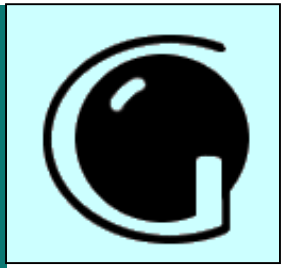
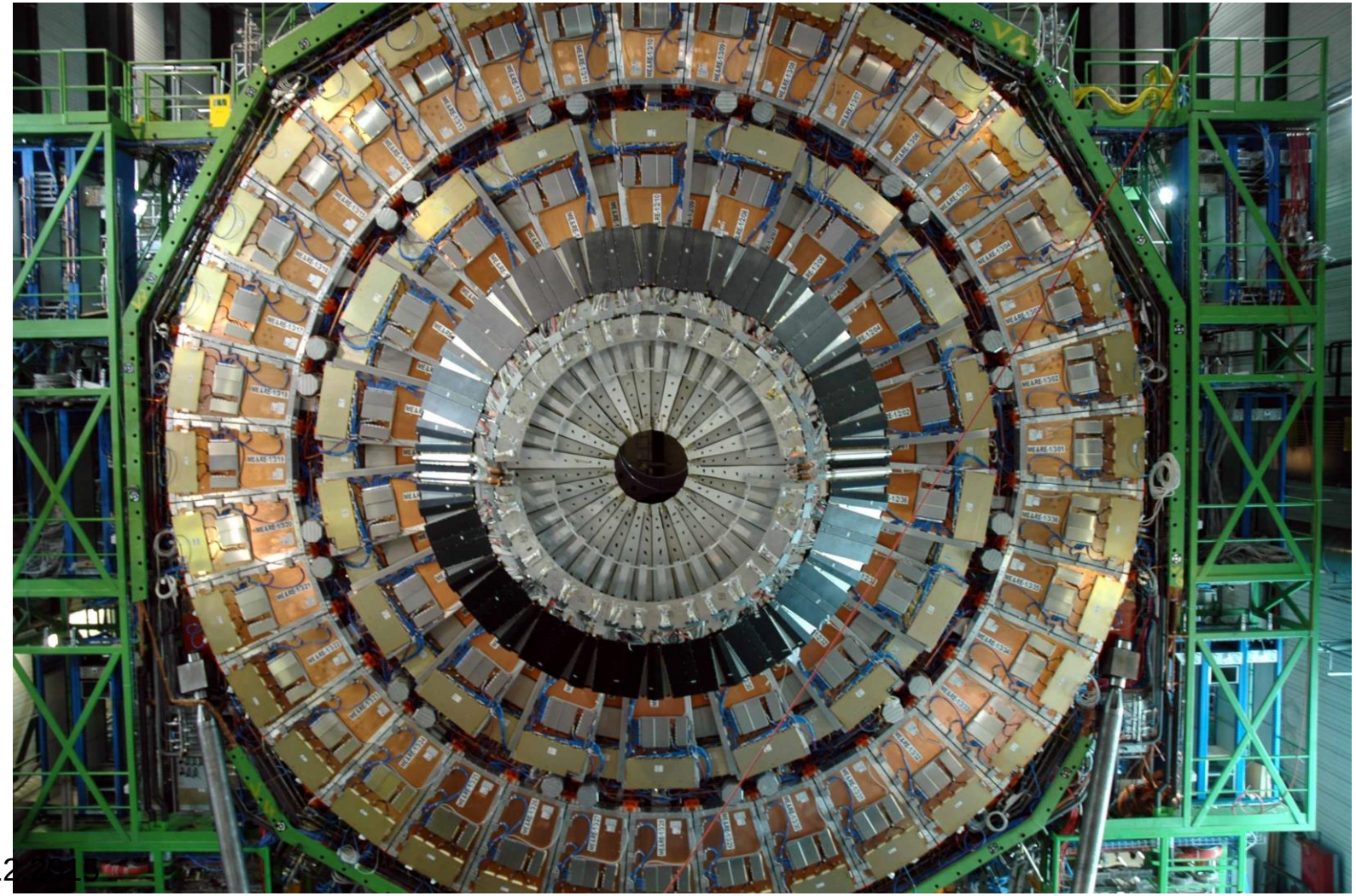
НАУЧНОЙ СЕССИИ ОФВЭ
22-25 декабря 2015



Upgrade EMU CMS

В. Сулимов

Muon Subsystem



CSC Upgrade LS1

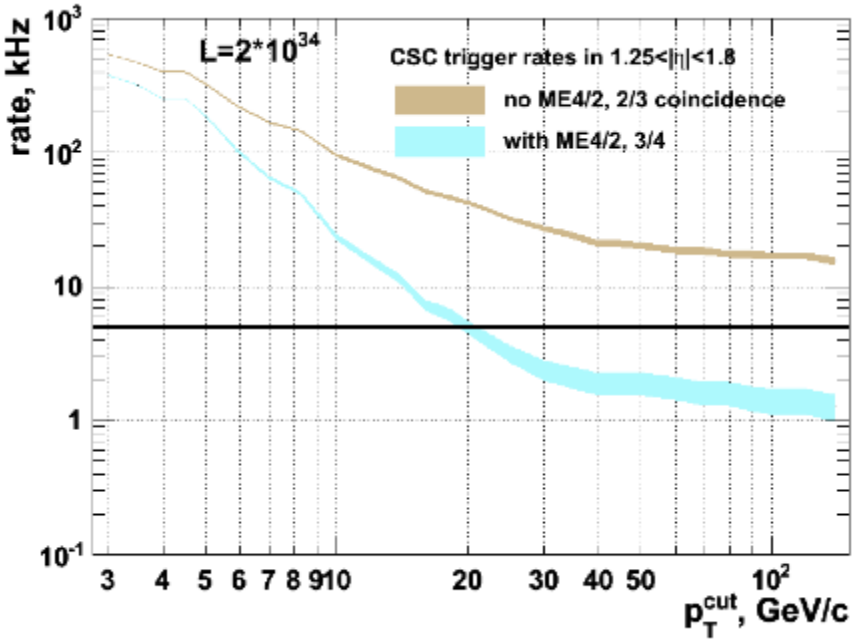
- Original design unfinished – ME4/2 not built, because of finance restrictions, it was decided to postpone the construction of the ME4/2 region (72 CSCs) until the first LHC shutdown
- 72 ME4/2 chambers to complete system
  - Identical to chambers already built and working well
  - Increase redundancy of system
  - Efficient triggering at high luminosities

Why ME4/2 upgrade?

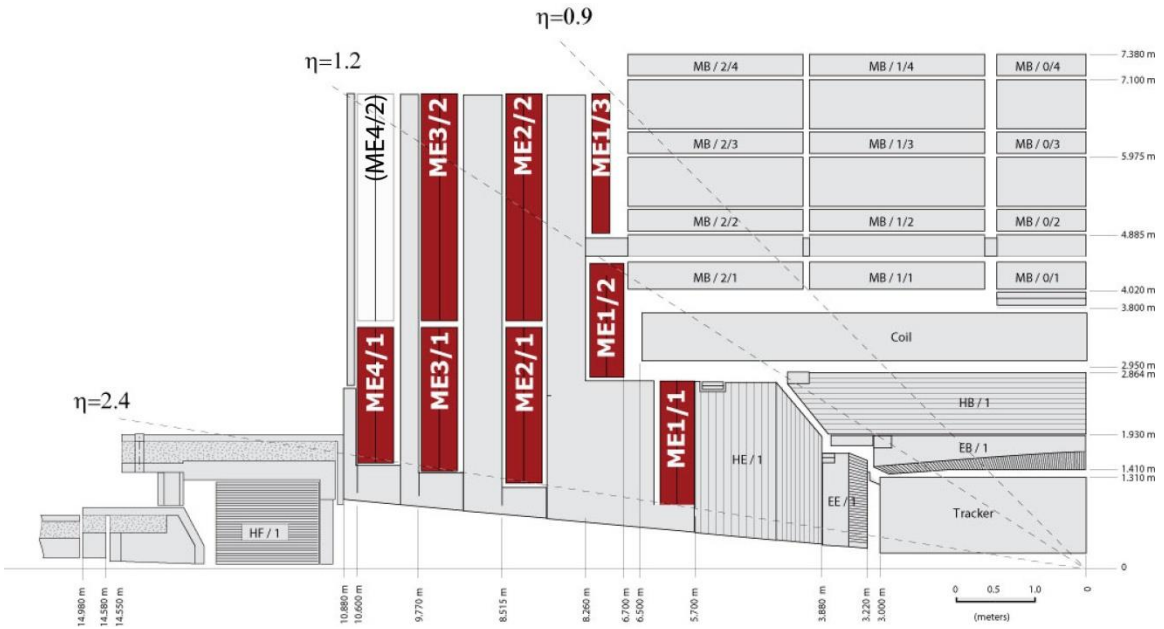
With ME4/2, we can change the trigger Condition to be 3/4 Coincidence instead of 2/3

- Decrease in fake rate (predicted)

Prediction of adding ME4/2 from simulation



Status Muon Subsystem



ME1/1 72 1.5×0.5 m²
ME1/2 72 1.6×0.8 m²
ME1/3 72 1.7×0.9m²
ME 2/1 36 1.9×1.25 m²
ME3/1 36 1.7×1.25 m²
ME4/1 36 1.5×1.25m²
ME2/2 72 3.2×1.3m²
ME3/2 72 3.2×1.3m²
ME4/2 72 3.2×1.3m²
540 CSCs (cover about 6000 m²)
2.5 10**6 anode wires
210816 anode readout channels
273024 cathode readout channels

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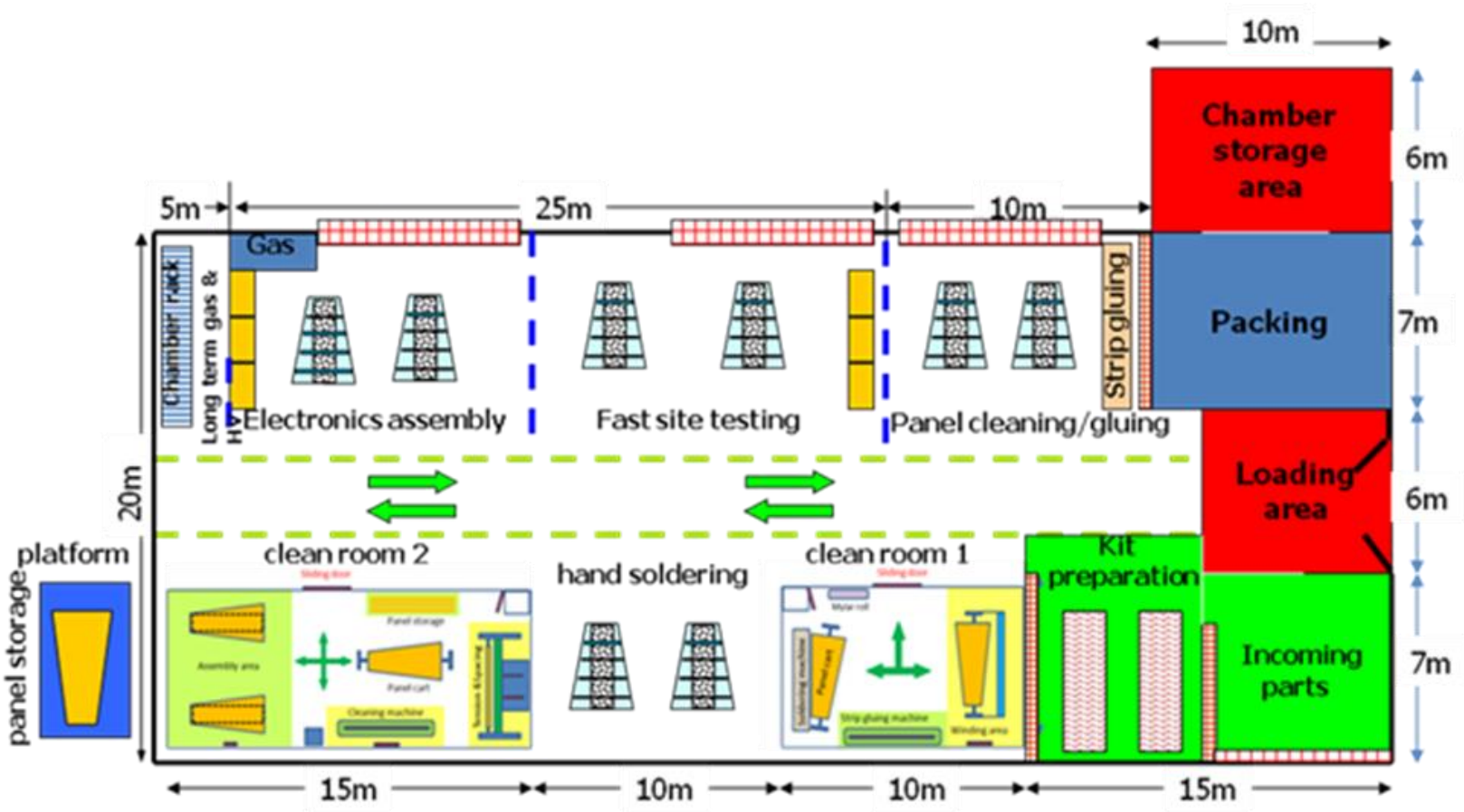
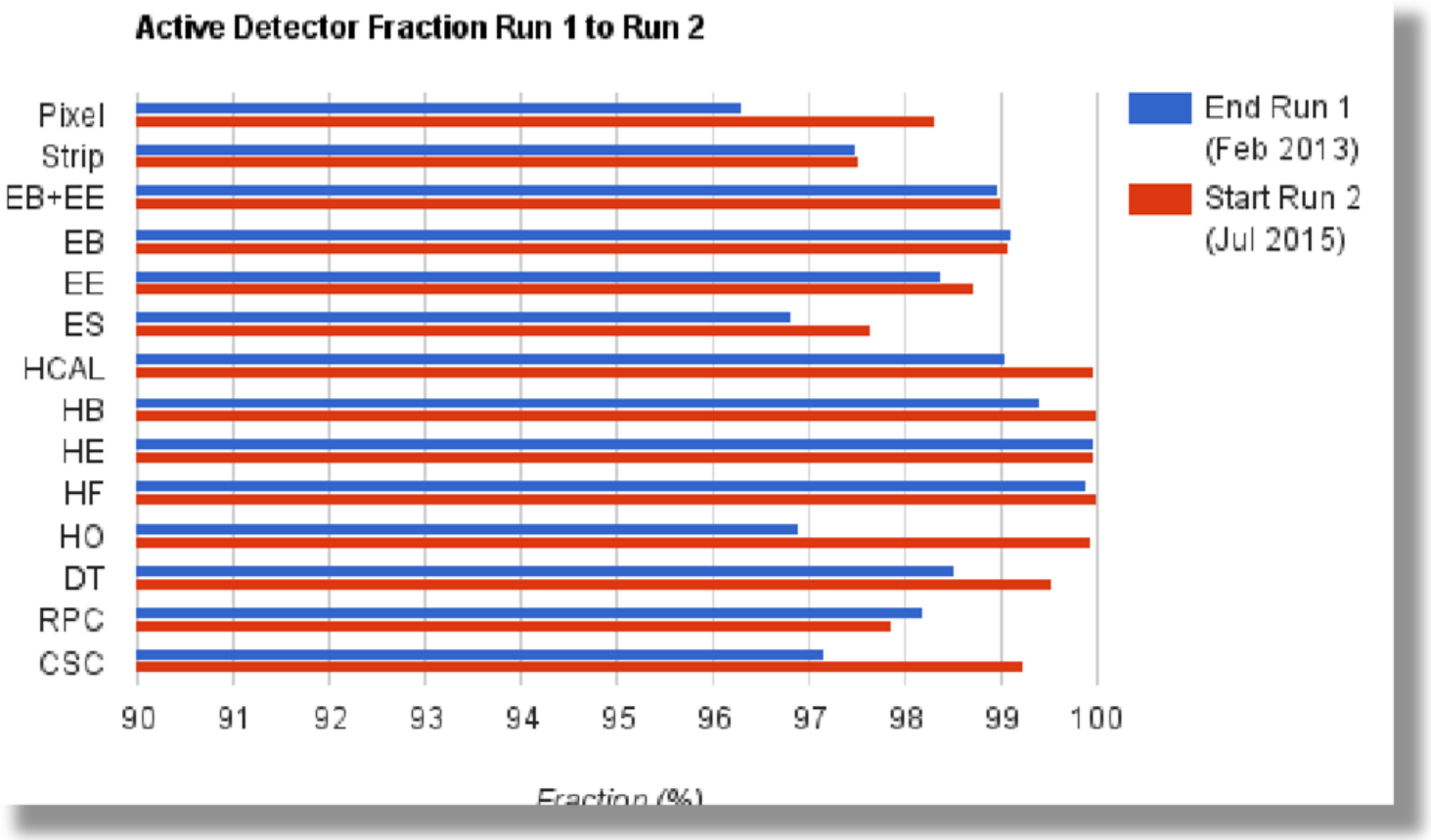
CSC Production



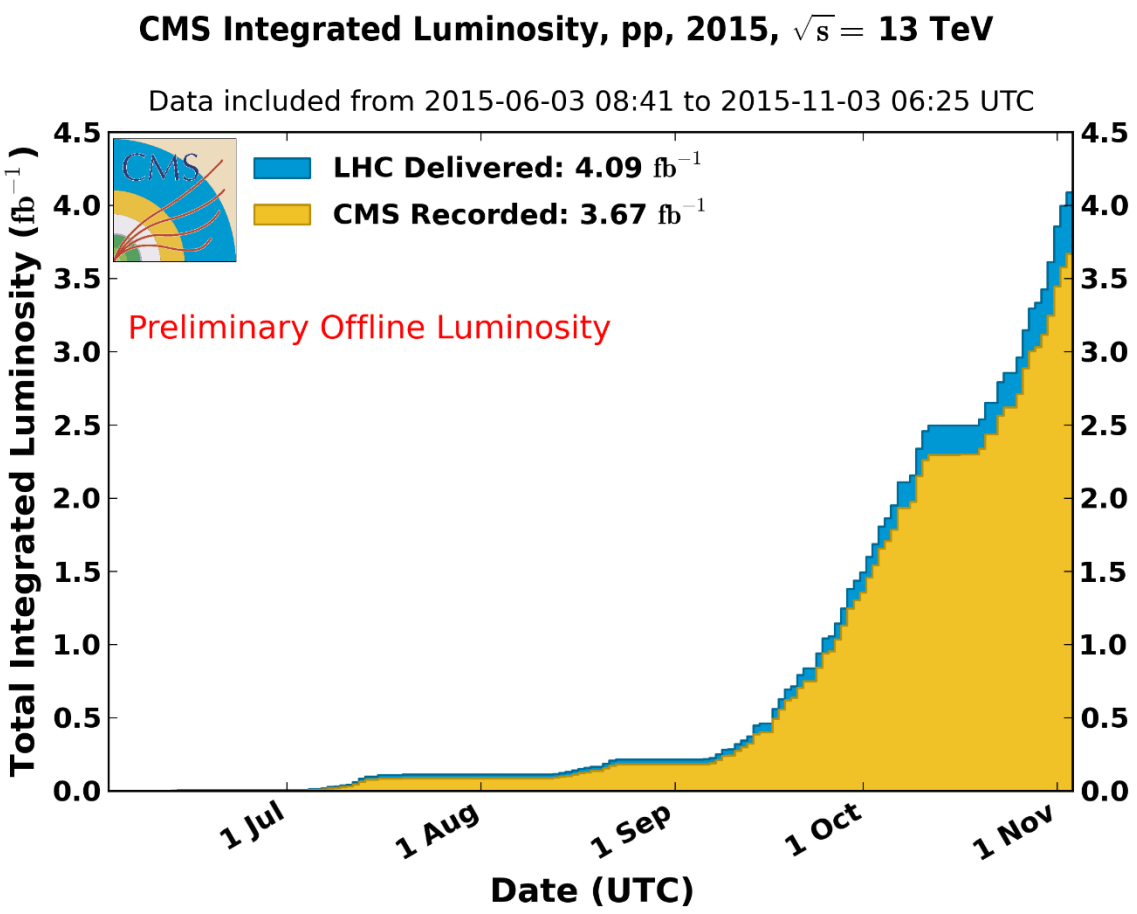
CSC Production

Width (top),	1530 mm
Width (bottom),	895 mm
Length, mm	3380 mm
Wire per plane	1028
Wire ch. per plane	64
Strip ch. per plane	80
HV segments per plane	5
Chamber weight, kg	276

Run1/2 CSC


Active Detector Fraction Run 1 to Run 2
Pixel
Strip
EB+EE
EB
EE
ES
HCAL
HB
HE
HF
HO
DT
RPC
CSC
90
91
92
93
94
95
96
97
98
99
100
End Run 1 (Feb 2013)
Start Run 2 (Jul 2015)
Fraction (%)

CMS Luminosity



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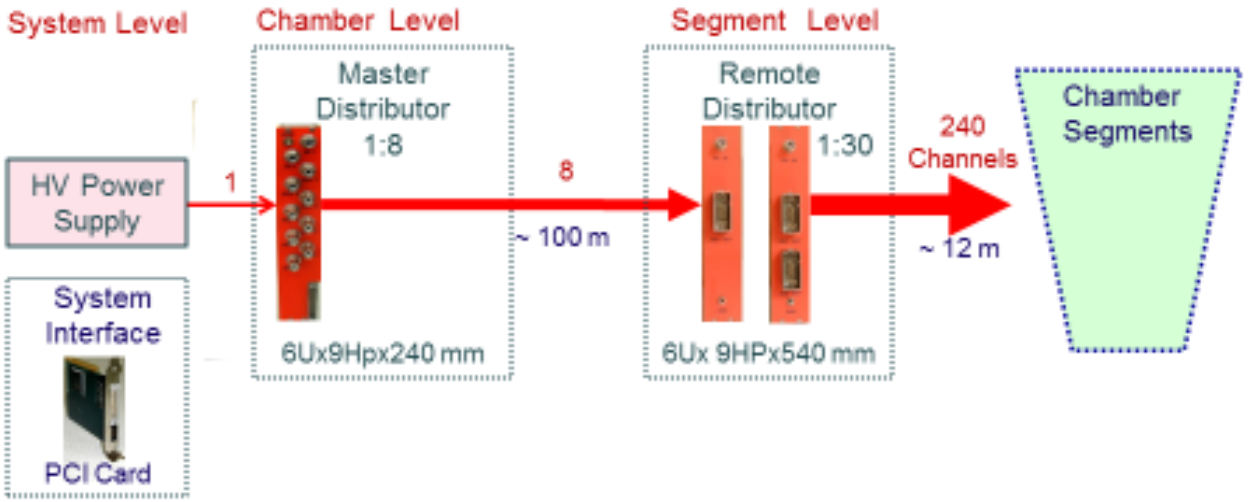
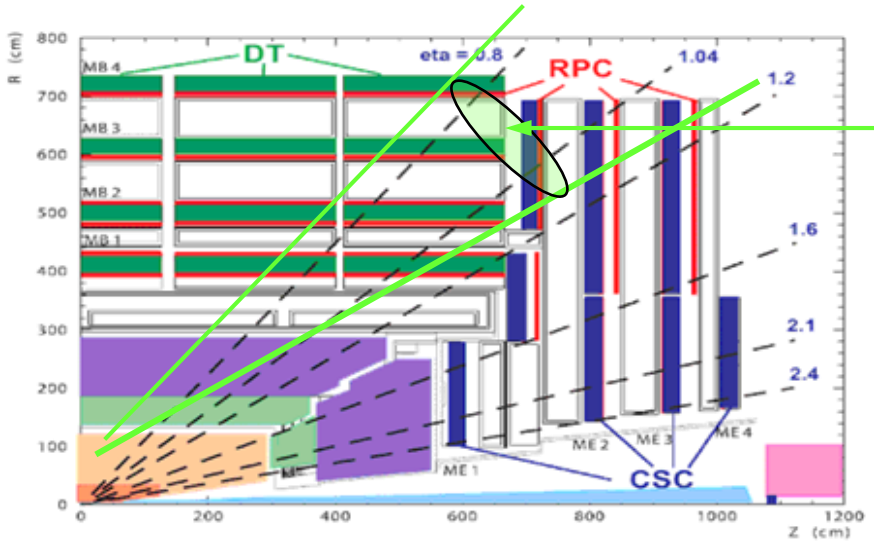
UF/ PNPI HV system



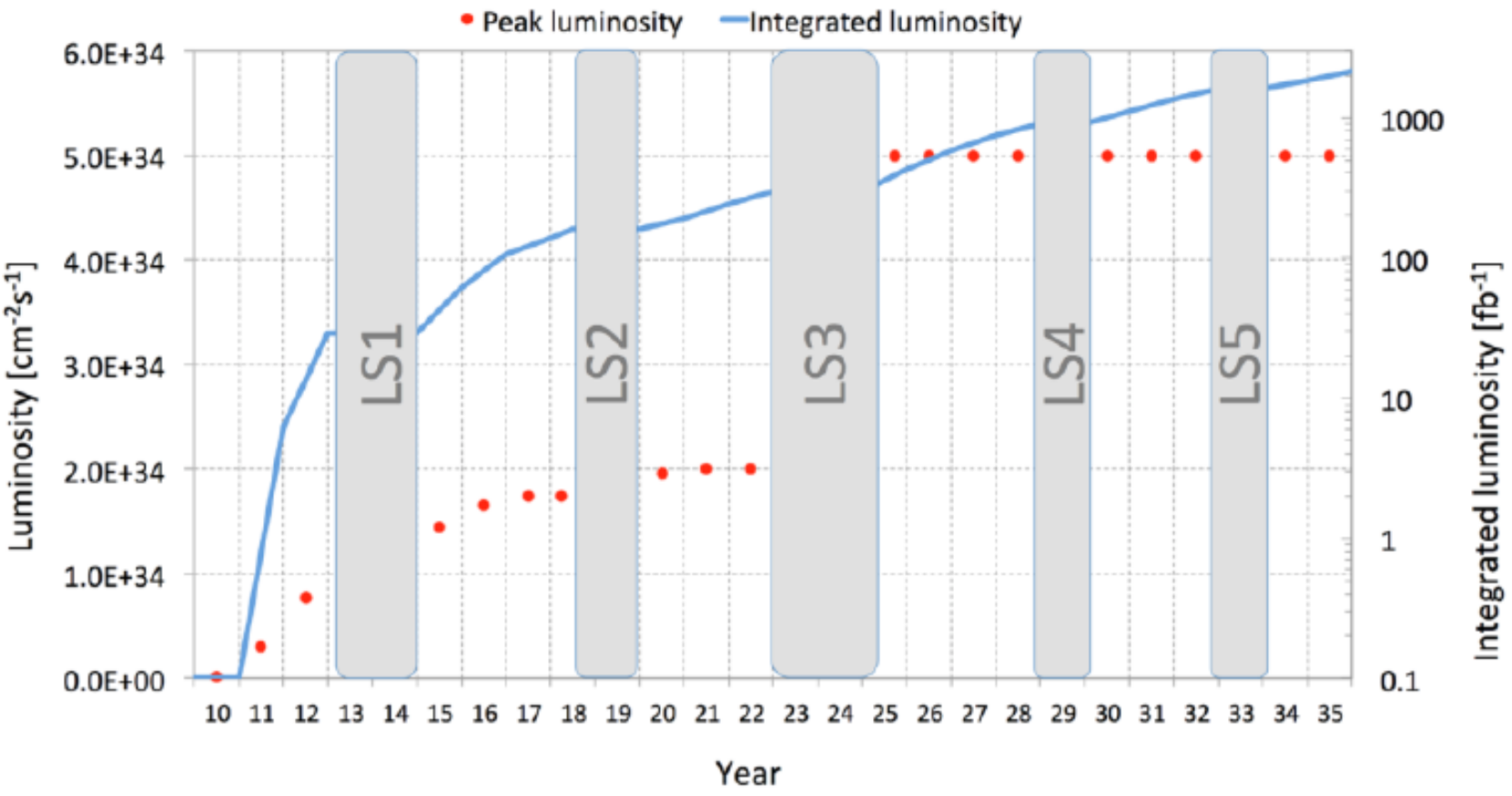
1	Voltage regulation	0 – V max = 4000 V
2	Voltage regulation step	20 V
3	Voltage measurement resolution	10 V
4	Max current per channel	100 mkA
5	Current measurement resolution	100 nA

Muon Overlap Track Finder



Overlap region: 0.8 < /η/ < 1.25
The data of the three systems are implemented for the trigger decision: CSC, DT, RPC.

LHC Luminosity



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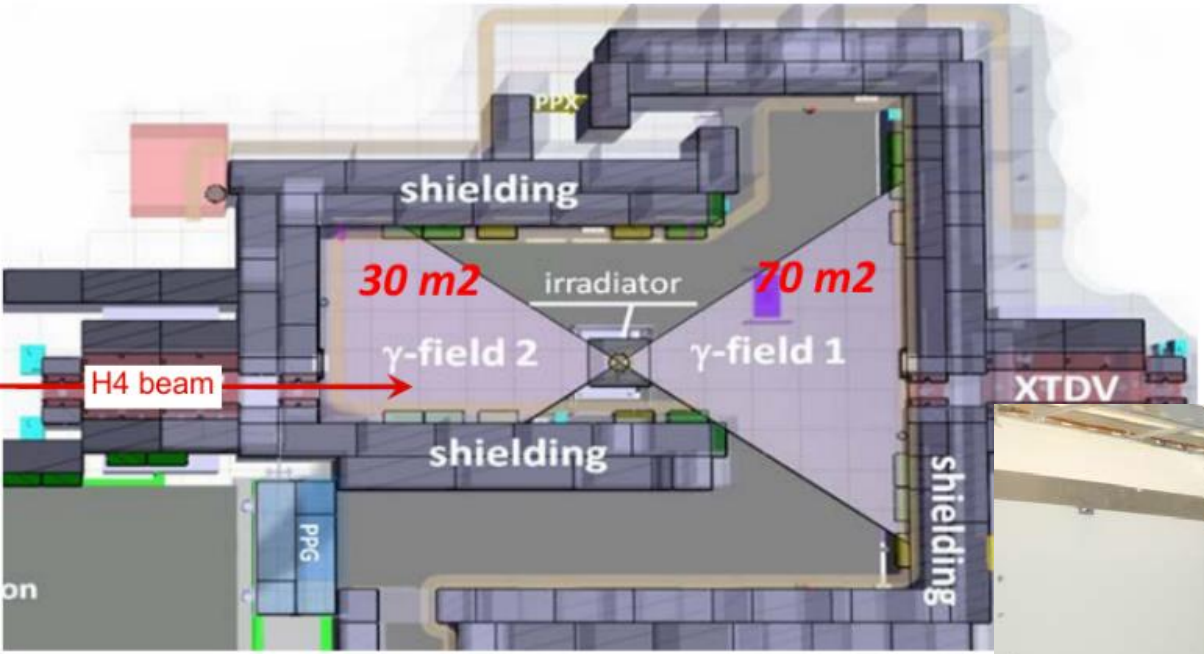
GIF++ Aging CSC



GIF++ operational since April. The 13.9 TBq137Cs source is ~19 times stronger than the old GIF one (0.76 TBq). Attenuation filters allow a wide variation of the γ-flux. A muon beam is available.H4.

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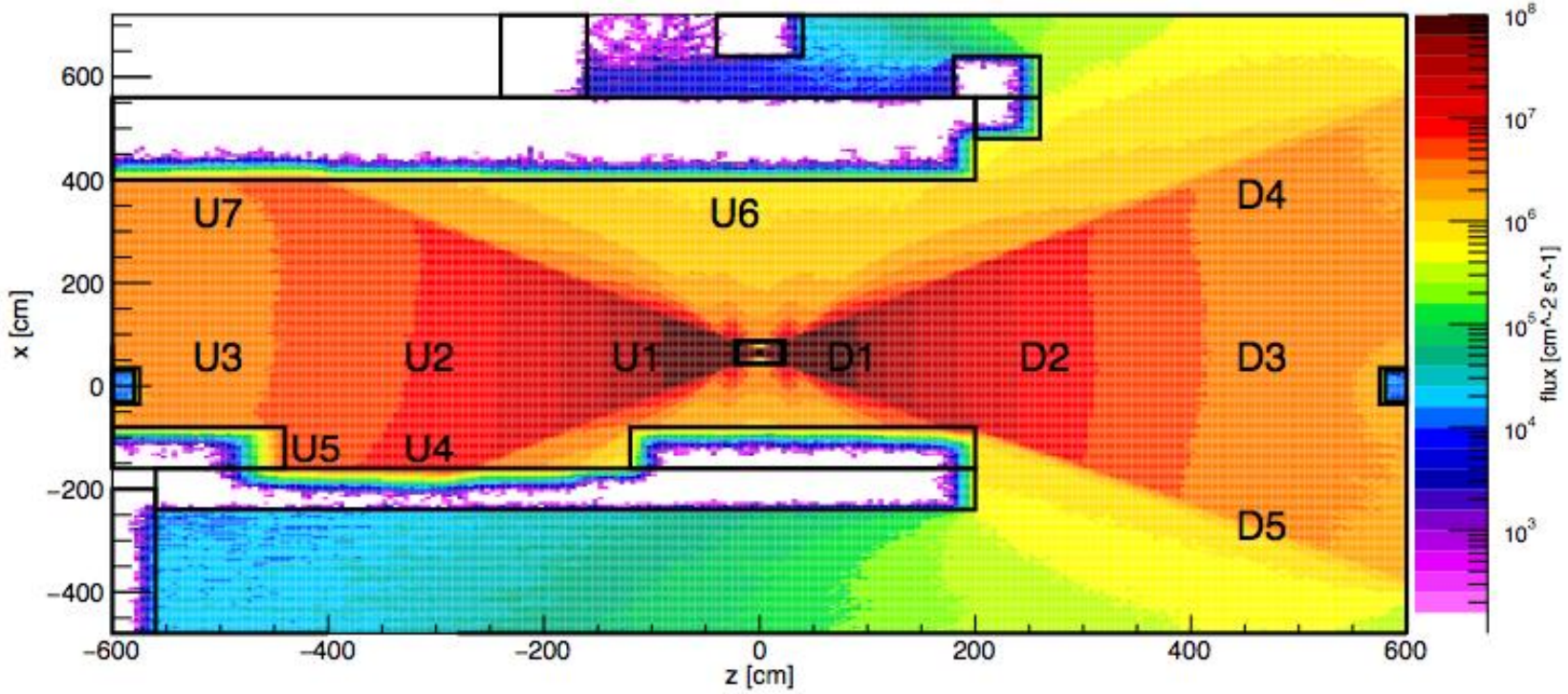
GIF++



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GIF++

Gas studies

New regulations on greenhouse gas emission could hit us as soon as 2025 (40% reduction) and 2050 (100%).

A number of possible candidates for replacing CF_4 were proposed

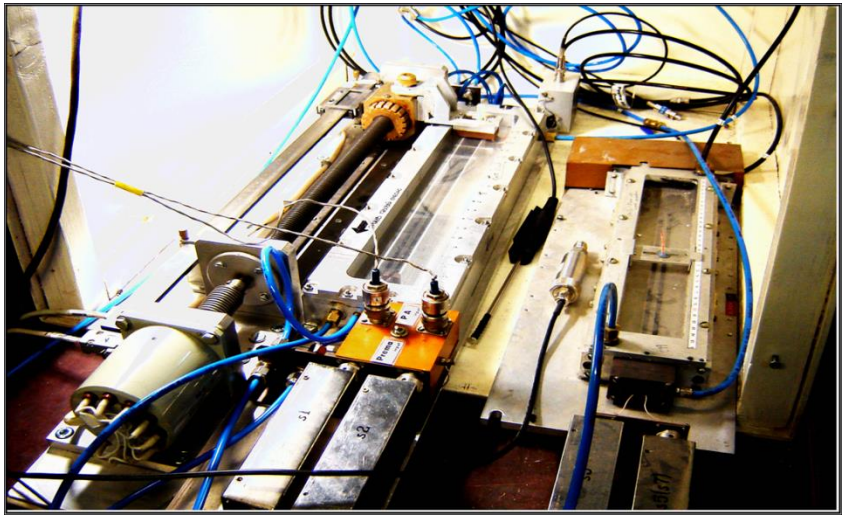
Collaborators at PNPI have began investigating properties of such gases when used in Ar+CO_2 based gas mixtures

Molecular name	Chemical formula	CAS	Refrigerant identifier	GWP	Life time in athmosphere, years
Carbon Dioxide	CO_2	124-38-9	R744	1	50-200
Tetrafluoromethane	CF_4	75-73-0	R14	7390	50000
Trifluoroiodomethane	CF_3I	2314-97-8	R13I	0	<1
Hexafluoroethane	C_2F_6	76-16-4	R116	12200	10000
Octafluoropropane	C_3F_8	76-19-7	R218	8830	7000
Octafluorocyclobutane	c-C_4F_8	115-25-3	RC318	10300	3000

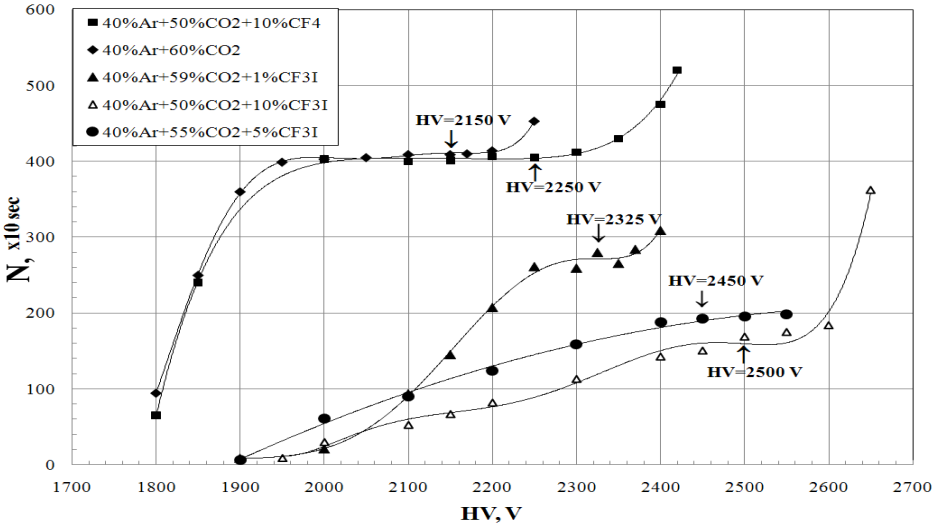
All these gases are used for dry plasma etching primarily related to silicon technology in microelectronics .•

CF3I has comparable Si-etching properties as CF4. So it is a good candidate

Straw aging test set up



Attachment for electrons E ~ 0.01–0.5 eV in CF3I is 200 high in compare with CF4



Both aging tests and gas mixtures study are available

G.Gavrilov, PNPI

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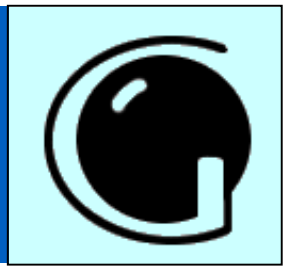
ME4/2 Upgrade



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