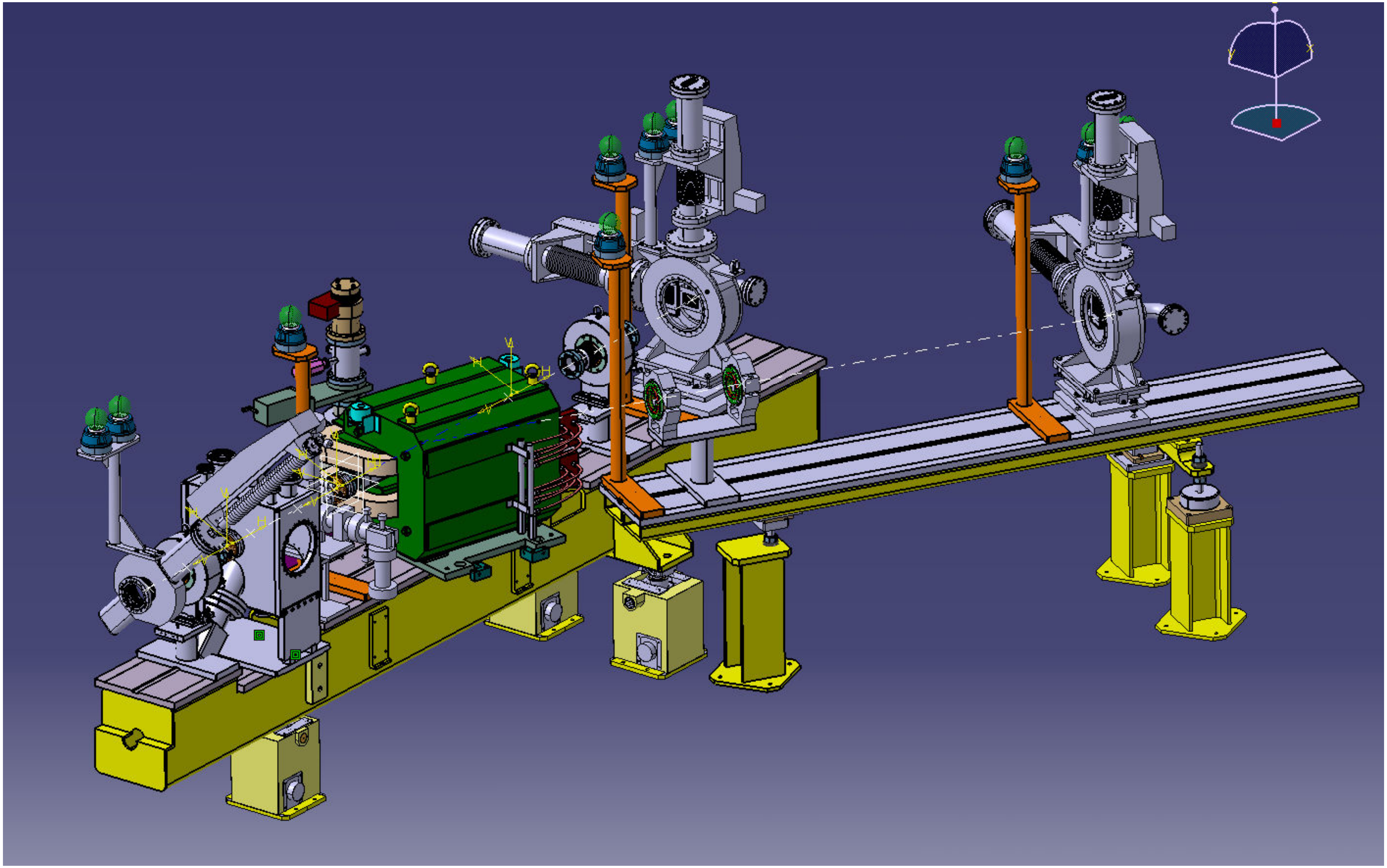
- Two type VI, at the RFQ output, when measuring the chopper line the quads of the chopper line will be used;
- Two type X in the spectrometer line

The diagnostic line

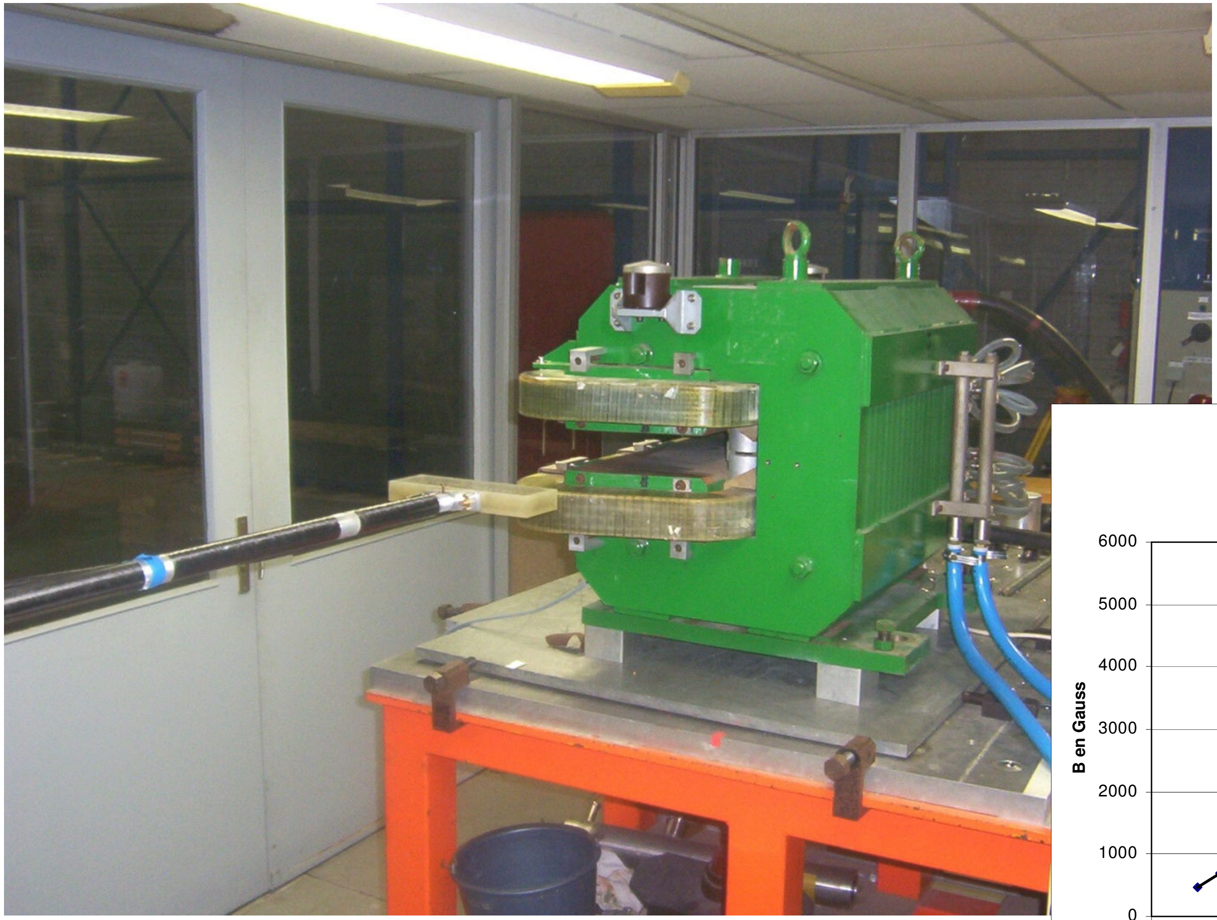
Vacuum chamber diameter:
Ø = 67 int / 70 ext mm



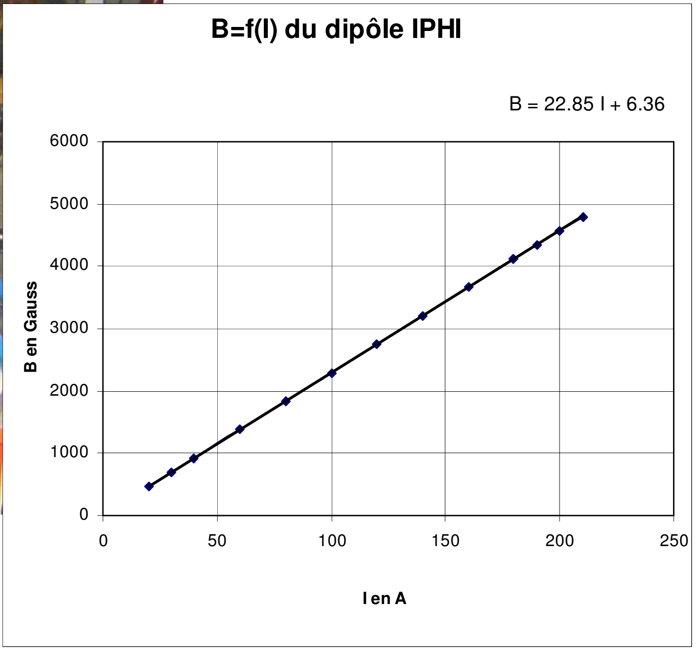
The diagnostic line



The magnets - Dipole



Deviation angle	28.5 degrees
Bending radius	1.5 m
Magnetic field	0.17/0.34 T
Imax	215A
Bmax	0.48T
Gap height	75mm



The magnets - Quadrupoles

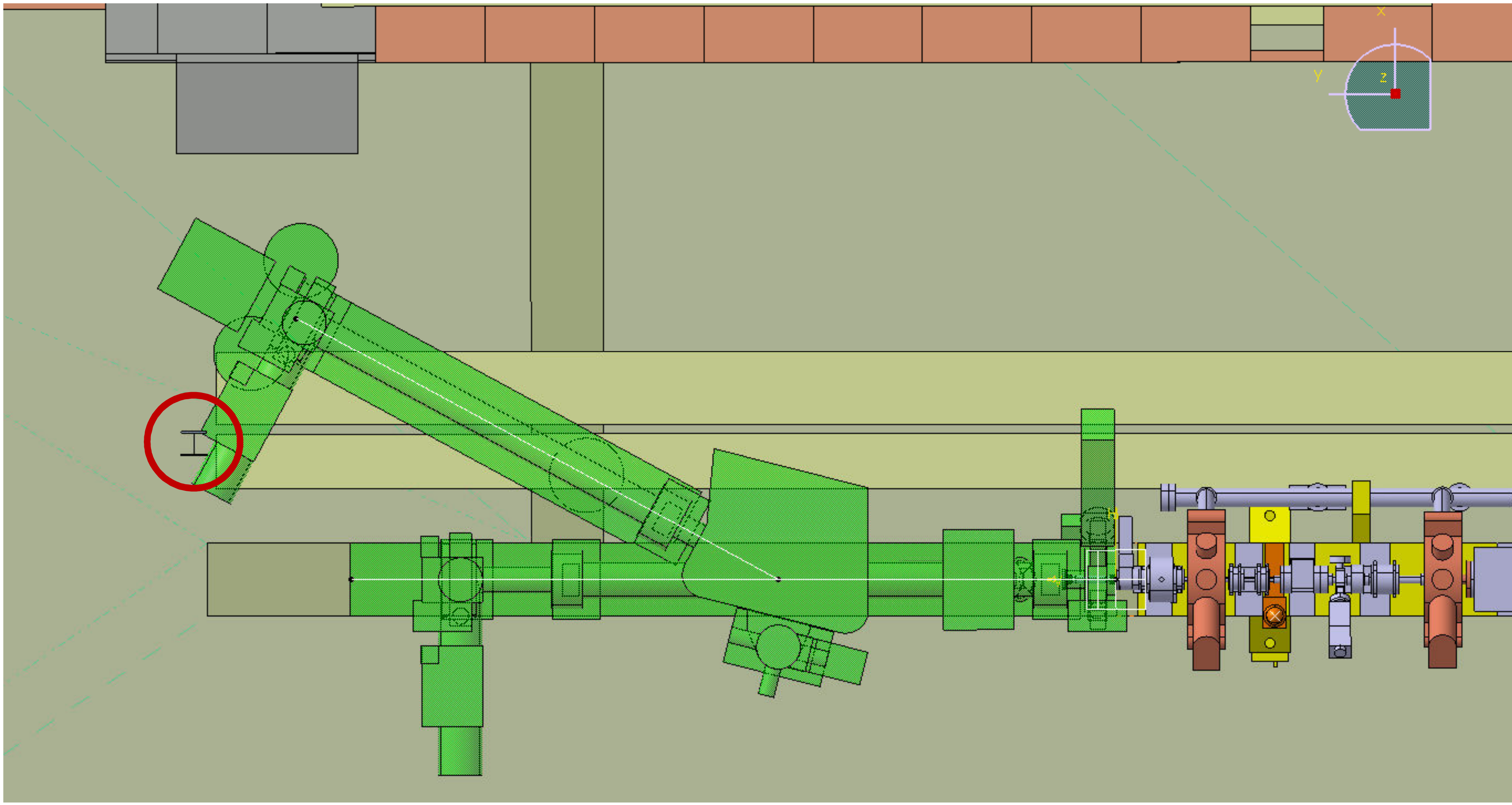
Quadrupoles of type VI at the RFQ output

	Type VI
Core length	54mm
Effective length	78mm
Aperture diameter	48mm
Max integrated field	1.8 T
Max field gradient	23 T/m
Imax	550A

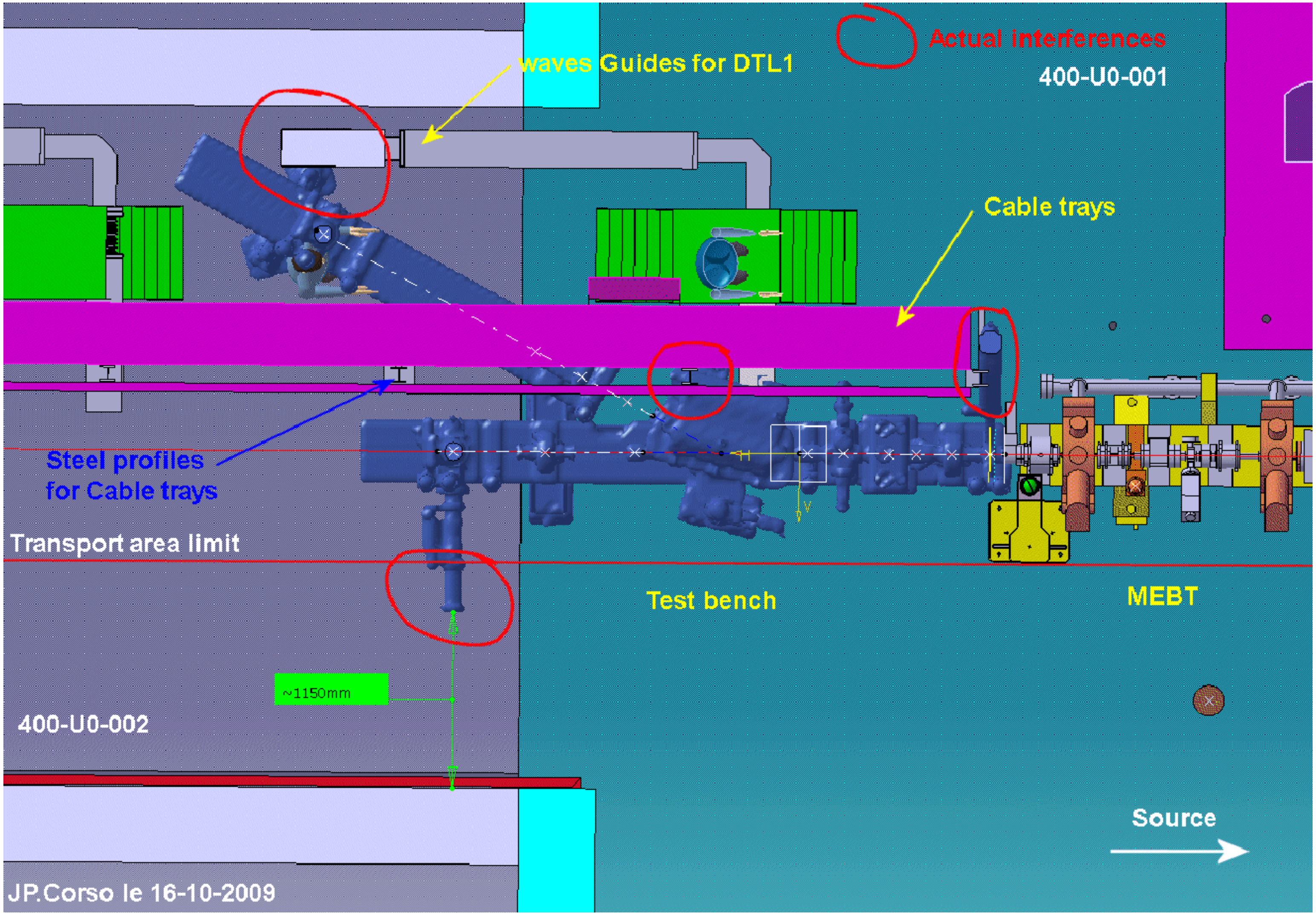
Quadrupoles of type X in the spectrometer line

	Type X
Core length	60mm
Effective length	95mm
Aperture diameter	70.5mm
Max integrated field	0.76 T
Max field gradient	8 T/m
Imax	260A

Conflicts at the Test Stand



Conflicts in the Linac4 Tunnel – after chopper line



Conflicts in the Linac4 Tunnel – after DTL Tank1