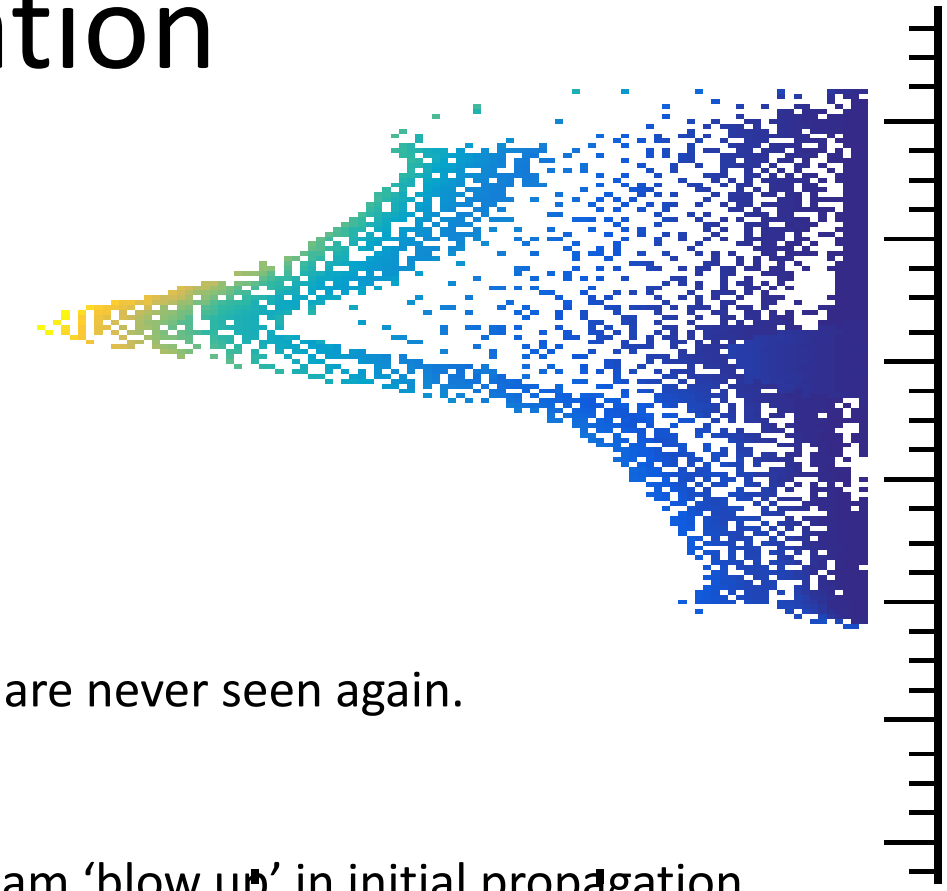
LhARA Capture Accelerator

K Long, B Bingham, J Pasternak, C Whyte, T Dascalu, HT Lau.

1. Source simulation.
2. Gabor lens prototype #2 design and simulation.
3. Fixed Field Accelerator

Source simulation

SMILEI (Epoch)



2D simulation – extrapolate (smear, invent?) to 3D.

Requires ‘experience’

M King, Strathclyde

O. Ettlinger, Imperial

Simulation area ~40um per side

requires transition to particle tracking software for mm to m scales.

Space-charge and neutralisation. 3 populations of particles

1. Fast electrons – first to emerge, basically leave at c and are never seen again.
2. Slow electrons.
3. Protons

2&3 exit simulation volume together as ‘mixture’ – prevents beam ‘blow up’ in initial propagation.

Objectives

1. Refine 2D to 3D smear
2. Understand propagation of electron/proton cloud exiting SMILEI
3. Particle trace through beam line

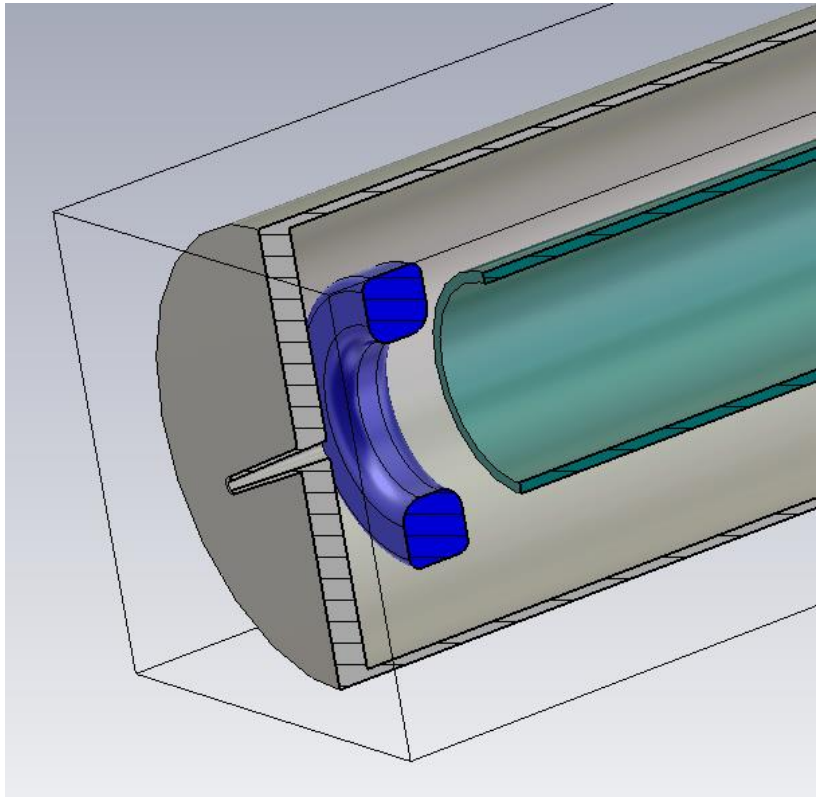
Gabor lens

Good progress understanding previous lens behaviour

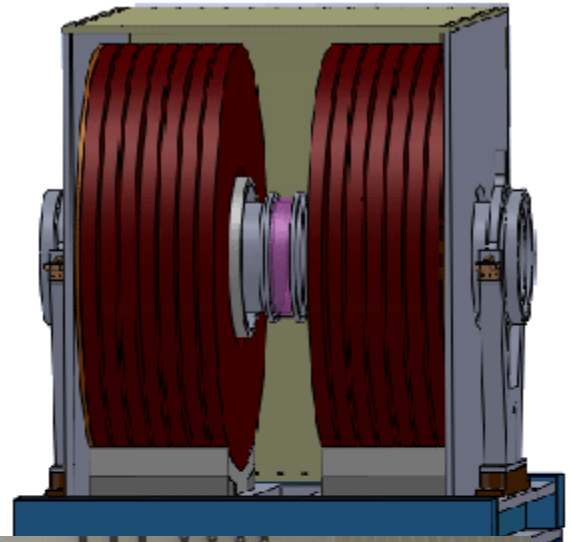
Objectives – redesign Gabor lens

Requirements

- Electron source
- method of introducing plasma rotation to stabilise
- Simulate ‘empty lens’ as well as ‘lens full’
- Practical/affordable



Fixed Field Accelerator



Single spiral scaling FFA

- 3-3.5m beam radius, 8m machine diameter
- 2 RF cavities, 1.5-6.5 MHz, 4kV/turn.
- 1.4T maximum magnetic field.

Objectives

- MA loaded cavities - Establish collaboration ISIS CERN, Kyoto – move to full-time RA
- Main FFA magnets. Development of alternative geometry based on tilted sector. Need to establish a collaboration with magnet designers. Will require a full RA post
- Particle tracking in FFA with space charge.