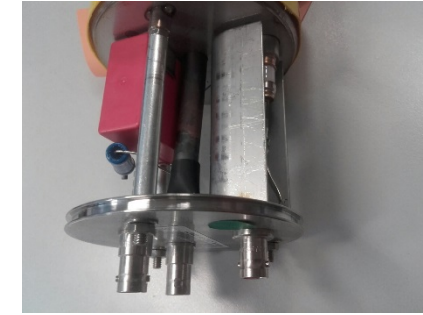
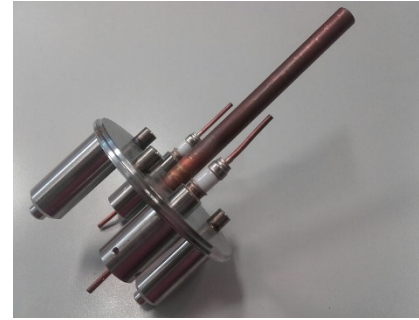


BLM Ionization Chambers - production status

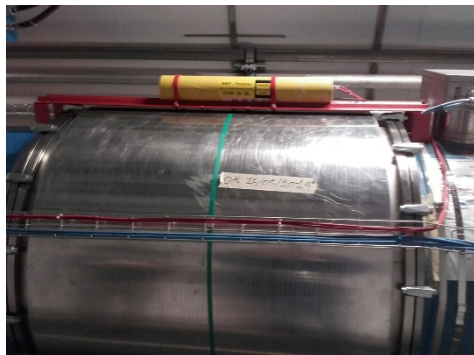
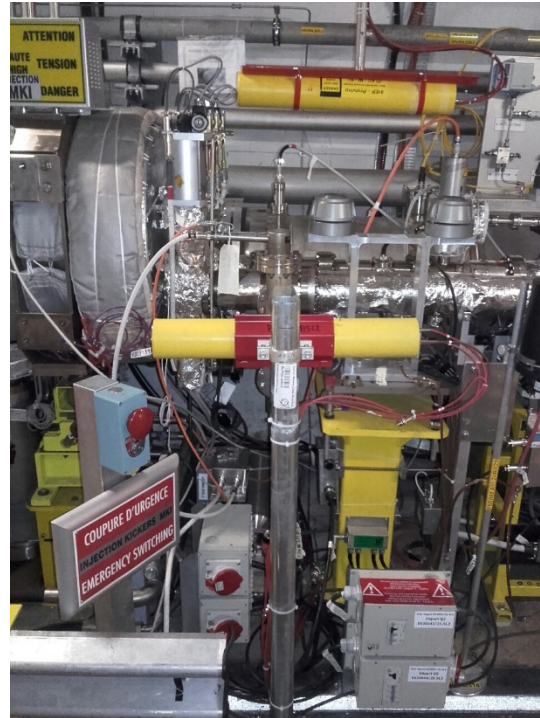
BLM Ionization Chambers



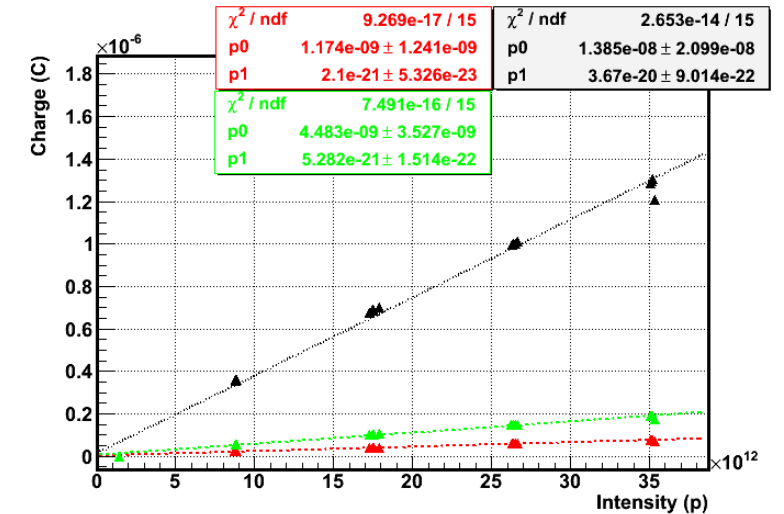
At the beginning of Run 2, BLM LHC system had 3929 monitors with 3518 Ionization Chambers (IC), 108 LIC and 191 SEM (and 1 FIC)

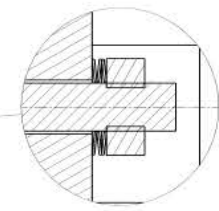
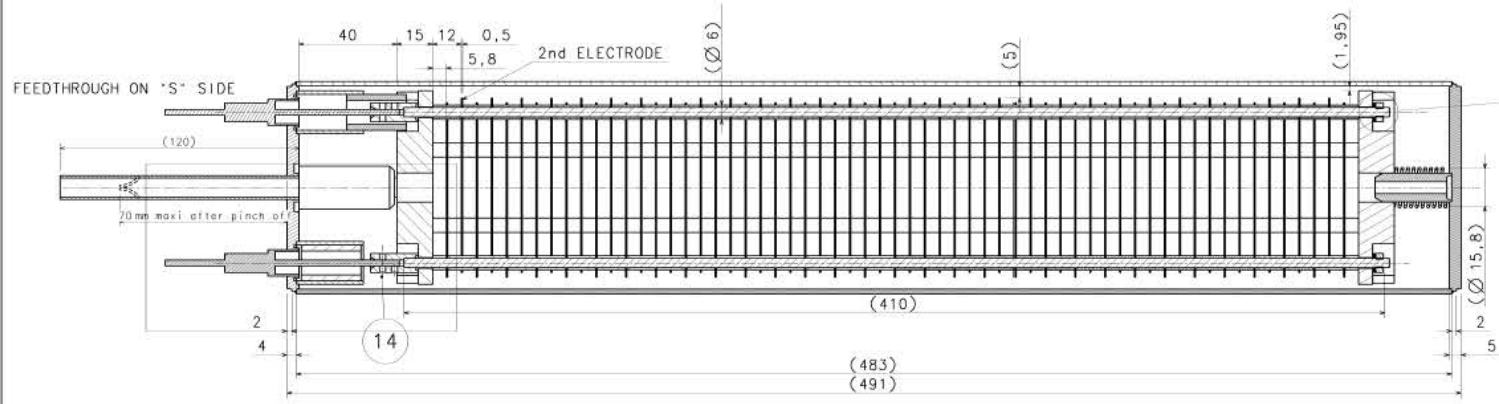
BLM PSB system had 32 installed IC.

LINAC 2 had 5 IC
LINAC 4 will install 24 IC
Some IC are in PS

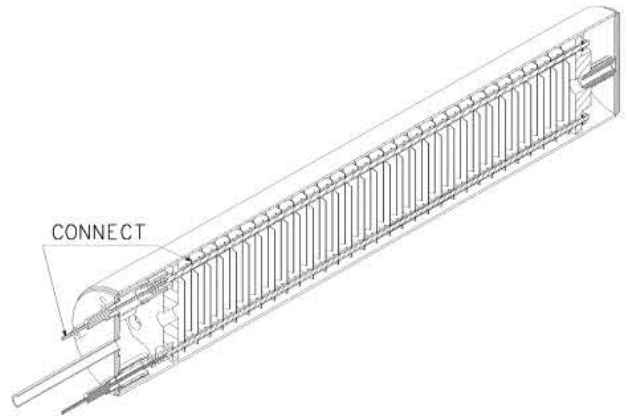
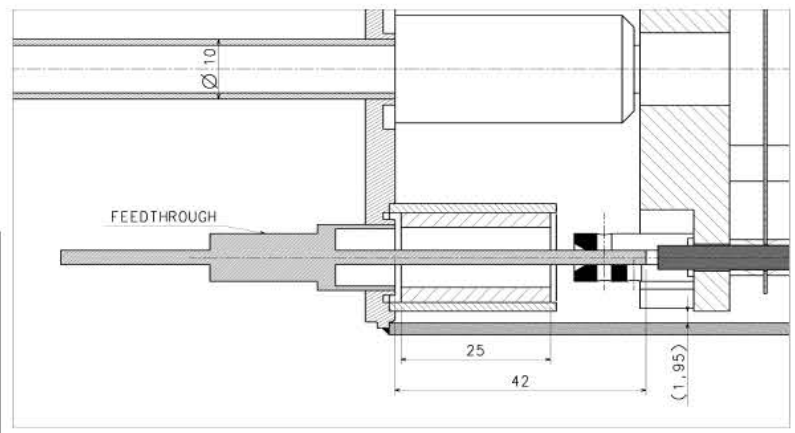


plot of the integrated charge (over 40 us), Sep 2015 at HRM
black = IC, green = FIC, red = LIC





MOUNTING SEQUENCE
Tighten nut M4 (Item 7) to completely compress washers, then unscrew 1/4 turn



!! WARNING !!
CONNECT THE FEEDTHROUGH ON THE 'S' SIDE WITH THE SECOND ELECTRODE

- WELDING SPECIFICATIONS**
- THE WELDS MUST BE EXECUTED BY TIG WELDING
 - WITHOUT FILLER METAL
 - UNDER ARGON GAS SHIELDING
 - WITH 100% PENETRATION
- LEAK TESTING REQUIREMENTS FOR ULTRA HIGH VACUUM COMPONENTS:
- CLEANING OF THE COMPONENTS BEFORE THE LEAK TEST:
- THE COMPONENT SHALL BE CLEANED IN ACCORDANCE WITH TECHNICAL NOTE 3035-PE-TF-03
- FOLLOWING PRESSURE TESTING AND FINAL CLEANING, THE COMPONENT SHALL BE LEAK TESTED BY ROOM TEMPERATURE WITH A SENSITIVITY $\leq 10^{-10}$ mbar·cm³/LEAK. A QUALIFIED LEAK DETECTOR THE LEAK DETECTOR SHALL NOT SHOW ANY DEVIATION WHEN THE COMPONENT IS ENCLOSED IN A HELIUM FILLED ENVELOPE

Mass = 3.8 kg

ITEM NO.	DESCRIPTION	POS.	MAT.	QTY.	REMARKS	REF. DIM.
1	MULTIPLE ELECTRODE BLM - EXTERNAL	15			LHEBLM...0040 TYPE A	
6	VIS S.T.G.P.C. BY POINT IN. 3X 3	14			Bossard BN610	
2	Slotted screw M3x4	13	A2-ISO1980		Bossard BN652	
2	ALUMINA TUBE \varnothing 15/10	12	Al2O3	L-25mm		19.63.30 128.9
1	COMPRESSION SPRING	11	1.4.310	Ferraflex VO-1804-N		
4	TIGHTENERS M4 -	10			LHEBLM...0016 TYPE A-VARIANTE 1	
2	TIGHTENERS M4 -	9			LHEBLM...0016 TYPE B-VARIANTE 1	
16	SPRING WASHER \varnothing 8/4.2-8.2	8	1.4.310		BOSSARD BN638	
6	LOCK NUT M4	7	A2		DN 980V-BOSSARD BN524.2	
1	BOTTOM COVER -	6			LHEBLM...0006-TYPE A	
6	ELECTRODE SPACERS -	5			LHEBLM...0007 TYPE C	
163	ELECTRODE SPACERS -	4			LHEBLM...0007-TYPE A	
61	ELECTRODE -	3			LHEBLM...0004 TYPE AI	
2	ALUMINE INSULATOR -	2			LHEBLM...0005	
1	COVER ASSEMBLY -	1			LHEBLM...0002-TYPE A	

DESIGN: INJECT TO BRANDES
 DRAWING: 3035-PE-TF-03
 PROJECT: ACCORDANCE TO ISO 15926

REV.	DESCRIPTION	DATE
B	NS-BA G. FÖFFAND updated	
A	NS-BA G. FÖFFAND updated length part 15i	

Beam Loss Monitor

MULTIPLE ELECTRODE BLM WELDED VERSION ASSEMBLY

SCALE: 1:1

DESIGNER: G. FÖFFAND 2004-09-08
 CHECKED: R. PERRET 2005-12-06
 RELEASED: E. HELD 2007-12-06

APPROVED: LHEBLM...0040 (000001) (0001) (0001)

REPLACES/REPLACED: LHEBLM...0001

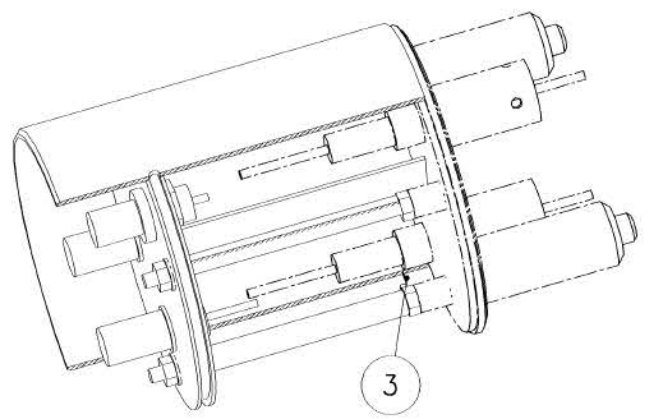
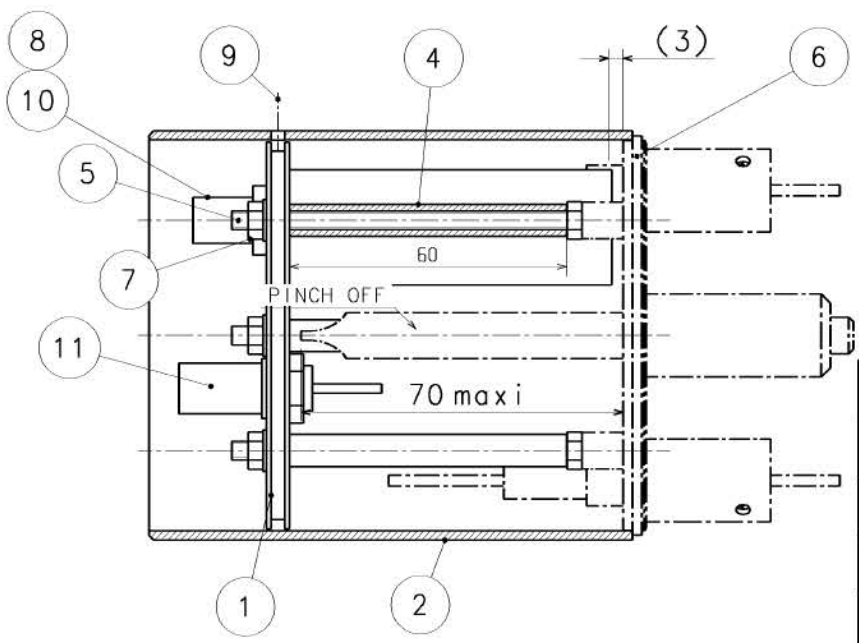
DESSIN, RUGOSITE, TOLERANCES
SECON NORME ISO
DRAWING, RUGOSITY, TOLERANCES
ACCORDING TO ISO STANDARD

PROJECTION

ORGANISATION EUROPEENNE POUR
LA RECHERCHE NUCLEAIRE
EUROPEAN ORGANIZATION FOR NUCLEAR
RESEARCH

dessin ne peut être utilisé à des fins commerciales sans autorisation écrite.
this drawing may not be used for commercial purposes without written authorisation.

B	2005-11-14	G. FOFFANO		updated
A	2004-09-27	G. FOFFANO		UPDATED
IND.	DATE	NOM/NAME	ZONE	MODIFICATION



2	H.V.CONNECTOR	11			
1	SIGNAL CONNECTOR	10			
1	INOX HEAD,HEX.POINT.SCR.M3x5 VIS S.TETE TR6P.AC45H P.M3x 5	9			47.62.96 101.1
3	RONDELLE CONTACT MOYENNE M 4	8			47.78.09 004.1
6	HEX.NUTS INOX A4 316 0,8D M4 ECROU 6P.INOX A4 316 0,8D M4	7			47.43.77 040.1
	MULTIPLE ELECTRODE BLM - COVER AS	6			LHCBLM_0002-For information only
3	IN.STEEL.THR.RODS A4 316 M 4 TIGE FILET.AC.INOX A4 316 M 4	5		L=85mm	47.38.77 040.8
3	ROUND TUBE _7/_4 TUBE ROND _7/_4	4	AW-6082	L=60mm	39.64.05 012.1
1	BRASS SOLDER,CAB.T. BNC 50 OHM COSSE A SOUDER AC. BNC 50 OHM	3			09.46.11 520.6
1	ELECTRICAL CONNECTION - EXTERNAL	2			LHCBLM_0038
1	ELECTRICAL CONNECTION - EXTERNAL	1			LHCBLM_0037
QUANT	DESCRIPTION	POS	MAT.	OBSERVATIONS	REF.CERN
	ENS./ASS.			S.ENS/S.ASS.	

Beam Loss Monitor

**ELECTRICAL CONNECTORS
ASSEMBLY**

ECHELLE SCALE 1:1

DES/DRA.	G. FOFFANO	2004-05-07
CONTROLLED	R PERRET	2005-12-06
RELEASED	E HOLZER	2005-12-06
APPROVED	-	-

LHCBLM_...BEAML0S000,B007,B0072129PL
REPLACE/REPLACES

List of materials

Sub system	Company (2015)	per chamber	Order				
LHCBLM_0001 and LHCBLM_0009				electrical connections LHCBLM_0036			
Material: tubes 1.4435 ss 88.9 x 2.0 x 6 mt	Nicormal(Germany)		89 pcs x 6 m	external plate LHCBLM_0037, manufacture	Morfi (Greece)	1	850
tube inox 316L 483x88.9x2.0 LHCBLM__0040, IC	Morfi (Greece)	1	850	st steel sheet LHCBLM_0037, manufacture	NCP (Portugal)	1	850
tube inox 316L 105x88.9x2 LHCBLM__0038	Morfi (Greece)	1	850	tube AlMgSi hard 4*7 L=60	Metallica (Swiss)	3	2615
Ceramics LHCBLM__0005 v.AC, IC	Friatec (Germany)	2	1740	in.steel.thr.rods A4 316 M4 L=85	Fournisseur EPI (France)	3	2615
Material AW6082	Metalvin (Spain)	6 km		BNC HT RRI Polystyrene SHV 5KV	Huber+Suhner (Swiss)	2	1743
Al electrodes production LHCBLM__0004 0.5X82, IC	ADM (France)	61	53200	BNC 50ohm, connecteur coaxial, femelle,RRI Polystyrene	Huber+Suhner (Swiss)	1	872
electrode spacer LHCBLM__0007 type A	Ruprec(Portugal)	183	160000	soldering lug, M4	CERN	1	872
electrode spacer LHCBLM__0007 type C	Ruprec(Portugal)	6	5300	soldering lug, BNC	CERN	1	872
bottom cover disk LHCBLM__0006	Morfi (Greece)	1	850	wires (L=100, 1.5mm2)	CERN	0.15	130
bottom cover spacer LHCBLM__0006	Morfi (Greece)	1	850	tinned copper wires, without insulation, D=0.91mm	CERN	0.1	10
tighteners M4 LHCBLM_0016				Resistor 10Mohm ,1W	Etronics AG (Swiss)	1	900
type A Var 1 (incl. welded washer)	Morfi (Greece)	4	3500	Capacitor (0.47uF, 2000V)	WIMA(Germany)	1	900
type B Var 1 (incl. LHCBLM__0013)	Morfi (Greece)	2	1800	shrinking tube	CERN	0.05	OK
small items				el+A35:D56 box assembly LHCBLM_0002			
compressing spring 1.4310 ferroflext	Ferroflext (France)	1	872	cover plate LHCBLM_0003, 316L	Morfi (Greece)	1	850
alumina tube D15/10, L=25mm	Ceratec (Netherlands)	2	1743	feed throughs	Ceramtec (USA)	2	1710
electrical connections LHCBLM_0036				copper tube 10 x 8, L=120mm	CERN	1	900
external plate LHCBLM__0037, manufacture	Morfi (Greece)	1	850	cover spacer LHCBLM_0008 type A, 316L, IC	Ruprec(Portugal)	2	1800
st steel sheet LHCBLM__0037, manufacture	NCP (Portugal)	1	850	protection tube LHCBLM_0010, 316L	Morfi (Greece)	2	850
tube AlMgSi hard 4*7 L=60	Metallica (Swiss)	3	2615	welded spacer LHCBLM_0035, 304L, IC	Ruprec(Portugal)	3	2700
in.steel.thr.rods A4 316 M4 L=85	Fournisseur EPI (France)	3	2615	Screen for cover LHCBLM_0056	NCP (Portugal)	1	850
BNC HT RRI Polystyrene SHV 5KV	Huber+Suhner (Swiss)	2	1743	Holder on cover LHCBLM_0085	NCP (Portugal)	1	850
BNC 50ohm, connecteur coaxial, femelle,RRI Polystyrene	Huber+Suhner (Swiss)	1	872	additional jobs (IC)			
soldering lug, M4	CERN	1	872	cleaning and heating of Cu	CERN		
soldering lug, BNC	CERN	1	872	additional materials for cleaning and vacuum stand (IC)			
wires (L=100, 1.5mm2)	CERN	0.15	130	NGL	Nyon(Swiss)	120 kg	120 kg
tinned copper wires, without insulation, D=0.91mm	CERN	0.1	10	TL7-Part#14210	OERLIKON leibold vacuum	1	1
Resistor 10Mohm ,1W	Etronics AG (Swiss)	1	900	TL7-Part#14023	OERLIKON leibold vacuum	1	1
Capacitor (0.47uF, 2000V)	WIMA(Germany)	1	900	insert Front olifes	CERN	1100	1100
shrinking tube	CERN	0.05		insert Front olifes	CERN	1100	1100
				Nuts for sagana	CERN	50	50
				Tungsten electrodes "TIG" welding	CERN	20	20
				Rub. Karton autocol	CERN	4	4
				Gant cuir souple/soudure	CERN	4	4
				CERN shipping permission	Tom Wegelius (CERN+Swiss)		In progress
				Protvino shipping permission	Expert - OK: new IHEP Director - change of doc		In progress
				Gaine thermo jaune s halogenne	Srati (France)		OK

Main items

- Ceramics
- Electrodes
- Connectors
- Metrology tests
- Electrical test of feedthrough, ceramics
- Custom and shipping: CERN(Swiss to Russia) and Russia(Protvino)

INVESTIGATION OF AGEING EFFECTS OF THE BLM VACUUM STAND , December 2015



- The all main data are according to the previous tests.

There are some remarks from December 2015 test:

- The ultimate total pressure after the ion pumping is higher than was in the last test because the room temperature is 24°C instead of 15°C.
- The pumping time after heating with ion pump was 19 hours instead of 15 hours.

The stand is ready to production of the monitors.

BLM production schedule (update 11.02.2016)

- 1. Order, receiving, tests of materials (CERN)**
December 2014 – February 2016
- 2. Receiving of custom permission (CERN and Protvino)**
February 2016
- 3. Shipping of materials from CERN to Protvino**
February and April 2016
- 4. IC Production (Protvino) – 6 – 8 months**
March 2016 – August 2016
- 5. Shipping of IC from Protvino to CERN**
September 2016
- 6. Reception test at GIF++ (CERN)**
October 2016
- 7. Shipping of IC from CERN to Lund**
November 2016

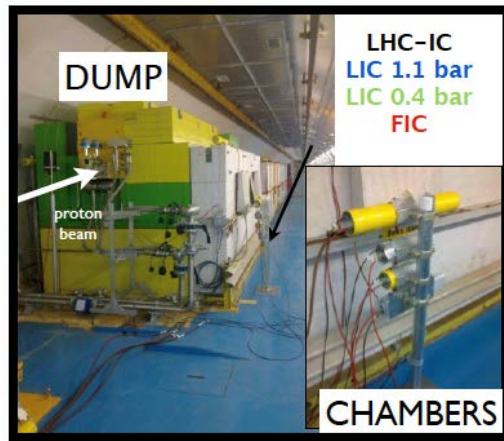
Some slides

Detector description

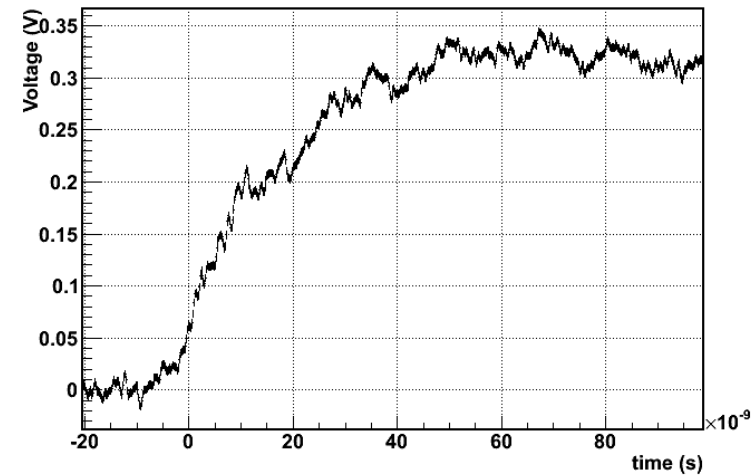
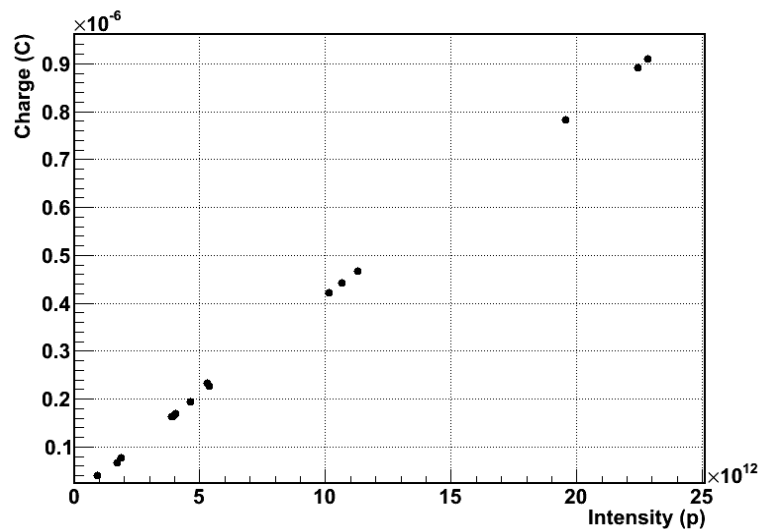
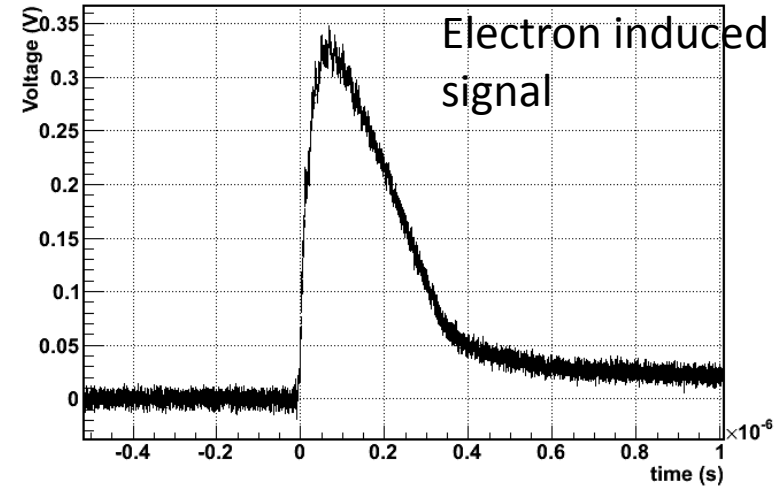
- 61 circular parallel plate Al electrodes
- HV = 1500V
- 1.5 l N₂ gas (1.1 bar pressure)
- Sensitivity: 5.26×10^{-5} C/Gy derived from
 - $\rho(\text{N}_2) = 1.2 \text{ kg/m}^3$
 - $W = 34.8 \text{ MeV}$ (avg energy for ionization)
- Dynamic range (10^{+7}) limited by:
 - Leakage current (1 pA)
 - Saturation effects (space charge)



Detector performance I

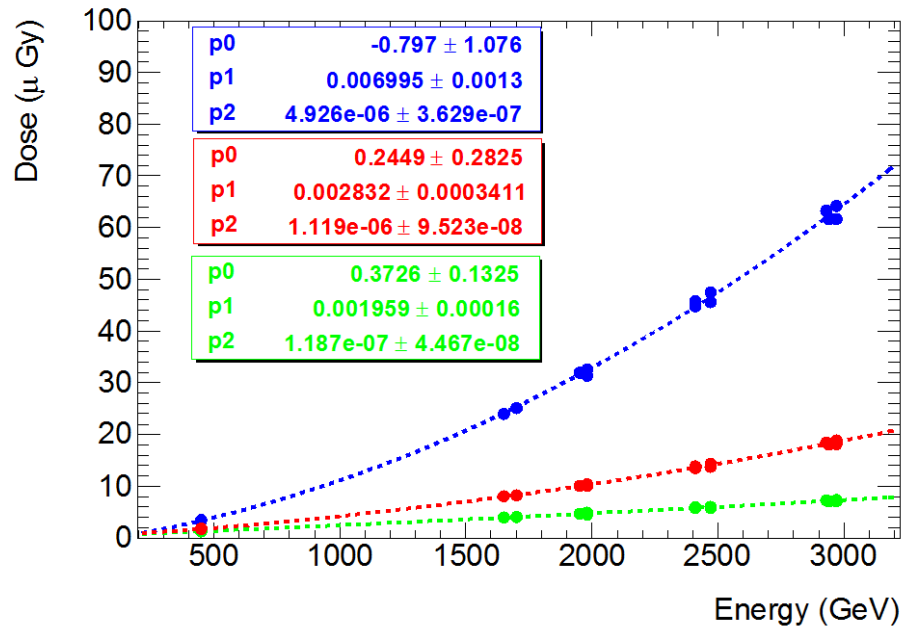


- Response to 1 ns pulsed (mixed radiation field. Protons onto dump)
- Raise time/FWHM $\sim 40/200$ ns
- Total (ion) charge collected in 300us
- Response linear with intensity



Detector performance II

- LHC losses



- UFO (unidentified Falling Objects):
Micron size dust falling into beam

- Losses observed during wire scans (3x IC downstream)

