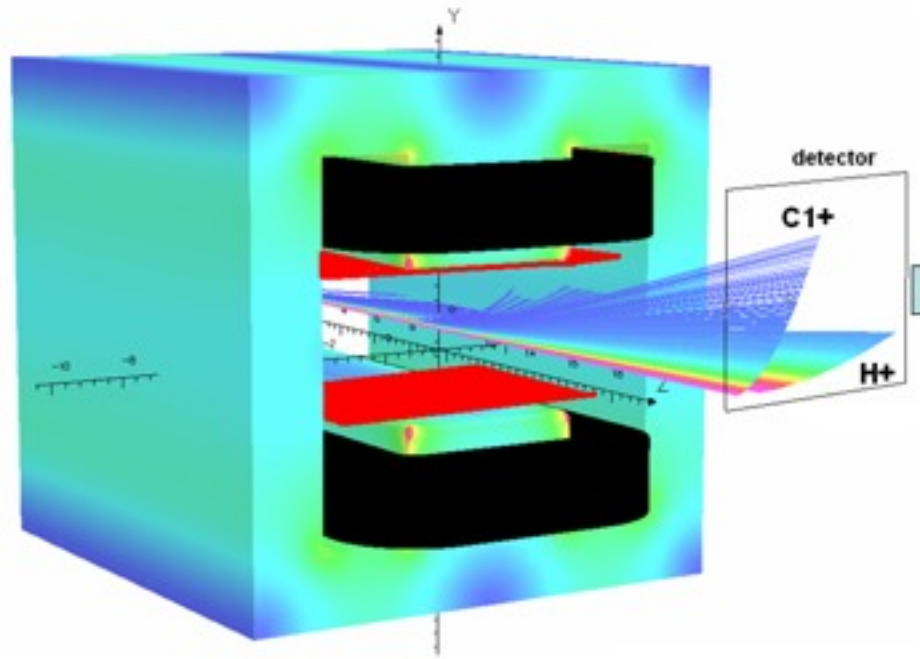
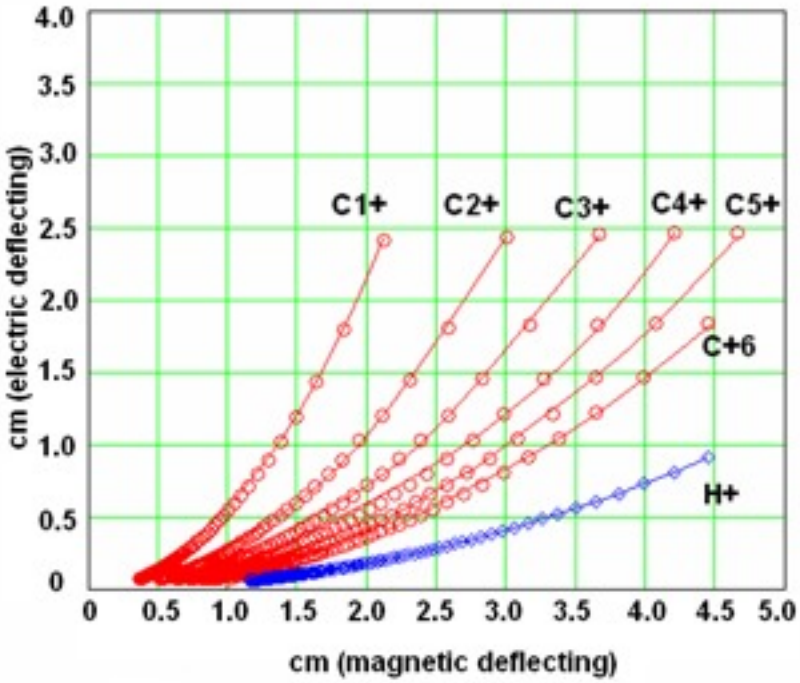
THOMSON SPECTROMETERS FOR LASER PLASMA FACILITY (LNS team for LILIA project)

Analysis of proton and carbon beams (Q=+1 to +6) from 0.1 to 10 MeV



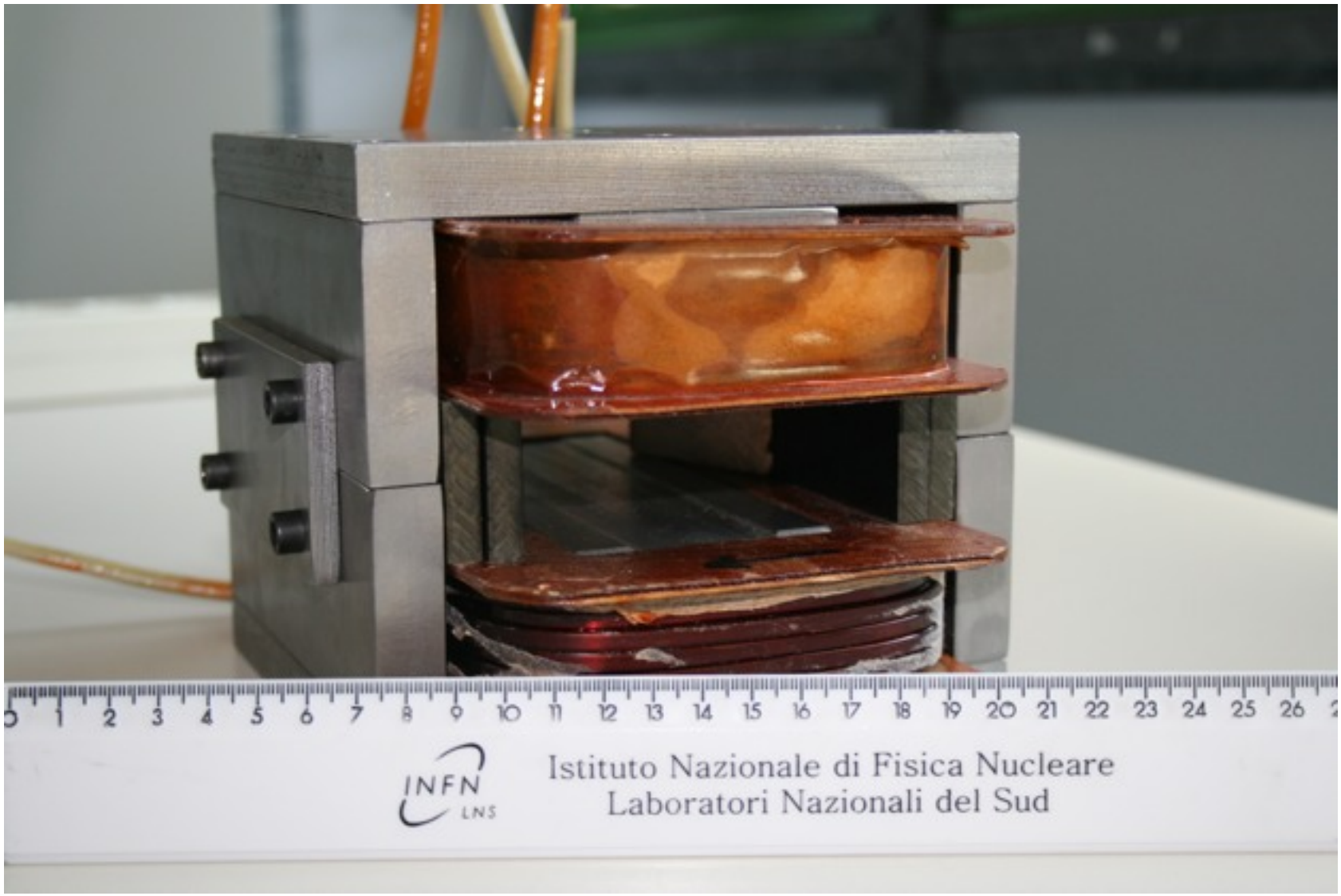


Very compact design → 160x144x150 mm^3

High magnetic field (tunable)→ 2200 gauss

High electric field (tunable) → 20kV/cm

IRON AND COIL ASSEMBLY

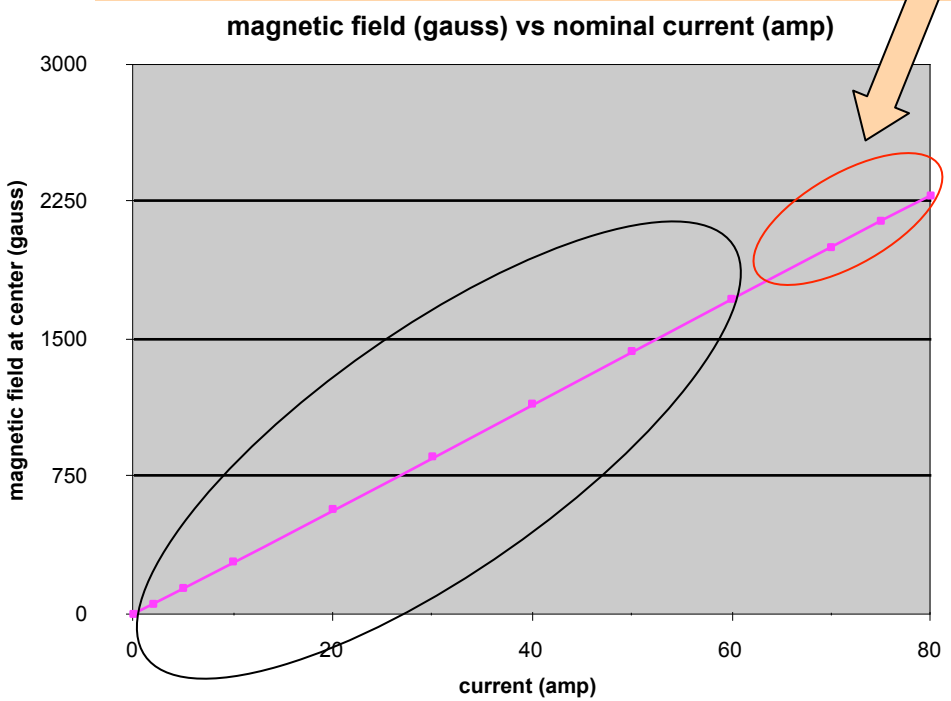


MAGNET ENERGIZATION

POWER SUPPLY: 0-80 A , 0-10 VOLT , 800 WATT MAX

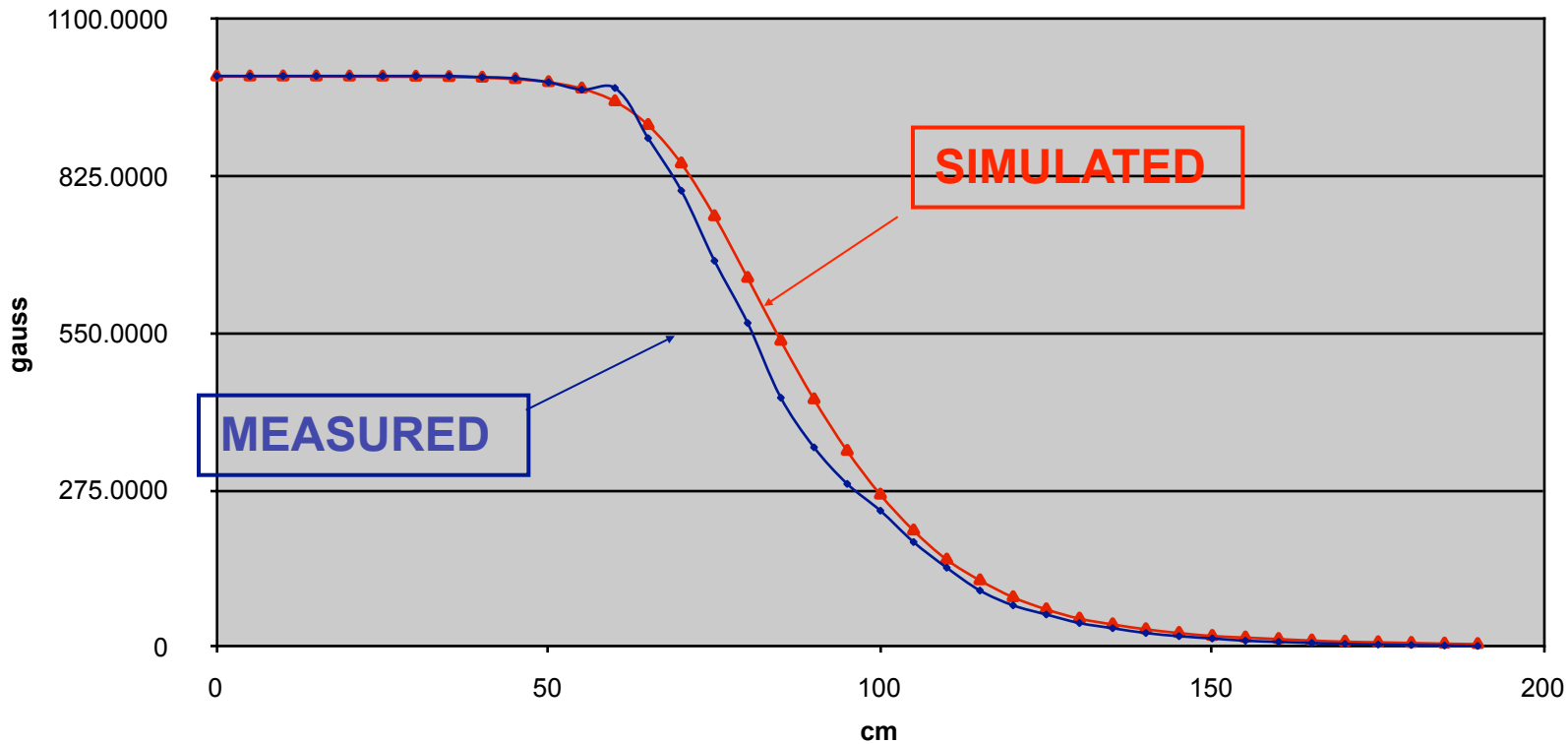
current (A)	Bo(gauss)	volt	power (W)
0	0	0	-
2	54,9	-	-
5	141,7	0,47	2,35
10	286,3	0,85	8,5
20	573	1,71	34,2
30	860	2,57	77,1
40	1148	3,47	138,8
50	1435	4,41	220,5
60	1720	5,41	324,6
70	2002	6,46	452,2
75	2146	7,12	534
80	2284	7,83	626,4

TO OPERATE IN THIS REGION IT NEEDS TO COOL THE SYSTEM WITH FORCED AIR OR WATER

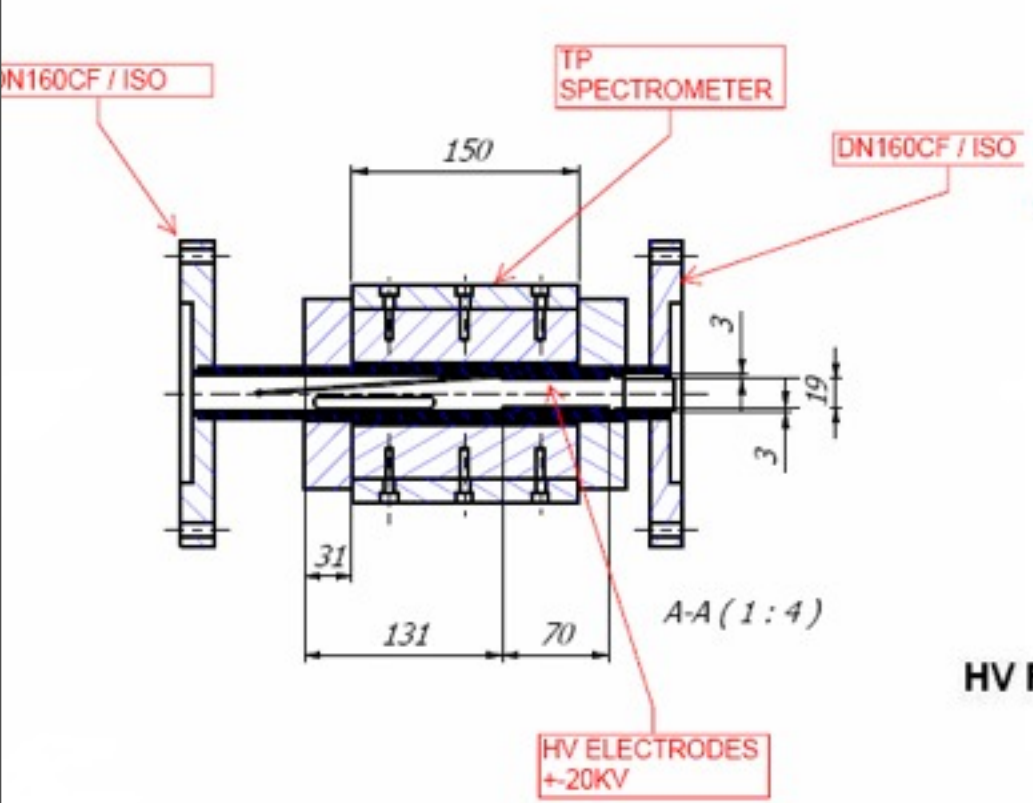


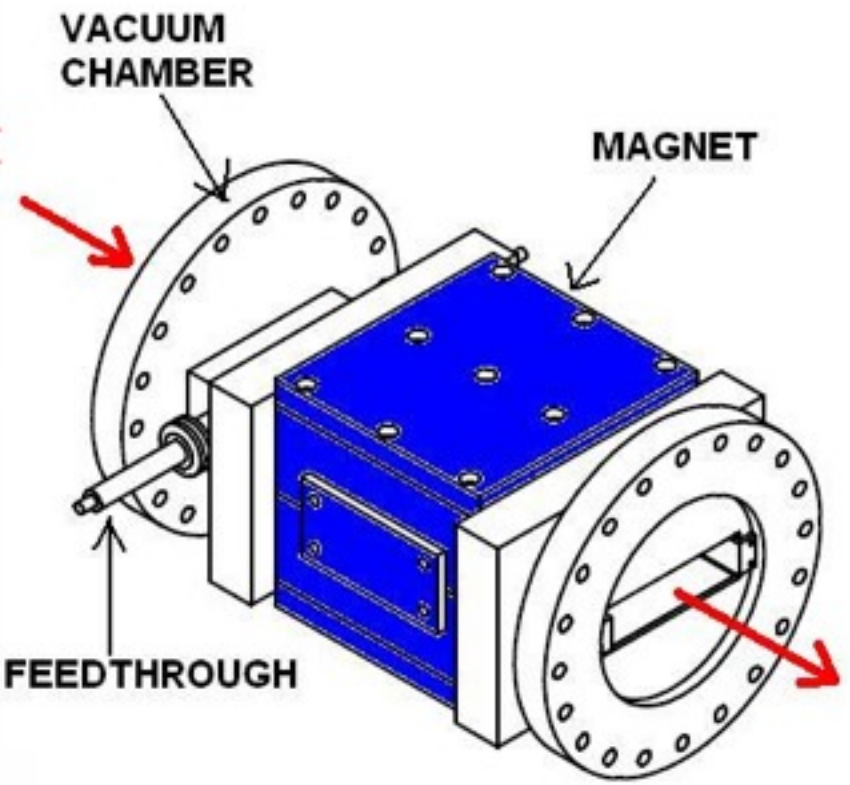
MAGNETIC FIELD & SUPPLY VOLTAGE KEEP STABLES FOR A RELATIVELY LONG TIME (tenth of minutes)

MAGNETIC FIELD MEASUREMENTS (Hall probe)

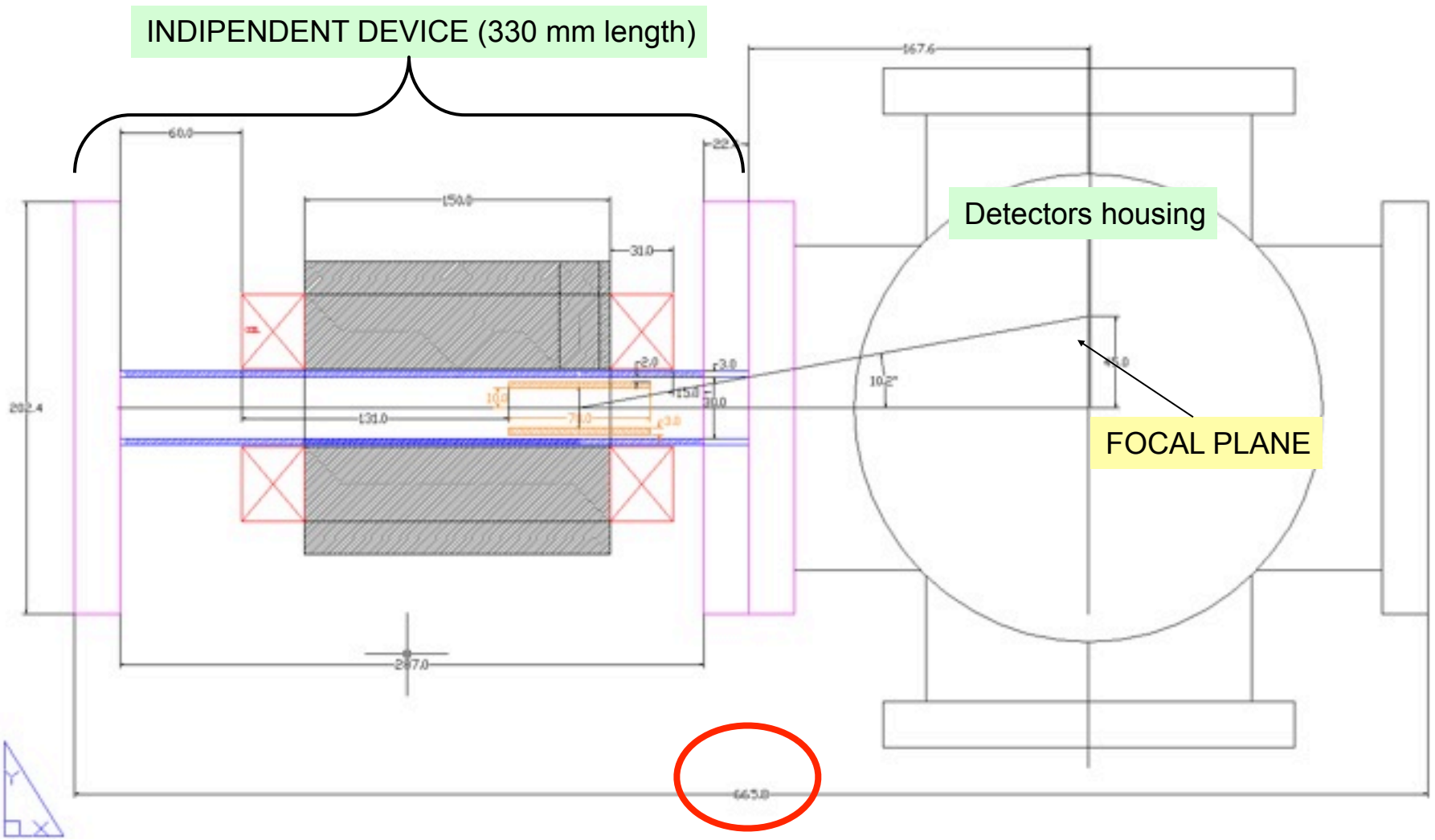


FINAL SPECTROMETER LAYOUT

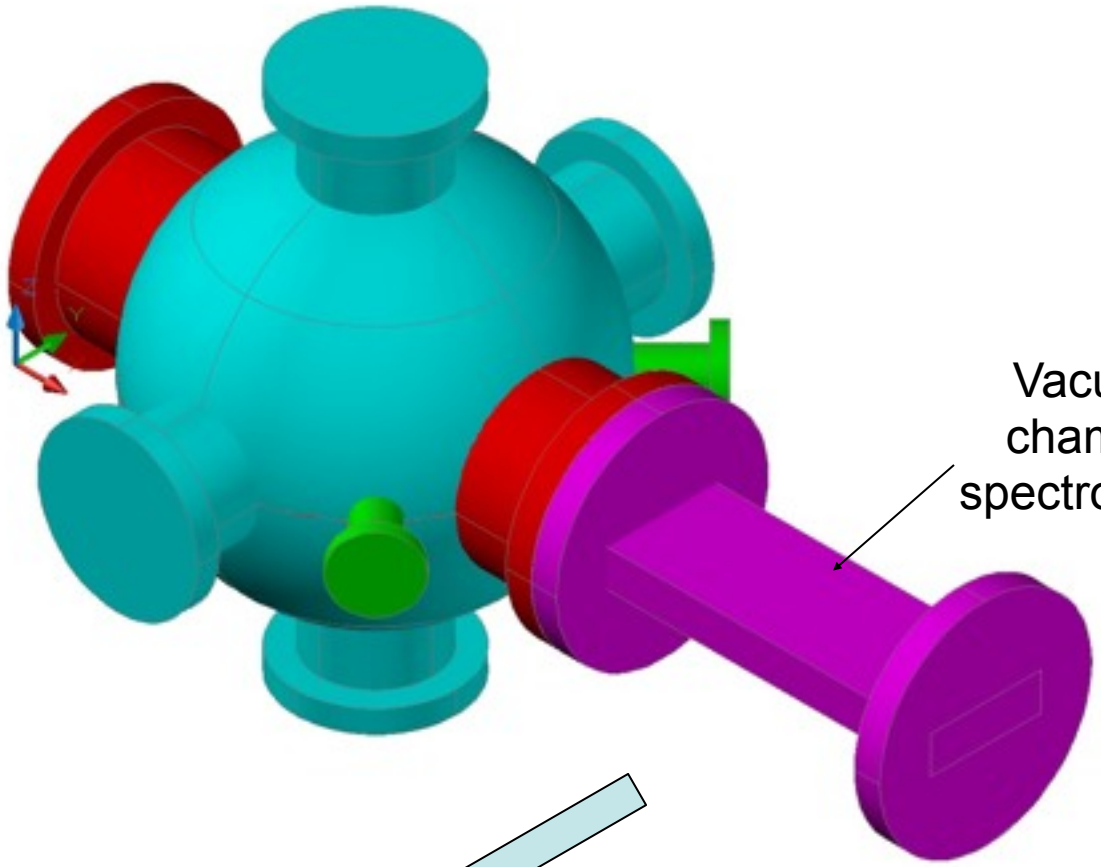




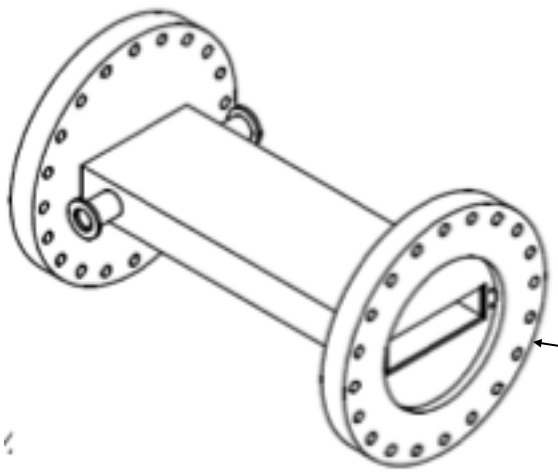
SIDE VIEW OF THE EXPERIMENTAL SETUP



VACUUM CHAMBER FOR DETECTORS (preliminary layout)

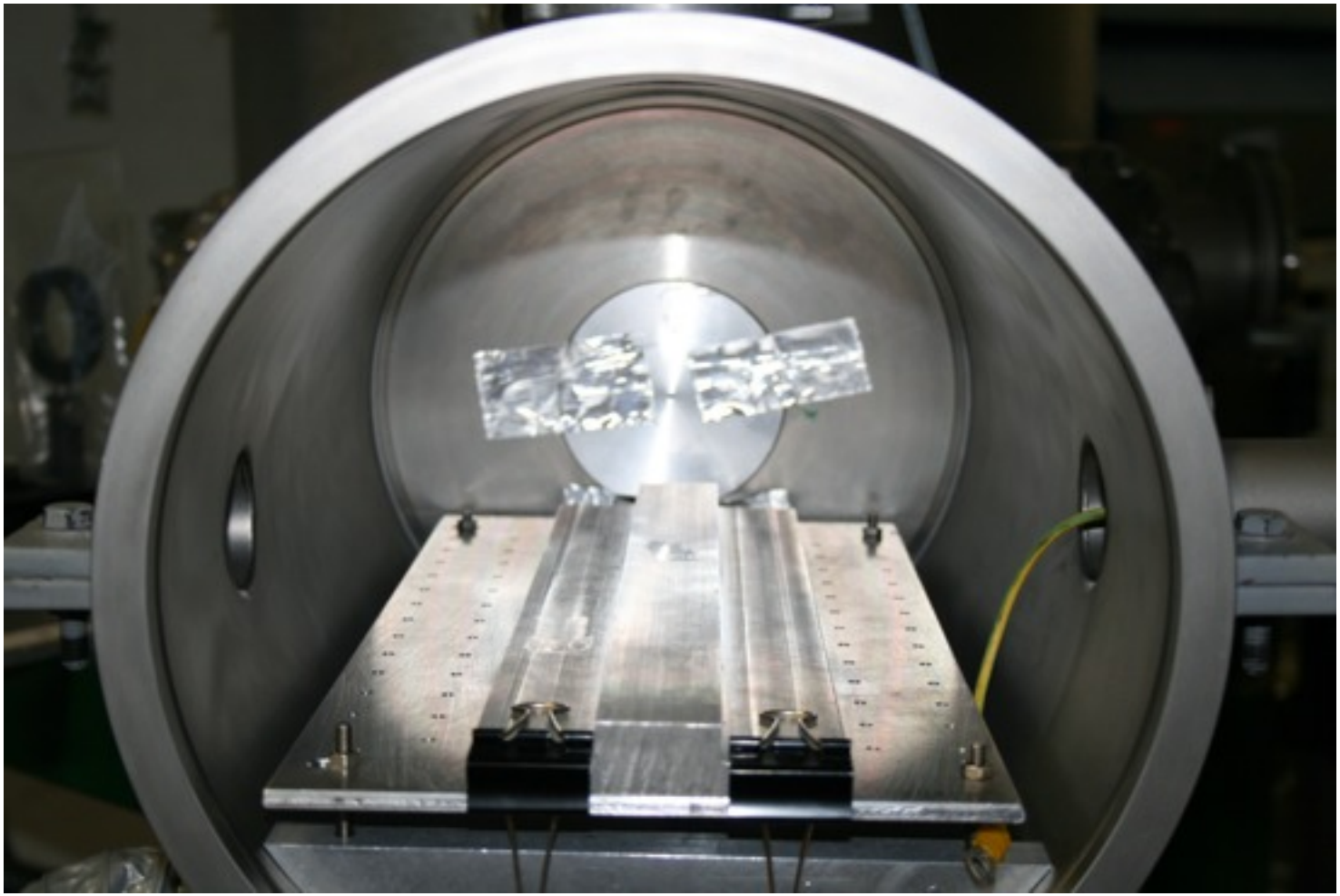


Vacuum chamber spectrometer

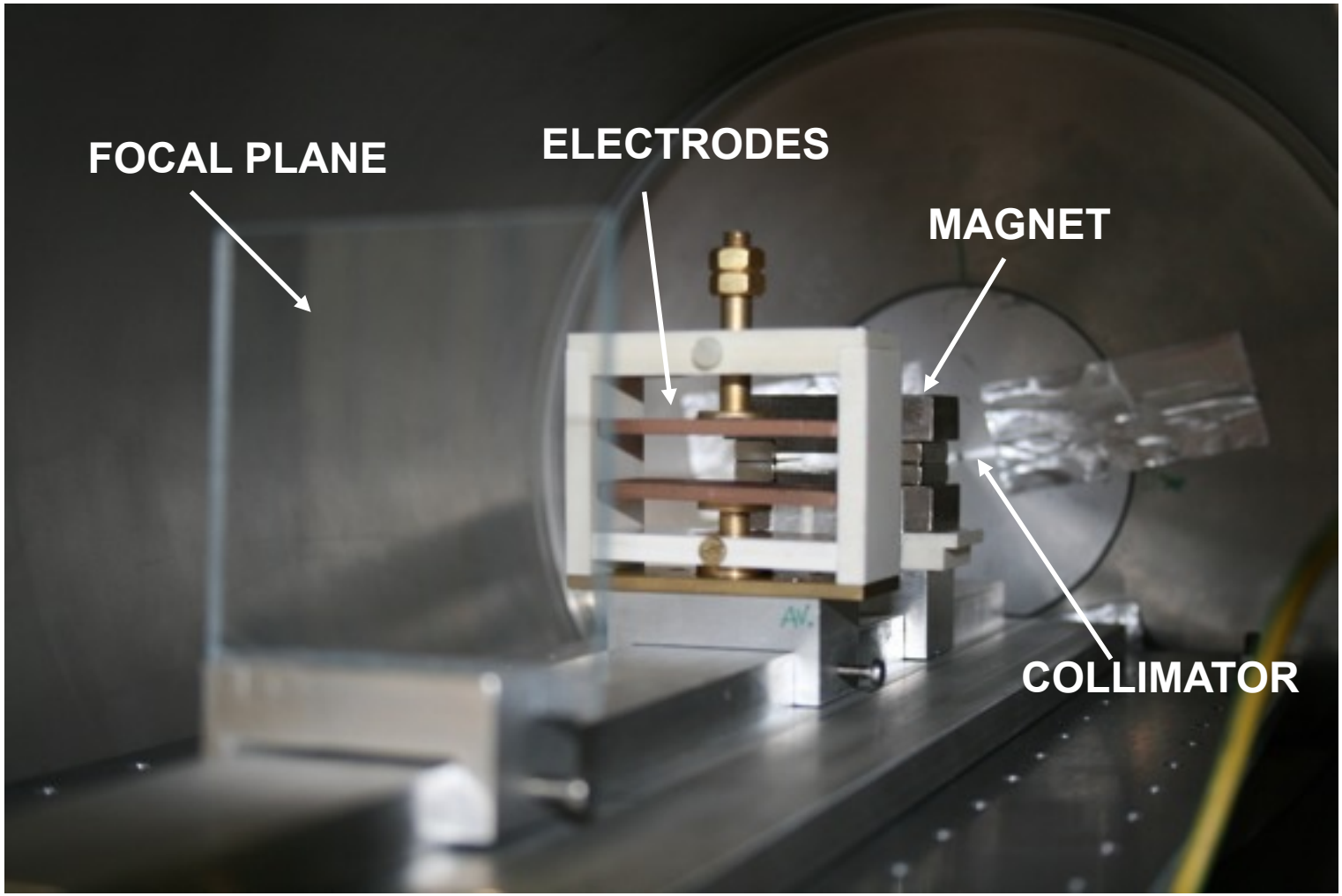


This is under construction (VCS Parma)

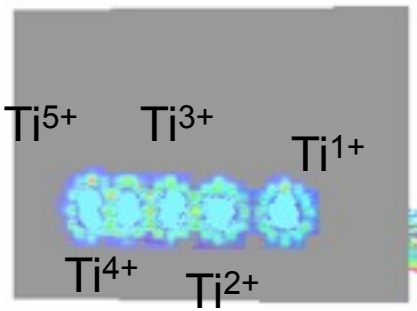
VACUUM CHAMBER PLEIADI - LILIA

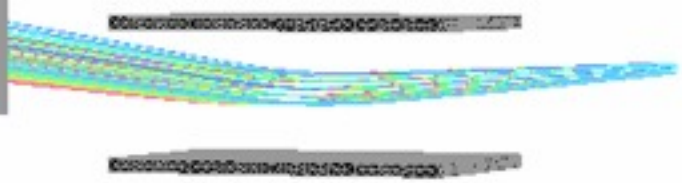


TP SPECTROMETER PLEIADI SETUP



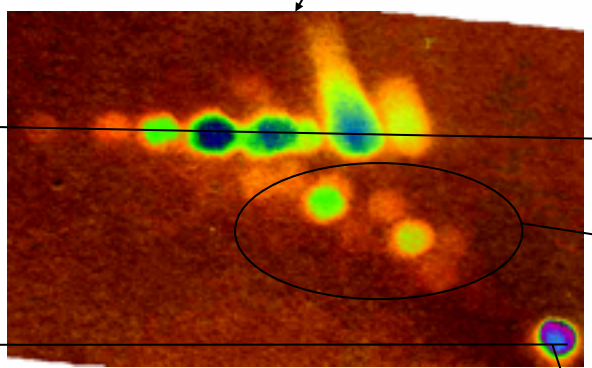
SIMULATIONS COMPARED TO THE EXPERIMETAL BEAM SPOTS





Electrodes
(E=2kV/cm)

Magnet is not shown
(3500 gauss)



15 mm

Gafchromic film

Ekin/Q = cost

Spots due to electrostatic failures or recombination effects?

Energy laser 850 mJ

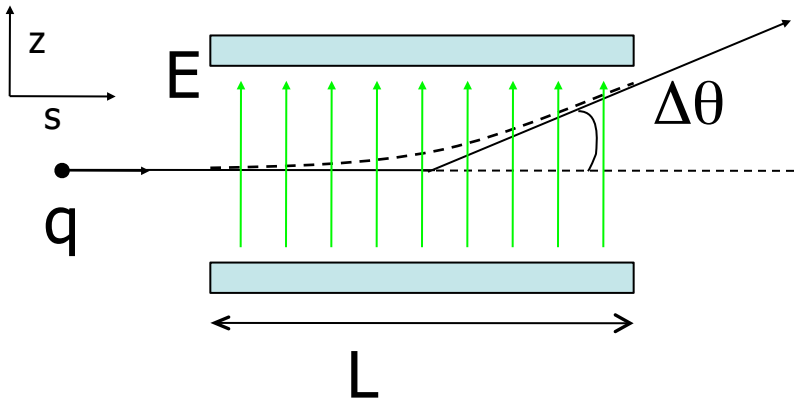
Number of shots=1500

Freq. = 1Hz

Gamma rays and neutral component (set x,y=0)

This is a good way to calibrate the spectrometer

Deflessione elettrica



$$p_z << P$$

$$\frac{dp_z}{dt} = qE_z \Rightarrow v\frac{dp_z}{ds} = qE_z$$

$$\int_0^{v_z} dv'_z = v_z = \frac{q}{mv}\int_L E_z(s)ds$$

$$v_z = v \times \sin\theta \xrightarrow{\theta << 1} v \times \Delta\theta$$

$$\Delta\theta_{ELETTRICA} \approx \frac{qEL}{mv^2} = \frac{qEL}{2K}$$

$$K = \frac{1}{2}mv^2 = q\Delta V_{ACC}$$

$$\Delta\theta_{ELETTRICA} = \frac{EL}{2\Delta V_{ACC}}$$

NON DIPENDE DAL RAPPORTO q/m !!

PERMANENT MAGNET TP SPECTROMETER LILIA LAYOUT (2nd option)