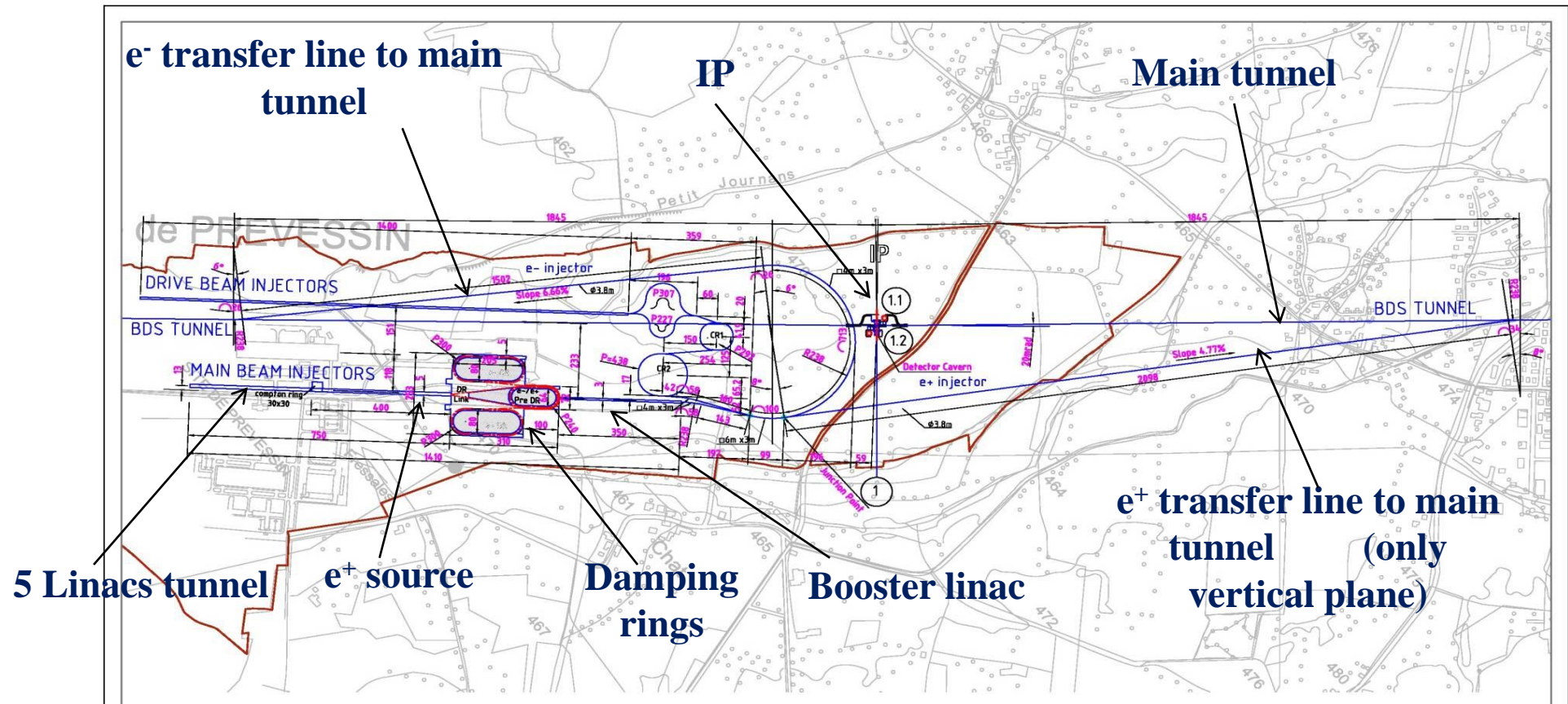
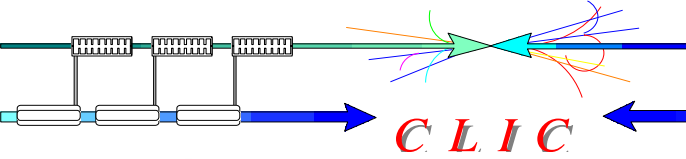


CLIC Main Beam Injector Complex

An updated layout in June 2010

Louis Rinolfi

General layout for all injectors



INJECTORS TUNNELS	DRIVE BEAM INJECTORS COMPLEX						MAIN BEAM INJECTORS COMPLEX						TRANSFER TUNNEL COMMUN	FINAL TRANSFER TUNNELS (after TT commun)			
	LINAC	DL1	DL2	CR 1	CR 2	TT to Junction Point	LINAC SOURCE	e- DR	e+/e- Pre DR	e+ DR	DR Link	LINAC Booster+BC1		TT to Junction Point	e- TT	e+ TT	
Length (l) m	1400	227	307	292	438	191	750	300	240	300	2x165	350	131	195	739	1528	2132
Section (w x h) m	6 x 3	4 x 3	4 x 3	4 x 3	4 x 3	4 x 3	5 x 3	5 x 3	5 x 3	5 x 3	8 x 3	3 x 3	4 x 3	6 x 3	4 x 3	ø 3.8	ø 3.8
delta e-/e+ = 135m																	

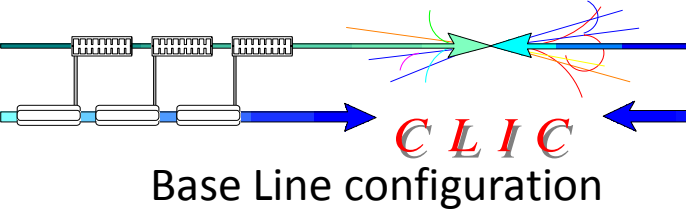
CLIC- MAIN / DRIVE BEAM INJECTORS AND EXPERIMENTAL AREA LAYOUT

GROUP : TS-CE
 CIVIL ENGINEERING
 SUPERVISOR : J.OSBORNE
 DESIGNER : N.BADDAMS
 SCALE : 1/10000(A3_FORMAT) DATE : 13_APR-2010
 CLIC.CE-1.1799.0002 3 H

Civil engineering

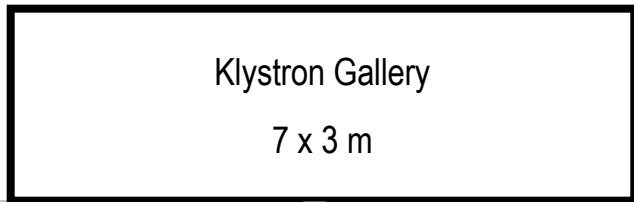
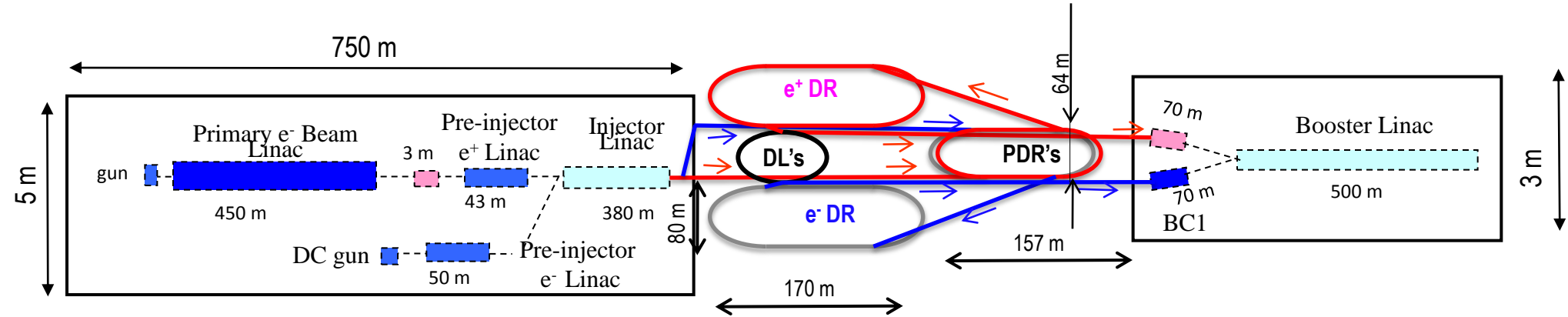
for the Main Beam Injector complex

Not to scale



Linac tunnel (incl. e+ source)

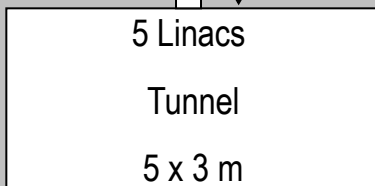
Linac tunnel (incl. bunch compressor)



Shafts for waveguides
Ø 0.3 m

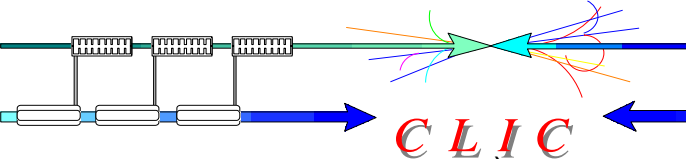
5 meters

Cut and cover ground halls

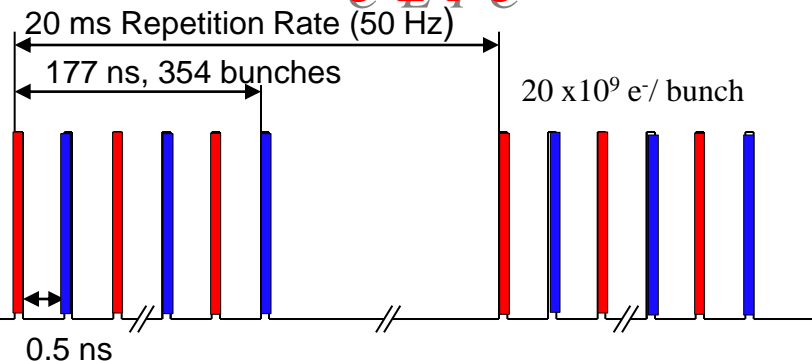


- + 100 m for beam diagnostics upstream BC1
- + 100 m for beam diagnostics downstream BC1
- + 100 m for Spin Rotator between DL and BC1

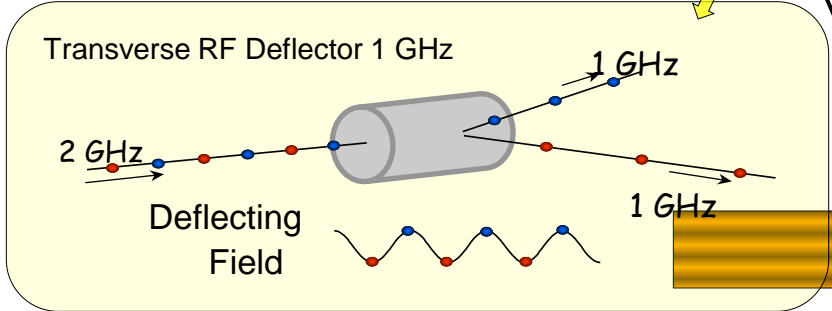
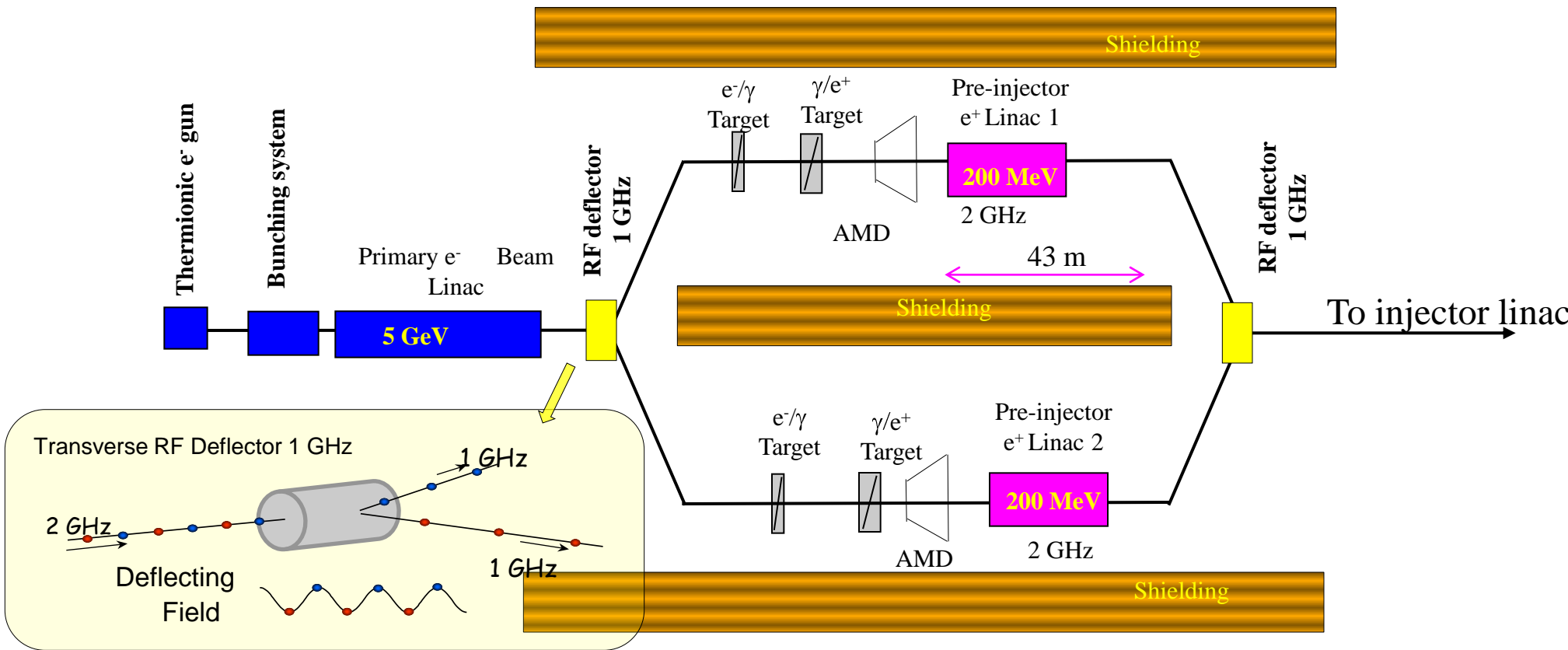
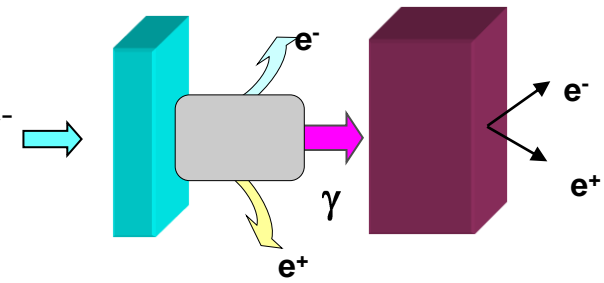
Double e⁺ target stations for 500 GeV



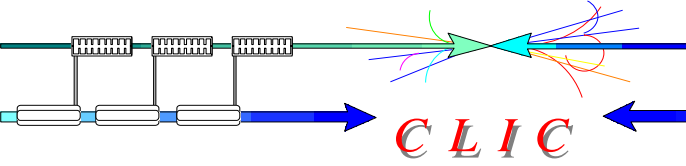
CLIC



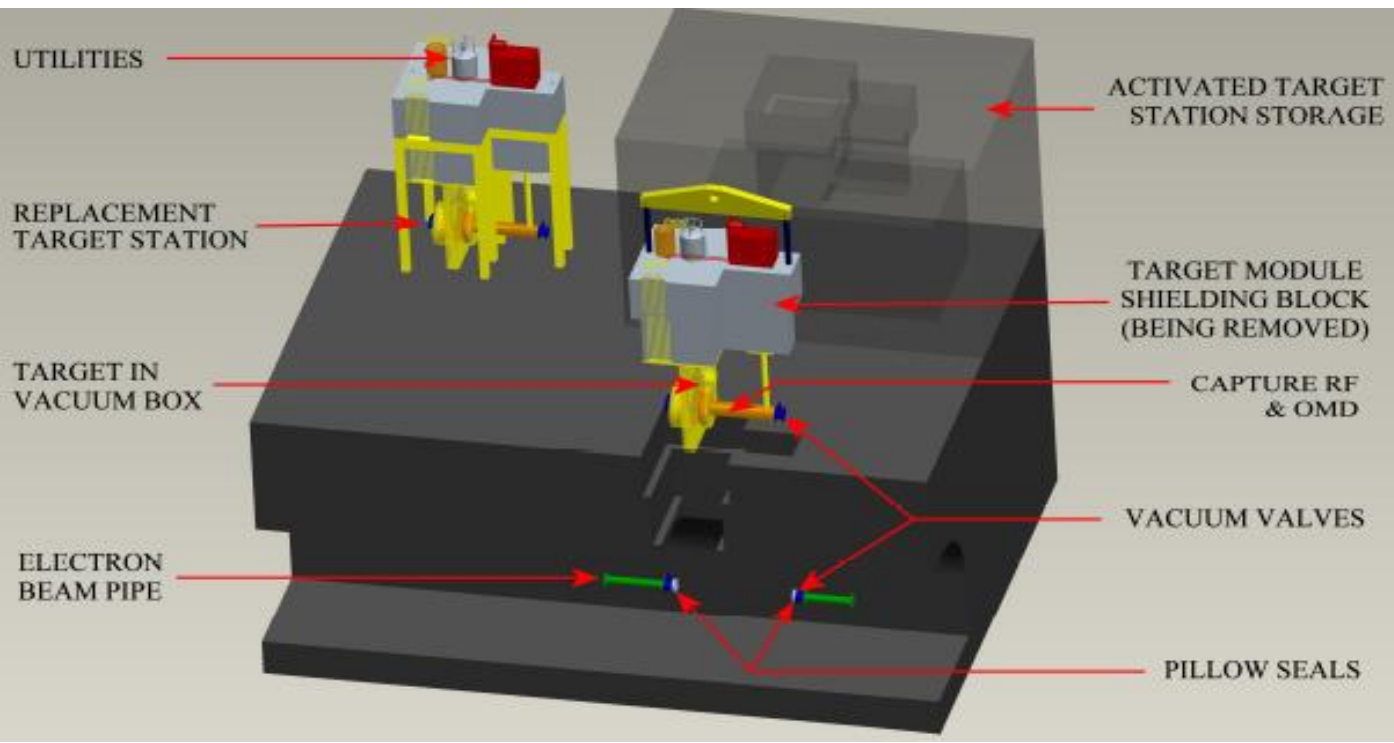
Each target 3.54 x 10¹² e⁻
 Compared to 2.34 x 10¹² e⁻



Complex Handling Equipment



CLIC



ILC study

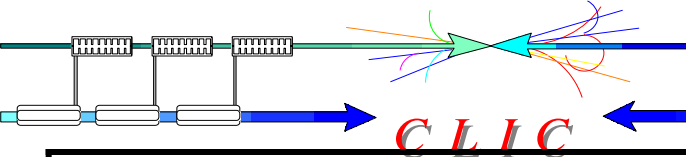
- Baseline uses a vertical remote-handling system
- Minimises target hall footprint (~100m²)
- Estimated target change time is ~ 53 hours (not yet optimised)



Beam Dynamics meeting

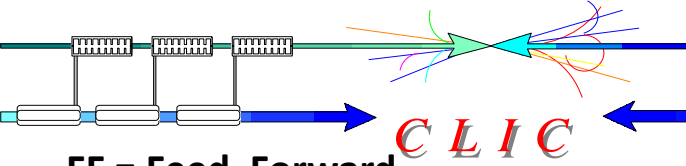


Bunch Compressors BC1 & BC2



Parameter	DR	BC1		BC2	
	Out	In	Out	In	Out
Energy (GeV)	2.86	2.86	2.86	9	9
No. of e ⁺ /bunch (10 ⁹)	4.1	4.1	4.1	4	4
Bunch length (rms) (mm)	1.6	1.6	0.300	0.300	0.044
Uncorr. energy spread (rms) (%)	0.13	0.13	0.7	0.22	1.5
Corr. energy spread (m ⁻¹)	0	0	26	8.2	0
Longitud. emitt. (eV.m)	~ 6000	~ 6000	~ 6000	~ 6000	~ 6000
BC factor	-	5.3		6.8	
RF frequency	-	2 GHz		12 GHz	
Gradient (Loaded)	-	15 MV/m		74 MV/m	
Structure length	-	3 m		0.25 m	
RF voltage	-	450 MV (10 ACS)		1800 MV (96 ACS)	
Length of linac	-	40 m		30 m	
Length of chicane	-	30 m		90 m	
Total length	-	~ 70 m		~ 120 m	

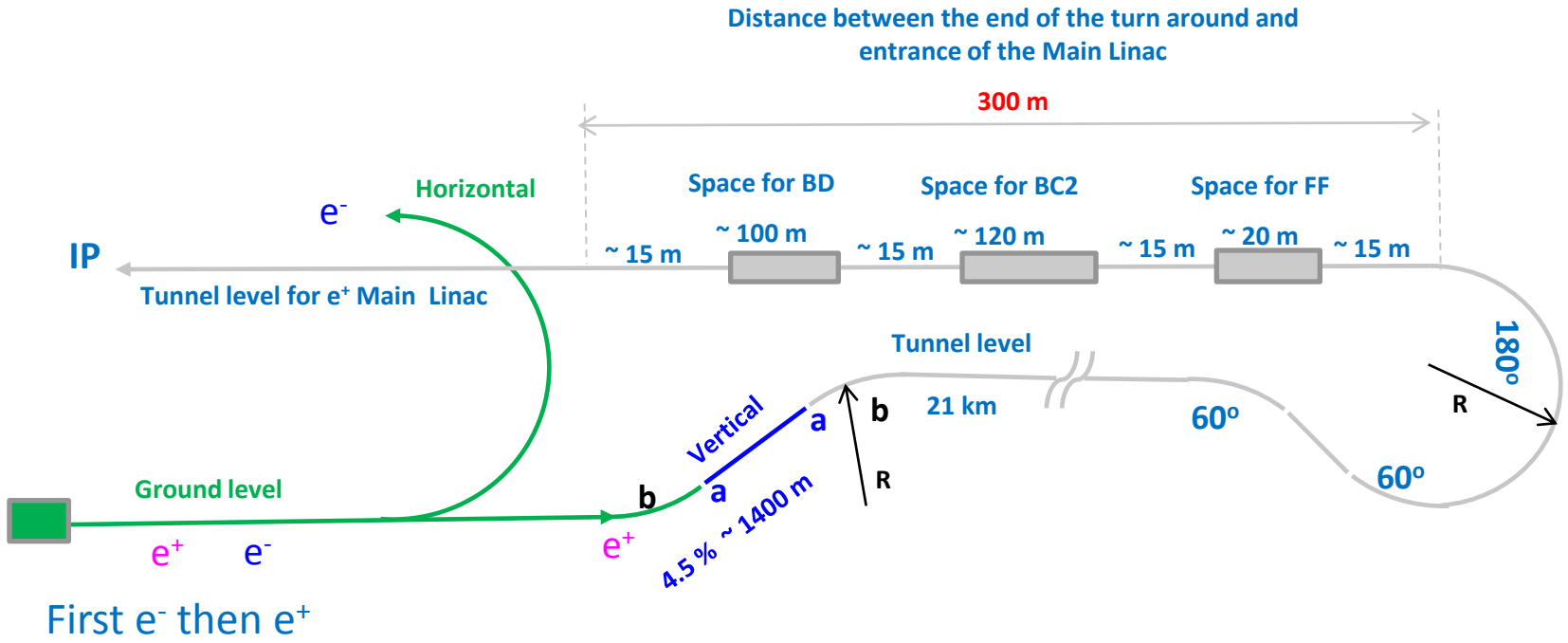
e^+ path



FF = Feed Forward

BC2 = Bunch Compressor (Stage 2)

BD = Beam Diagnostic + matching

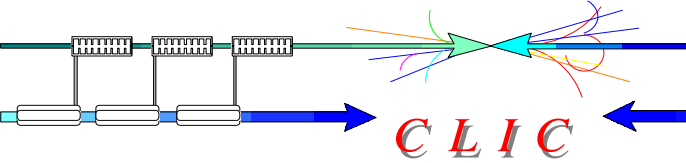


$R = 305$ m

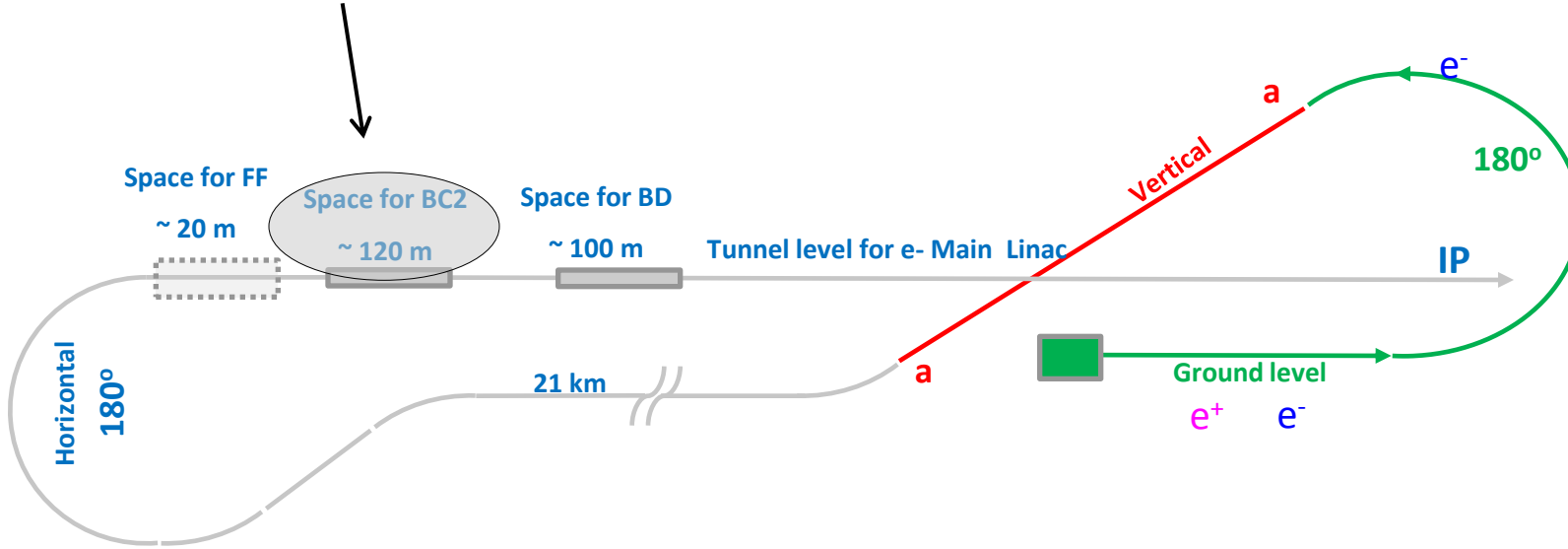
$a = \text{vertical angle} = 4$ degrees

$b = \text{horizontal angle} = \text{free}$

12 GHz Klystron gallery for BC2



BC2 = Bunch Compressor (Stage 2)



BC2 is composed of 96 CLIC accelerating structures working at 12 GHz (for each e^- and e^+ beams)

The klystrons will be located either:

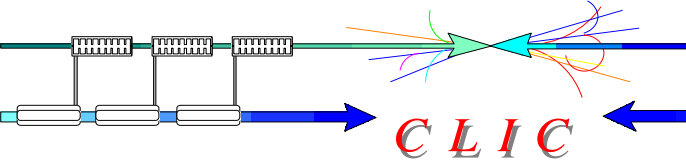
a) on the surface buildings (\Rightarrow \sim 200 m wave guides between the surface and the tunnel)

or

b) close to the RF structures (\Rightarrow an alcove in the tunnel).

The possibility to use the PETS structures of the Drive Beam should be investigated.

Summary



- 1) Length between the Delay Loop exit and Booster Linac exit is now 900 m
- 2) All transfer lines between the sources and the entrance of BC1 remain to be designed
- 3) Length just upstream of the Main Linac entrance has been reduced (400 m => 300 m)
- 4) The radius of the Turn Around Loop has been increased (238 m => 305 m)
- 5) The klystrons installation (1800 MV) for BC2 will consider the 3 options in the CDR