L. Keller, 13 Mar. 2007

Headon and Collimation Mini-workshop at Daresbury, 26 Feb. - 2 March, 2007

Goal is to reach a decision point ~ LCWS 07 – early June, 2007

Headon topics covered:

- Electrostatic separators w/ J. Borburgh and B. Balhan from CERN
- SC final doublet
- Skew quad compensation of detector solenoid and modeling solenoid over QD0
- Synchrotron radiation from extracted beam
- Extraction line optics for energy and polarization measurements
- Particle losses and backgrounds from dump

Half-day on collimation:

1. Collimation depth for different L*
2. Spoiler damage proposal to ATF (or ATF2)

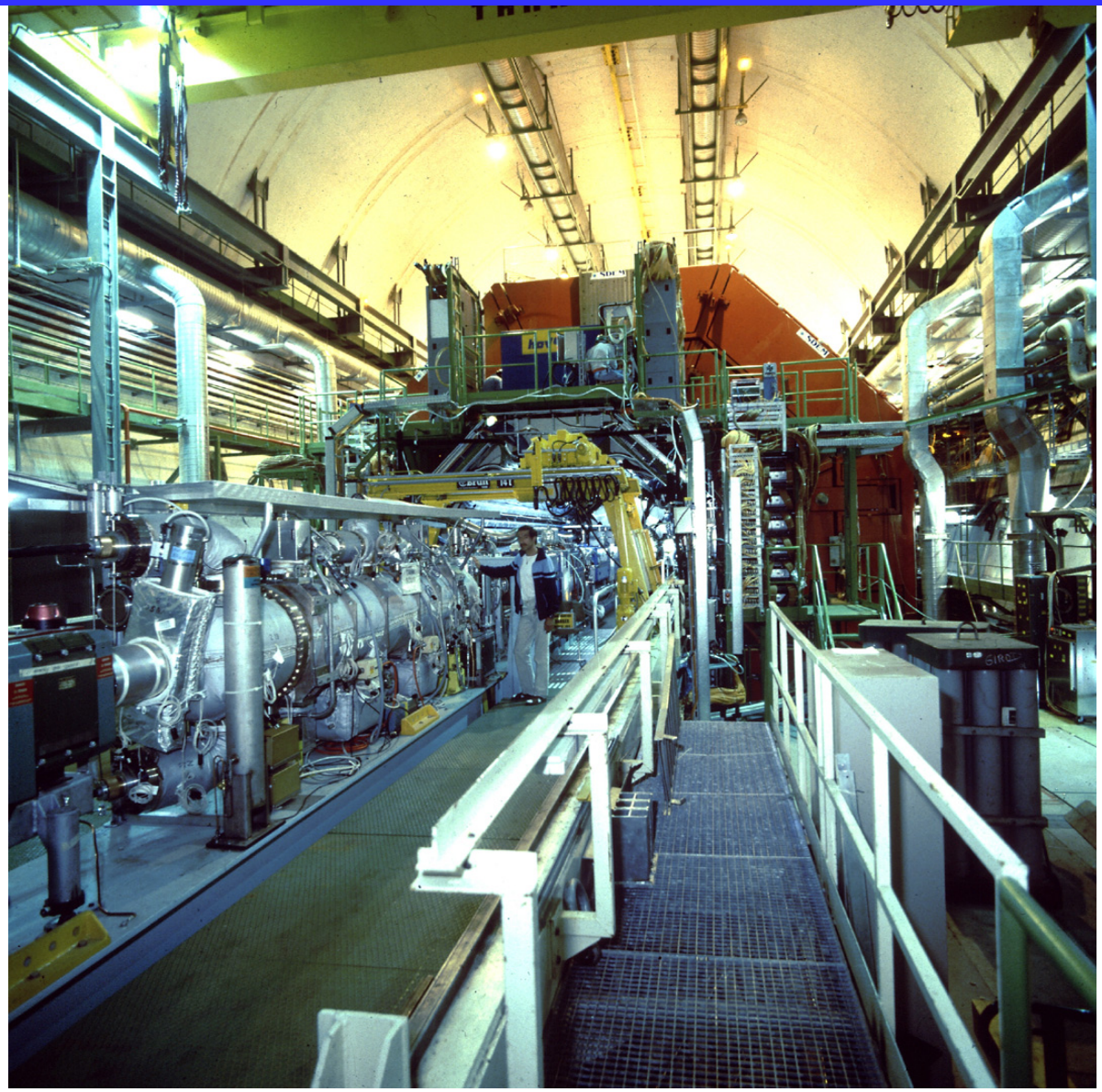
Backup slides

ILC separator issues

With input from:

B. Balhan

B. Goddard

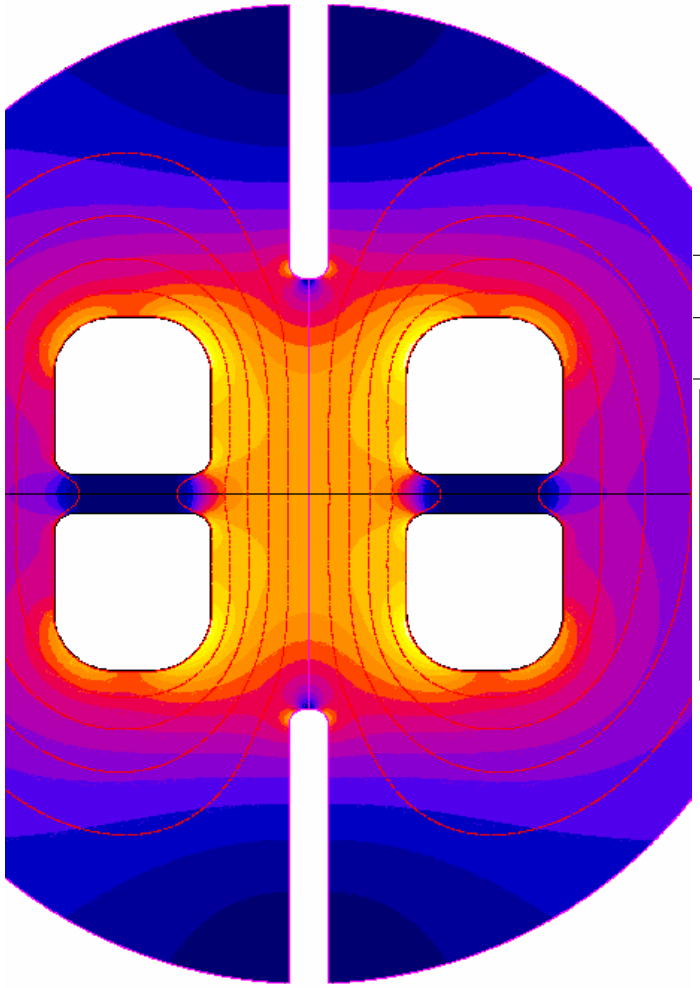


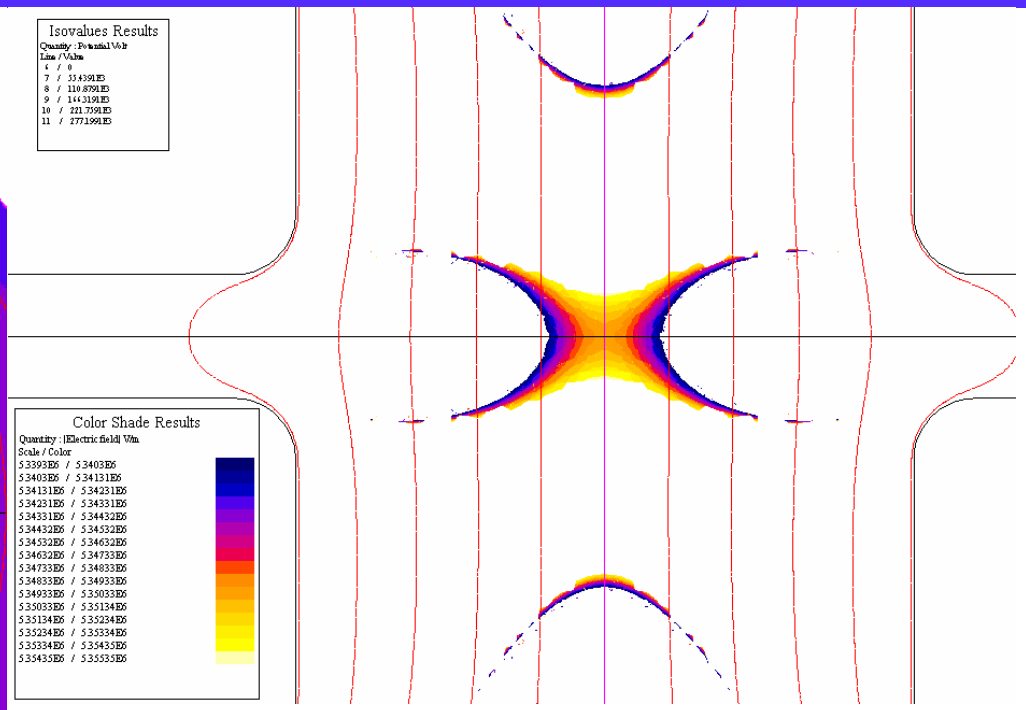
CERN 1989

Separators in front of

LEP L3 detector

Field quality
20 mm split electrodes





20 mm split electrodes at 100 mm gap, provide 1‰ field homogeneity in an area of 16 x 14 mm

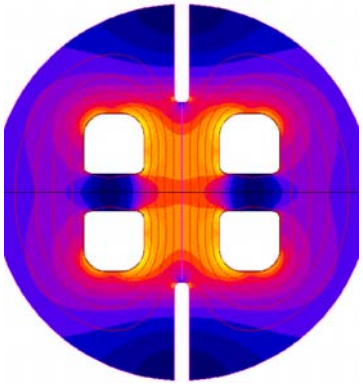
Updated ILC separator specifications

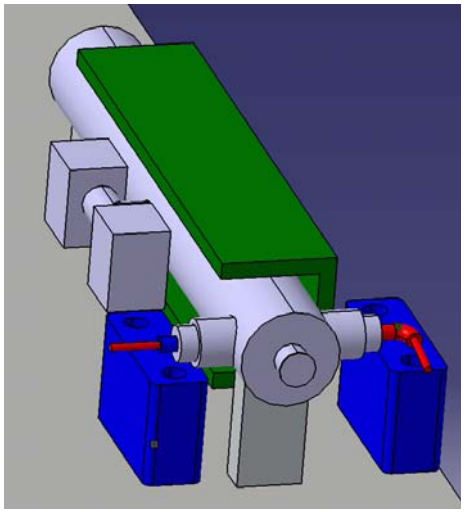
The total deflection provided by separator of 252 μrad is to obtain :

-12 mm separation at 55 m of the IP

-7 cm at QD2A

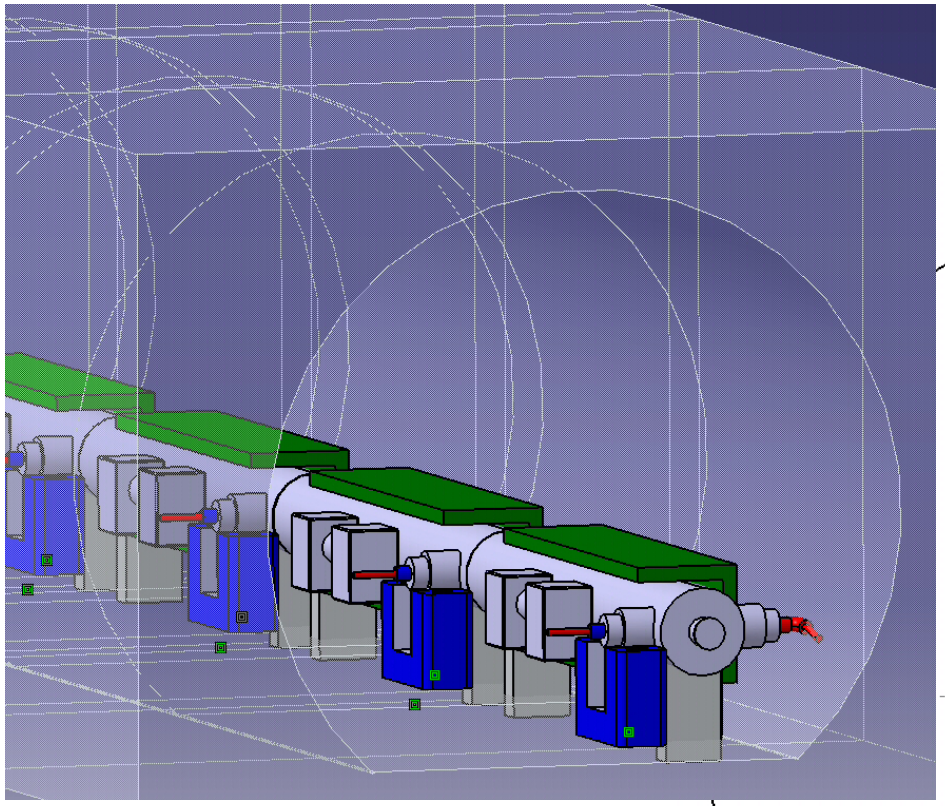
(1st separator electrode starts at 11.314 m from IP)



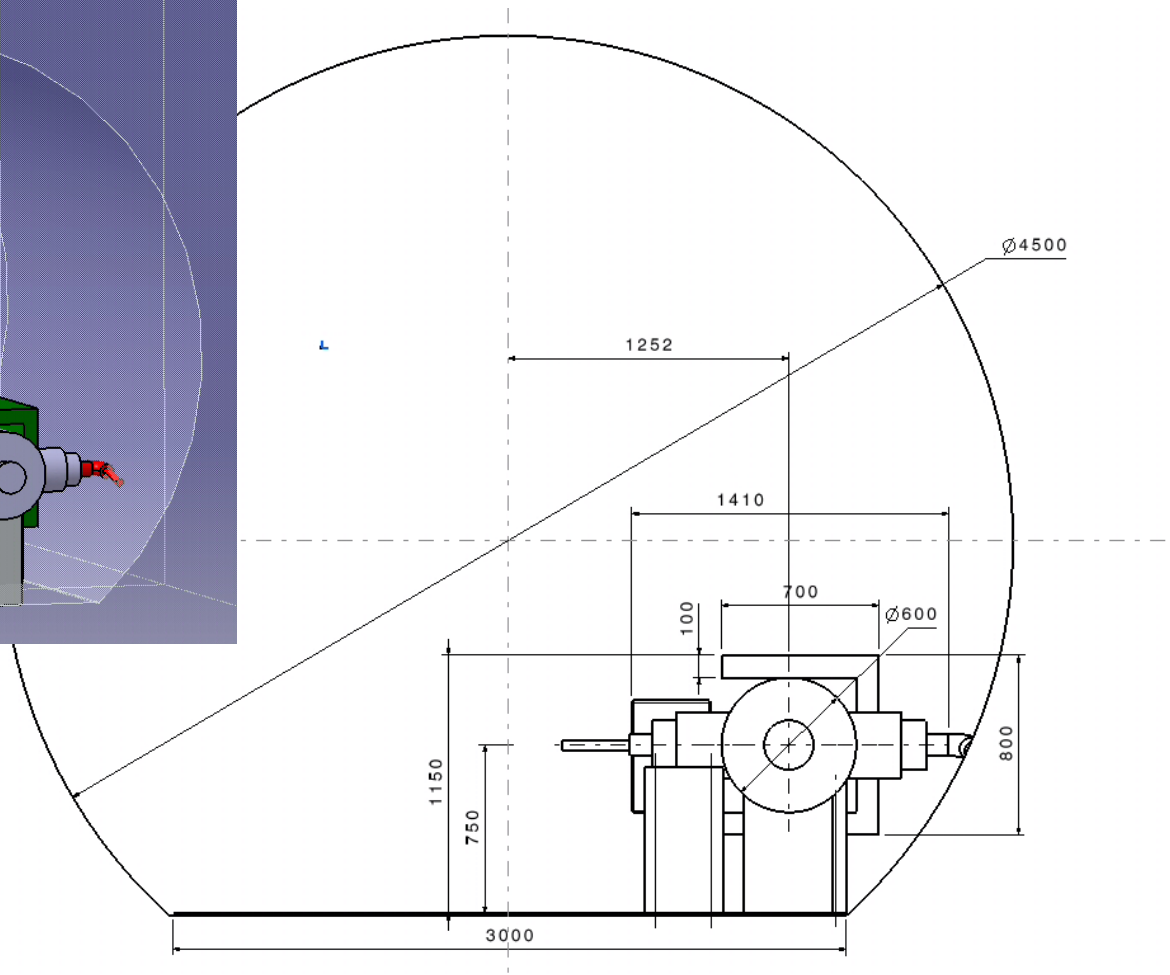


Separator parameters for	250 GeV	500 GeV	
Active length	28		m
Number of tanks	7		
Electrode length per tank	4		m
Electrode spacing	0.65		m
total installation length	32.55		m
Electrode material	titanium		
Total deflection required	252		μrad
E_0 (at separator center)	2.25	4.50	MV/m
Split size in electrodes	50	50	mm
Gap width	100 (70-140)		mm
Max. field between electrodes	2.62	5.23	MV/m
Applied Voltage	131	262	kV
Spark rate / tank	<0.04		#/hr
Field homogeneity	1.0E-02		
in area	22 x 12		mm
Quadrupole component	0.E+00		
Sextupole component	1.60E-03		
Octupole component	0.E+00		
Decapole component	1.14E-04		
Required HV generator	300		kV
	>3		mA
# of tanks per HV generator	2/2/2/1		
Decoupling resistors	*44 MΩ*	*1 W*	tbc

The separators in the tunnel



3D rendering of the separators in a standard tunnel cross section



Updated transverse dimensions and tunnel cross section

Required R & D

- **Performance under irradiation**
  - **Evaluation of radiation in existing set-ups**
  - **Expected dose rates and profile**
  - **Tests with beam**
- **Feedthrough & insulator support design to cope with harsh environment**
  - **(some work by CERN on insulator treatments available)**

- **System performance at 5.2 MV/m and beyond**

- **Optimal electrodes**
  - **Cross section profile**
  - **Manufacturing techniques in case of hollow Ti**
- **Coupling in the event of sparking**
  - **Geometry effects (coupling of field, coupling via the beam / photons etc.)**
  - **Circuit effects (partly dealt with by increasing the number of HV generators, partly to be dealt with by a carefull study of the value of the decoupling resistors)**
  - **Recovery**

- **Impedance presented to the beam:**
  - **Problem to the separator (Parasitic mode damping needed?)**