

Ion Source Assembly Requirements

Mechanical dimensions and constraints		
	Maximum distance between the <u>downstream surface of the ground electrode</u> and the <u>upstream surface of the 1<sup>st</sup> solenoid core</u> (a.k.a. end-plate) [ <i>See Figure 1 for detail</i> ]	35 cm
	Must ensure that there is no interference with the second 'leg' of the ion source-1 <sup>st</sup> solenoid assembly, when in the 2-ion source configuration with 60° angle between them [ <i>Figure 2</i> ]	
	Must ensure that there is no interference between equipment mounted on the vacuum chamber (e.g.: emittance scanner, vacuum pump) and the 1 <sup>st</sup> solenoid cables/pipes connections*	
	Must accommodate 2 emittance scanner probes (horizontal & vertical) for beam phase space measurements	
	Must replicate the 'simple' assembly of the original D-Pace source assembly i.e. the ground electrode and steering magnets assembly is removed and installed as a single unit	
	Vibrations [ <i>for frequencies <math>f &gt; 1</math> Hz</i> ]	< 1mm rms <sup>†</sup>
Vacuum		
	Maximum gas flow from the source	0.5 torr l s <sup>-1</sup>
	Gas flow to LEBT (with beam on)	~10 <sup>-3</sup> torr l s <sup>-1</sup>
	Pressure in the downstream part of the vacuum chamber	~10 <sup>-6</sup> torr
Alignment tolerances <sup>‡</sup>		
	Translation $\Delta x, \Delta y, \Delta z$	±2 mm
	Rotation $\Delta\theta_x, \Delta\theta_y, \Delta\theta_z$	±0.4°

\* In particular, the solenoid cables/pipes extend upwards ~450 mm from the beam centerline height i.e. (1.3 m + 0.45 m) from the ground (*Figure 3*). In the beam direction (longitudinal), all cables from the solenoid are contained within the envelope delimited by the solenoid core's width.

† This value corresponds to  $\lesssim$  1% effective rms emittance growth. This estimation assumes that the ion source + vacuum chamber assembly moves *as a whole* with respect to the rest of the beam line elements. At the exit of the vacuum chamber, the rms beam diameter is ~1.2 cm. Displacements from vibrations are added in quadrature.

‡ With respect to the beam center line.

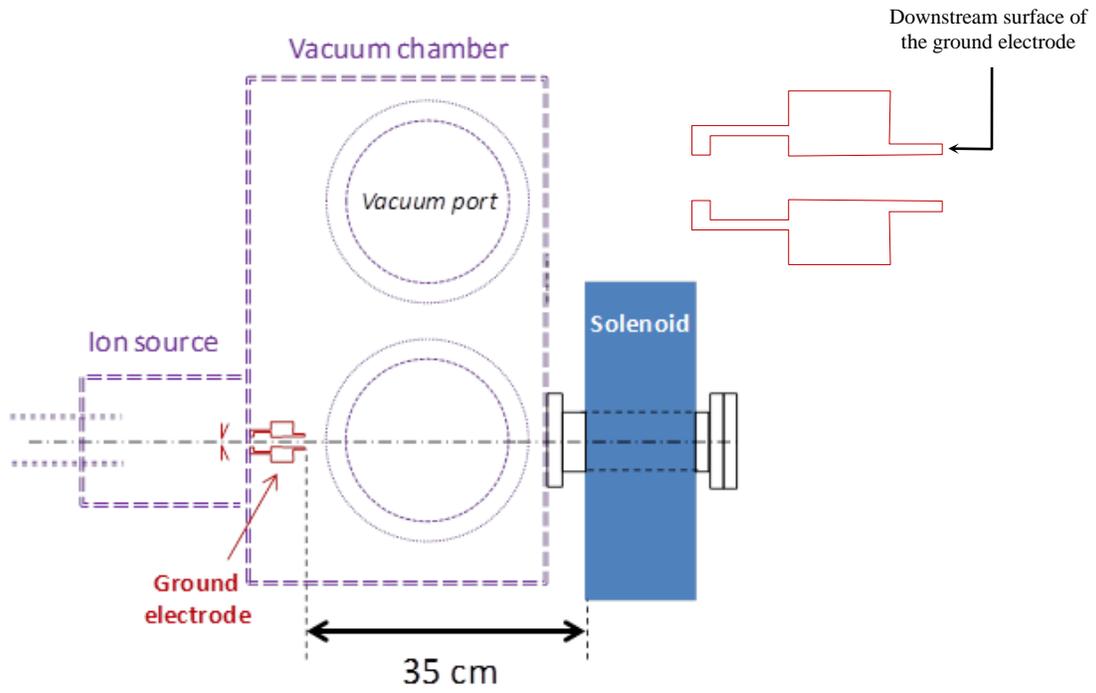


Figure 1.

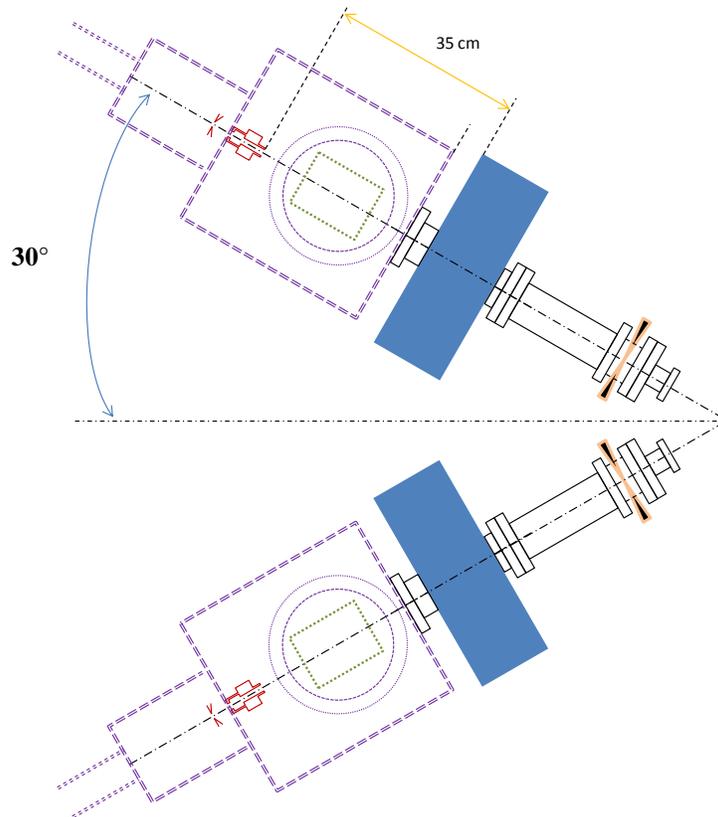


Figure 2.

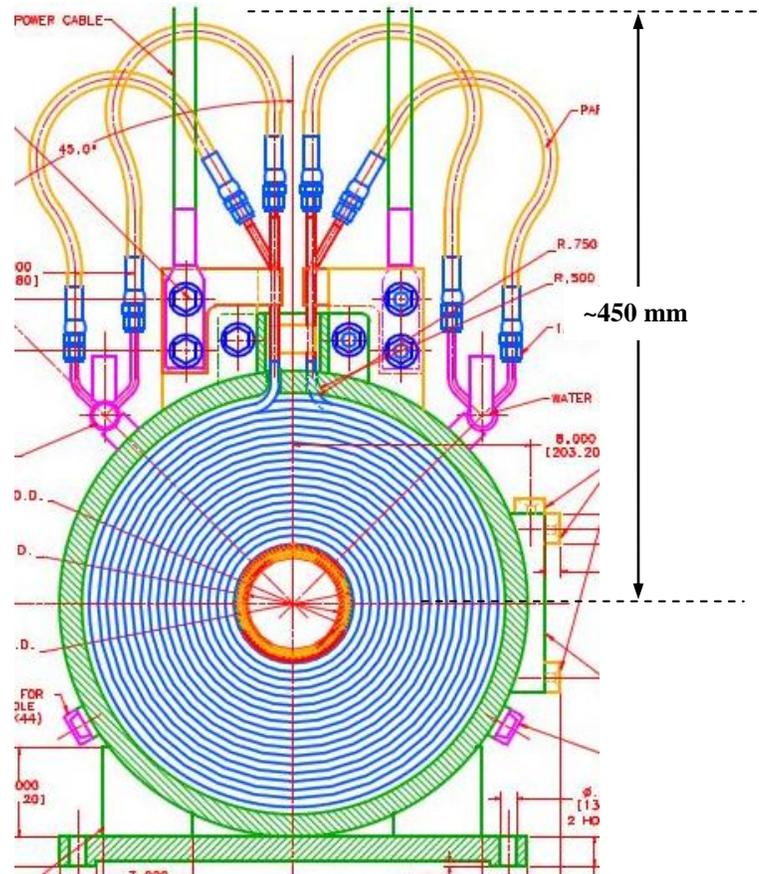


Figure 3.