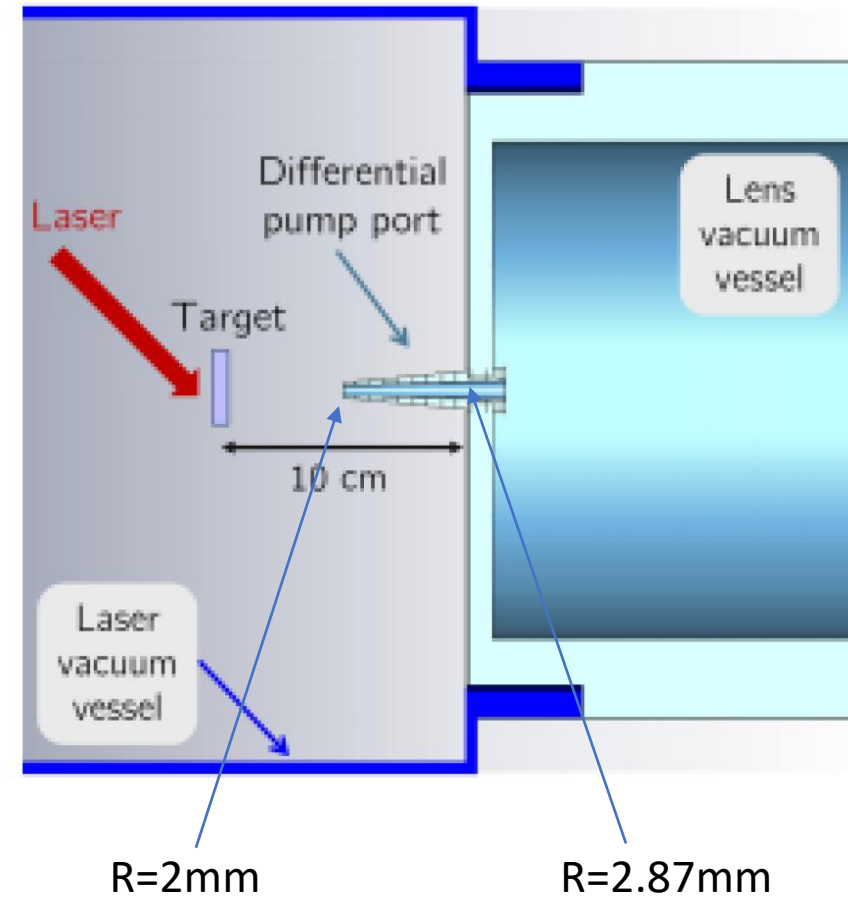
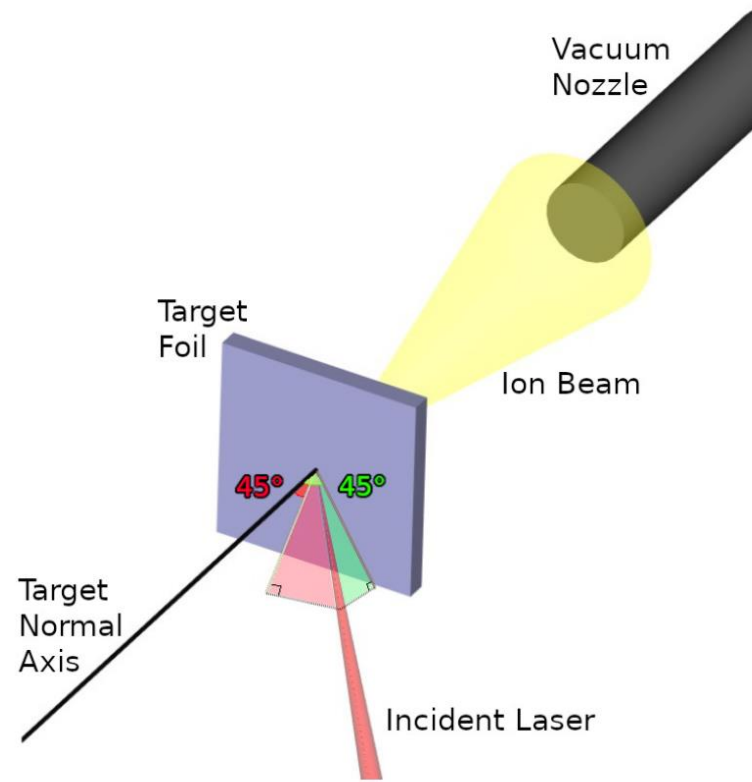


Issues with the initial distribution

J. Pasternak, WP2&WP6 meeting, 29/11/2022

Introduction



Discrepancy between pre-CDR and 2D PIC (Smilei) by HT

Parameter	Ideal Beam	Sampled Beam
β_x [m]	5.4 ± 0.1	145.4 ± 0.7
α_x	-56.0 ± 0.4	-1458.6 ± 6.8
ϵ_x [m rad]	$(2.3 \pm 0.03) \times 10^{-7}$	$(1.4 \pm 0.008) \times 10^{-8}$
β_y [m]	5.3 ± 0.1	149.1 ± 0.8
α_y	-55.2 ± 0.4	-1496.3 ± 8.4
ϵ_y [m rad]	$(2.4 \pm 0.03) \times 10^{-7}$	$(1.3 \pm 0.008) \times 10^{-8}$

Estimate w/o SC shows that these parameters are NOT compatible with the nozzle dimensions

Estimate w/o SC shows that these parameters are compatible with the nozzle dimensions (at 3σ at the entrance and 2σ at exit).
Max angular acceptance: 28mrad (2σ).

“Ancient” parameters

Parameter	Value	Units
Total length	15.58	m
Length w/o arc	11.58	m
Rep. rate	10	Hz
Initial pulse duration (FWHM)	35	fs
Beam spot size at the target (FWHM)	4	um
Physical emittance (rms)	0.021	π .mm.mrad
Proton energy range	12-15	MeV
Final energy spread	$\pm 2\%$	-
Mean dose rate	2	Gy/min
Final spot size (total diameter)	1-15	mm
Final bunch intensity	10^6 - 10^8	-

Estimated assuming max angular acceptance of ± 25 mrad. This beam is compatible with the nozzle.

In estimation of the beam parameters we assume:

- Motion in drift w/o SC for the first 5 cm from the target (beam fully neutral)
- Motion of the distribution for the ideal beam with full SC (pure proton beam)
- This procedure is far from ideal

Please comment on our assumptions!
We need to decide on the “working parameters” for our work in WP6!

Questions

- What information can we gain from the available 3D distribution (from SCAPA):
 - What are the laser parameters and nominal proton beam?
 - What particle species are included (protons, electrons, other ions)?
 - Can we have full distribution of those species?
 - Is there a longitudinal information?
- What differences are we expecting for the LhARA case?
- When do we expect 3D PIC simulations for the LhARA case?