

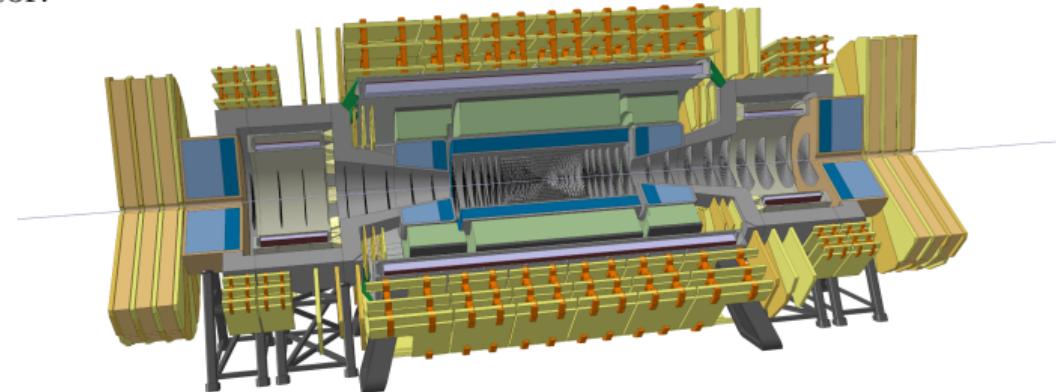
FCC-HH AND HE-LHC EXPERIMENTS & DETECTORS OVERVIEW

Anna Zaborowska
on behalf of the FCC-hh detector group



FCC Week Amsterdam
April 9, 2018

- Towards the Conceptual Design Report:
- Final results for FCC-hh summary volume are presented during this FCC Week.
- Comprehensive report on the FCC-hh experiments and detectors will be ready for September 2018.
- Study of one reference detector.



HE-LHC and FCC-pp colliders

Parameter	unit	LHC	HL-LHC	HE-LHC	FCC-hh
E_{cm}	TeV		14	27	100
Peak luminosity $\times 10^{34}$	$\text{cm}^{-2}\text{s}^{-1}$	1	5	25	30
bunch spacing	ns			25	
σ_{inel}	mbarn		85	91	108
σ_{tot}	mbarn		111	126	153
$\langle p_T \rangle$	GeV/c		0.6	0.7	0.76
$dN_{ch}/d\eta _{\eta=0}$			7	8	9.6
Number of bunches			2808		10600
BC rate	MHz		31.6		32.5
Peak pp collision rate	GHz	0.85	4.25	27.3	32.4
Peak avg PU events/BC		27	135	864	997
Goal integrated luminosity	ab^{-1}	0.3	3	10	20

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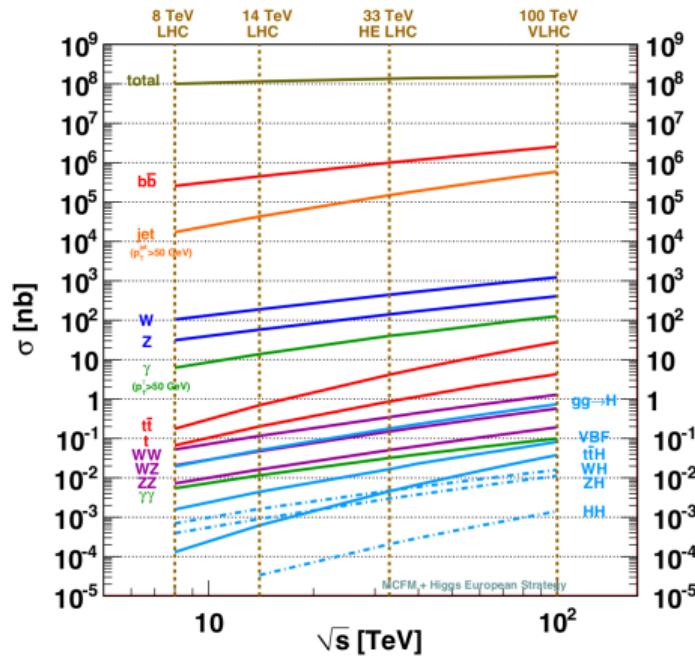
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FCC-hh an extremely high luminosity machine.

- huge particle/data rates
- significantly higher radiation level (especially in inner/forward detector)

HE-LHC similar in terms of pile-up and radiation load.

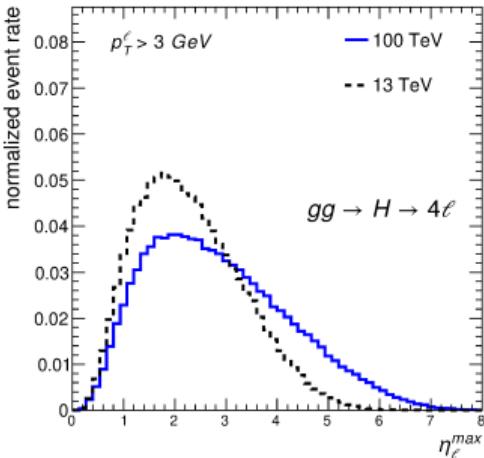
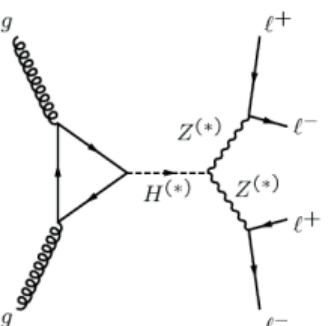
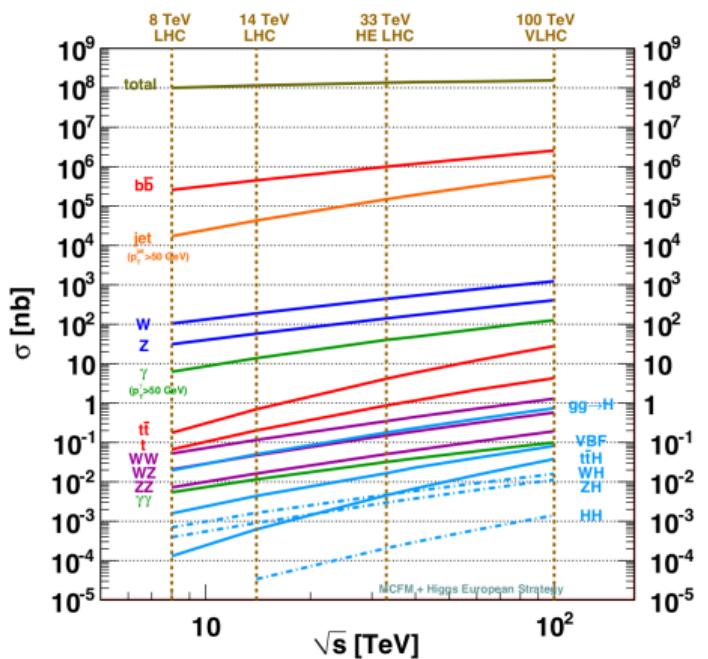
Physics requirements



Physics requirements

More forward physics → large acceptance

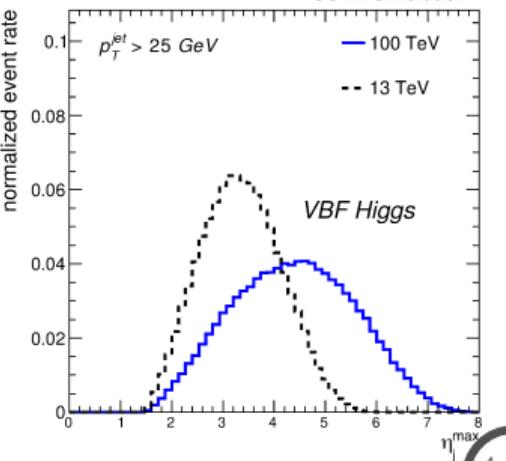
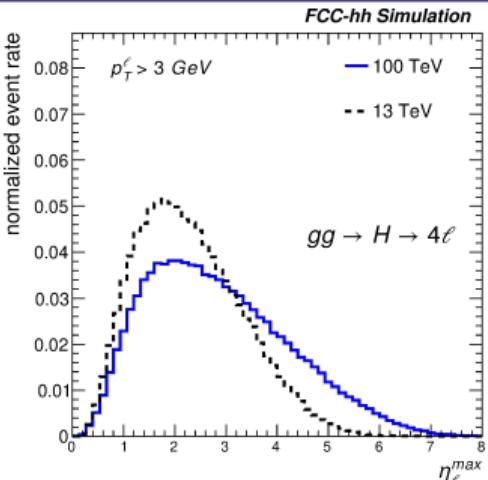
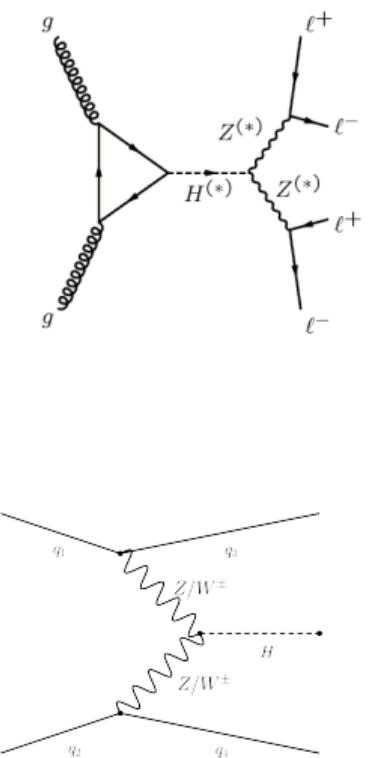
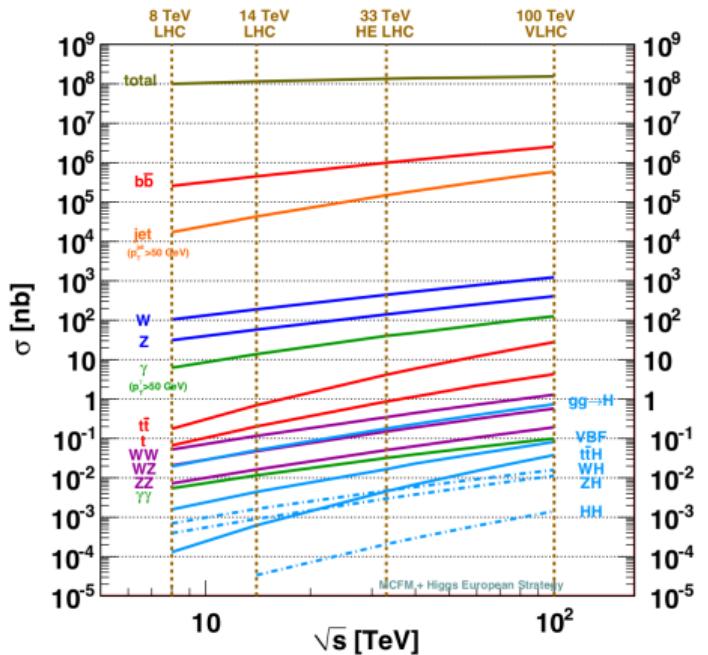
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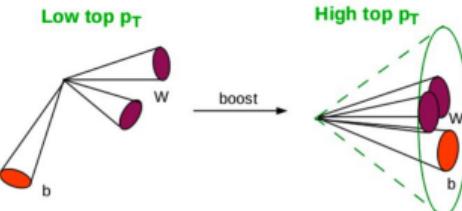
- precision momentum spectroscopy and energy measurements up to $|\eta| < 4$
- tracking and calorimetry up to $|\eta| < 6$



Physics requirements

Physics objects will be more boosted

Requirement of high granularity (both in tracker and calorimeters)



e.g.: $W(p_T=10 \text{ TeV})$ will have decay products separated by $\Delta R = 0.01$.

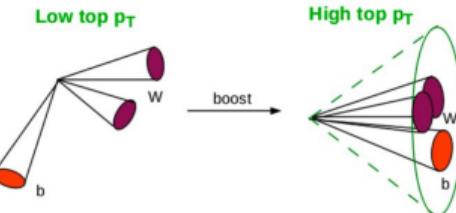
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- granularity defined by
 - occupancy
 - double track separation
 - pattern recognition
 - vertex/momentun resolution
- target $\sigma_{p_T}/p_T = (10 - 20)\%$ @ 10 TeV (10% @ 1 TeV at LHC)
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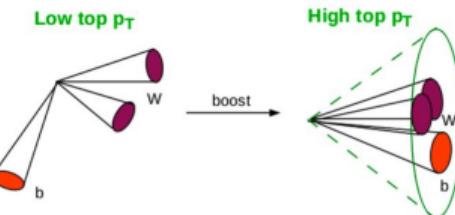
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Long-lived particles live longer:

- 5 TeV tau lepton can travel 10 cm before decaying
- 5 TeV b-hadron can travel 50 cm before decaying

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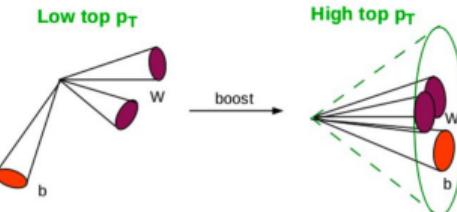
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Muons target: $\sigma_p/p = 5\% @ 10 \text{ TeV}$ ($\eta \sim 0$)



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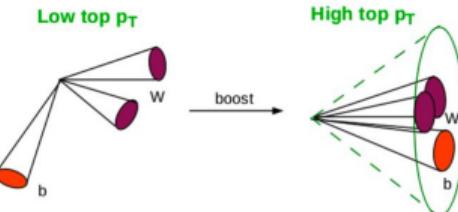
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Muons target: $\sigma_p/p = 5\% @ 10 \text{ TeV}$ ($\eta \sim 0$)

Calorimeter:

- keep constant term as small as possible
- target $\sigma_E/E = 10\%/\sqrt{E} \oplus 1\%$ for electrons/photons
- target $\sigma_E/E = (50 - 60)\%/\sqrt{E} \oplus 3\%$ for jets
- transverse granularity x4 better than ATLAS or CMS

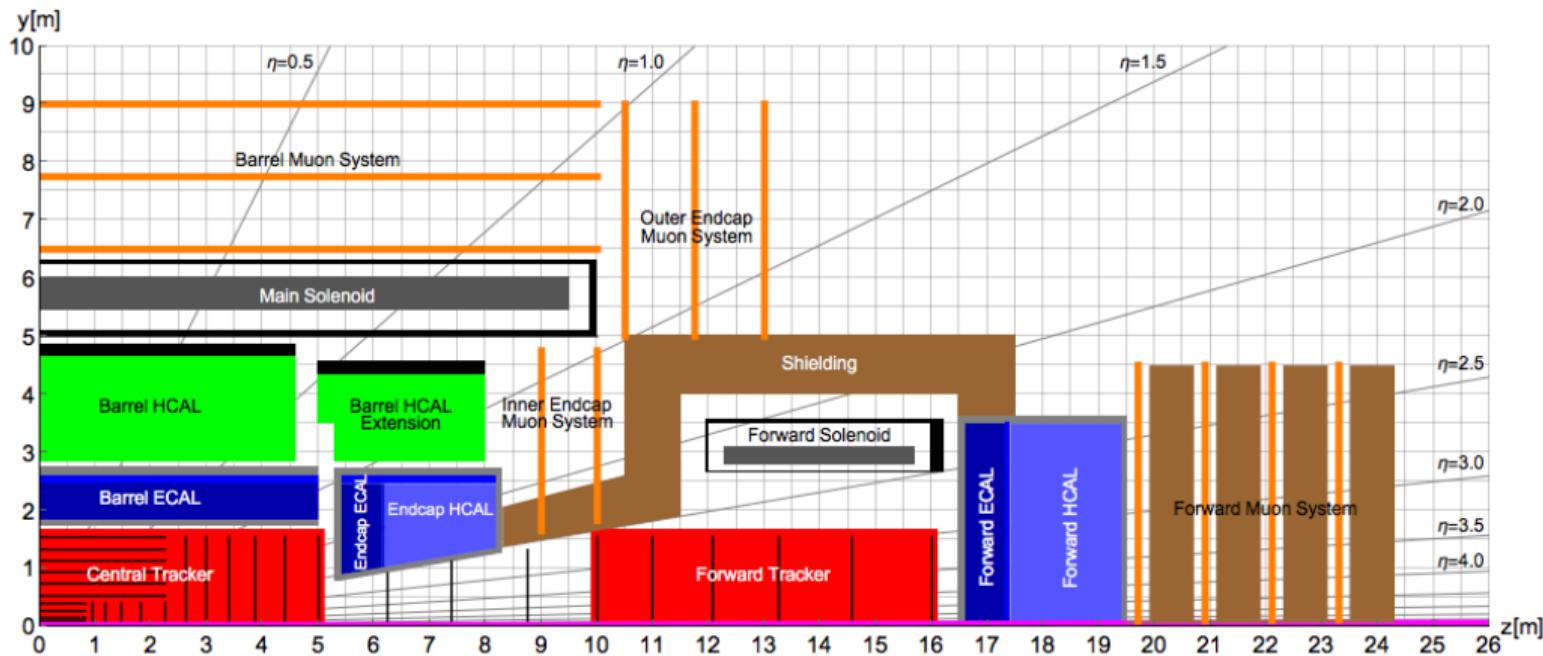


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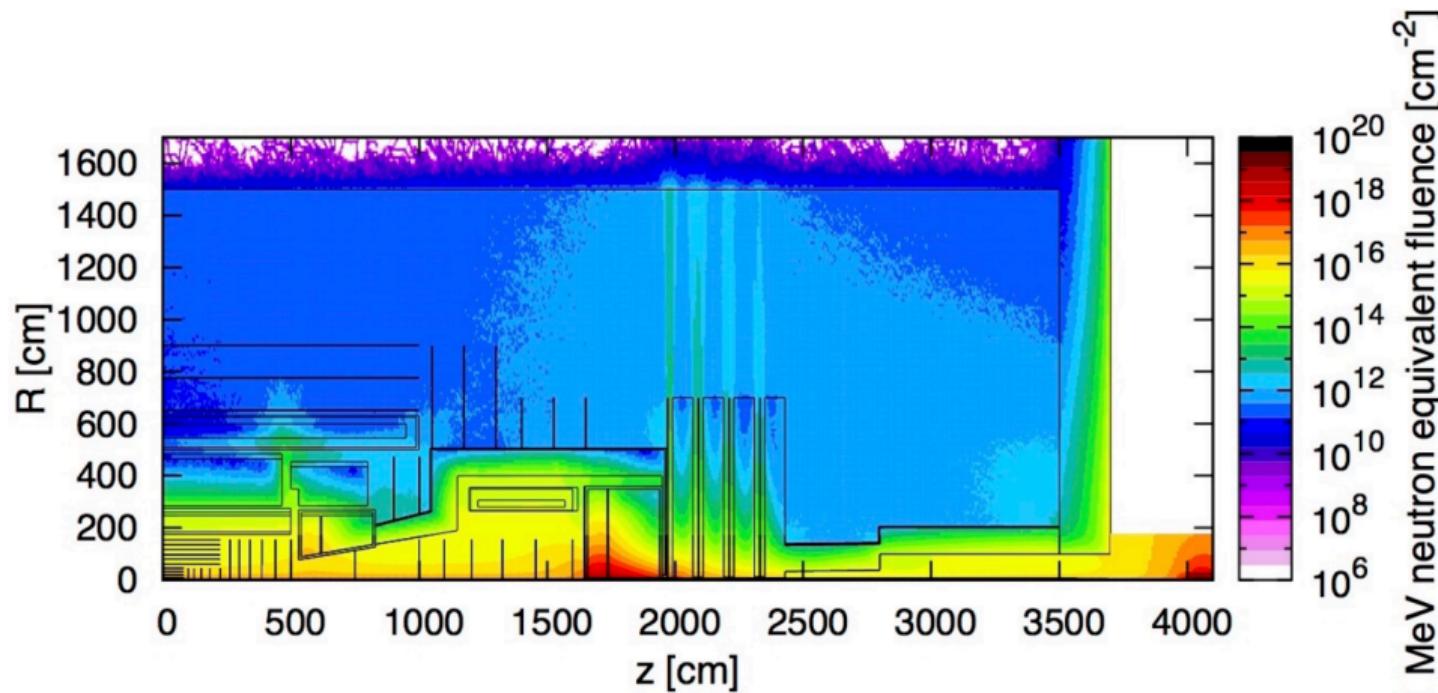
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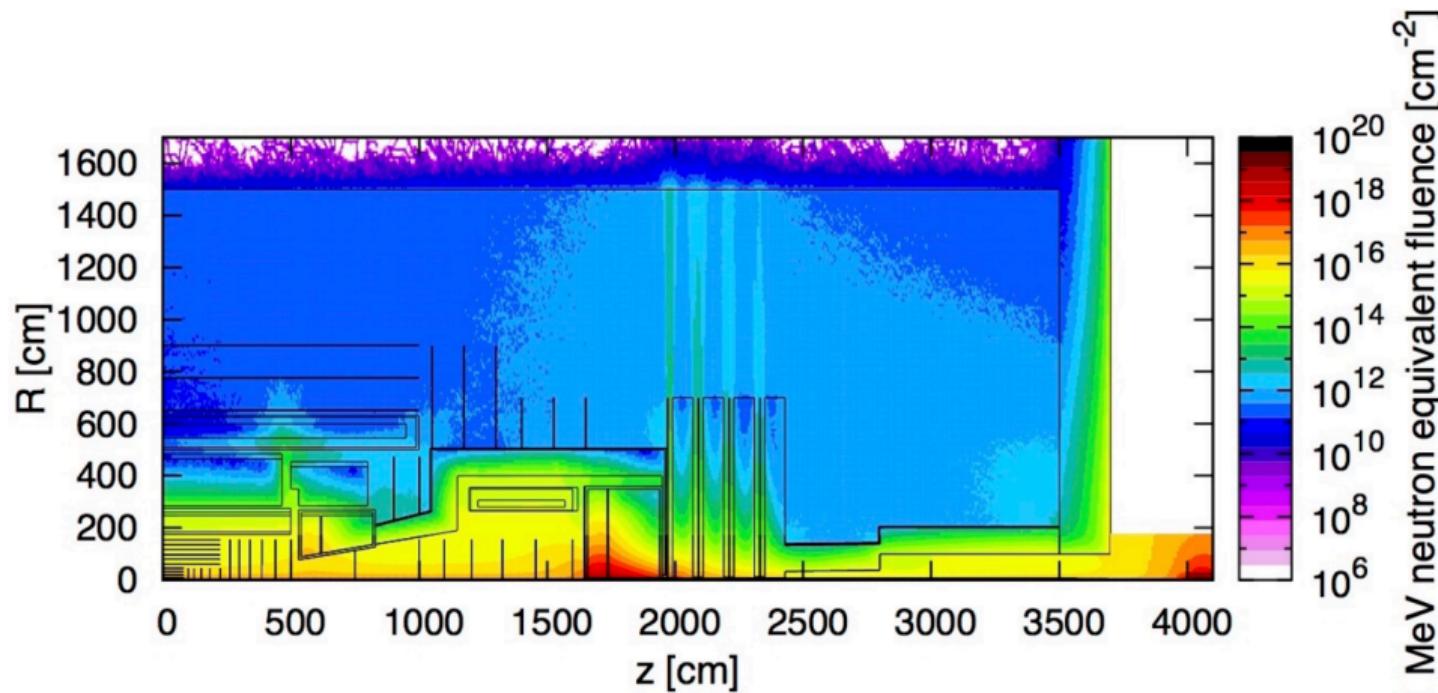
FCC-hh reference detector layout



1 MeV neutron equivalent fluence for 30 ab⁻¹



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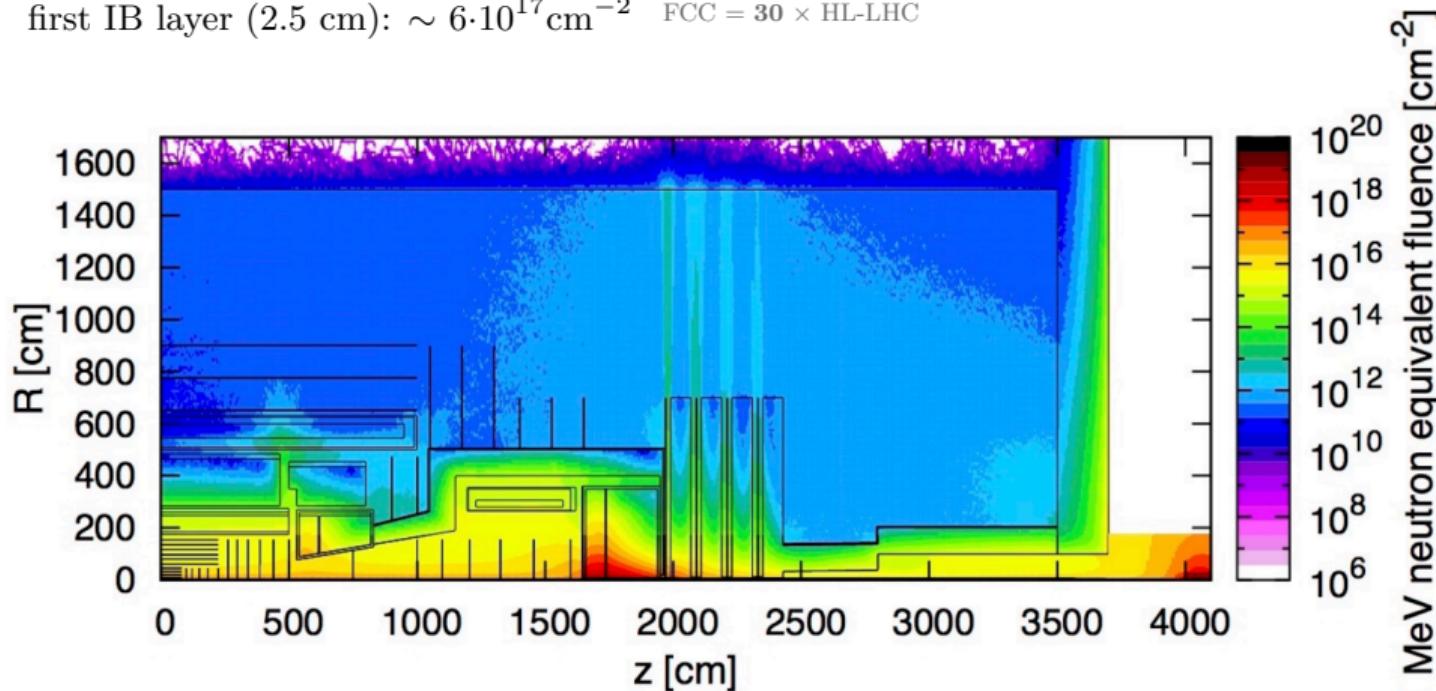


Forward calorimetry:
maximum at $\sim 10^{18} \text{ cm}^{-2}$

1 MeV neutron equivalent fluence for 30 ab⁻¹

Tracker: first IB layer (2.5 cm): $\sim 6 \cdot 10^{17} \text{ cm}^{-2}$ HL-LHC = 20× LHC FCC = 30 × HL-LHC

See talk by Matteo Centis Vignali Thu 15:30



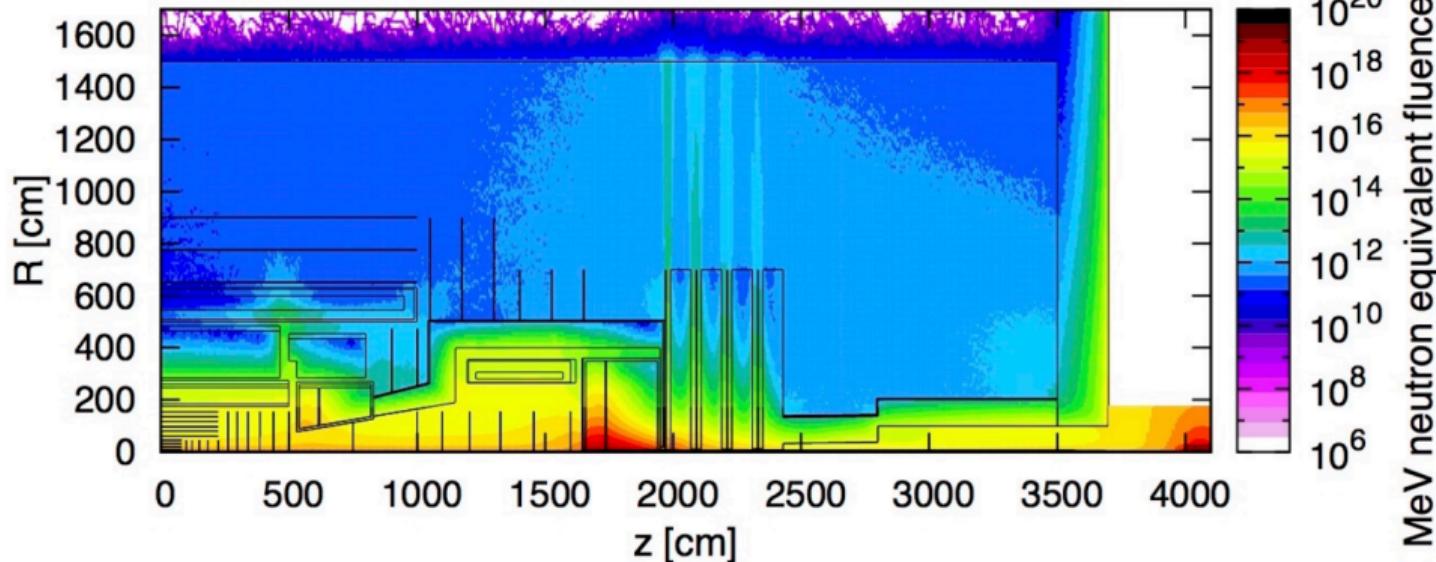
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FCC = $30 \times$ HL-LHC
HL-LHC rad. tolerance limit @ R=27 cm: $\sim 10^{16} \text{ cm}^{-2}$
external part: $\sim 5 \cdot 10^{15} \text{ cm}^{-2}$



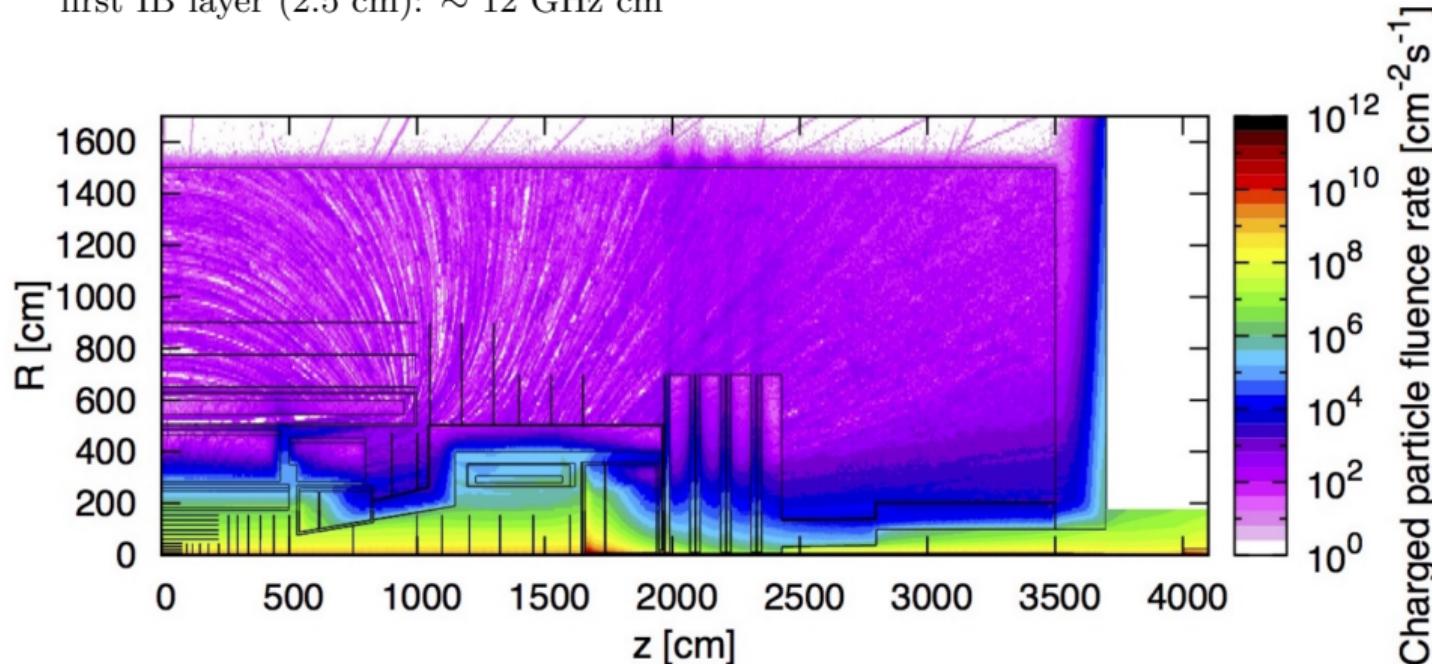
1 MeV neutron equivalent fluence [cm⁻²]

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Charged particle fluence rate for $L = 30 \cdot 10^{34} \text{cm}^{-2}\text{s}^{-1}$

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first IB layer (2.5 cm): $\sim 12 \text{ GHz cm}^{-2}$

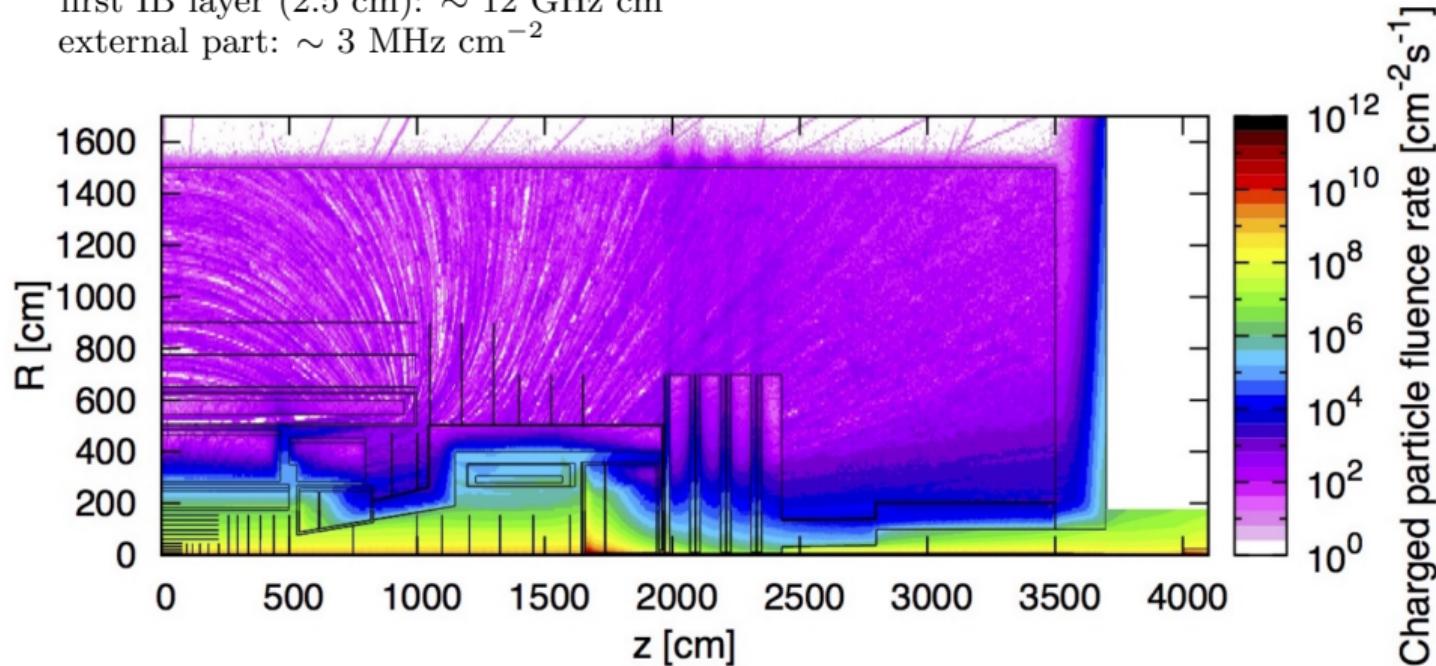


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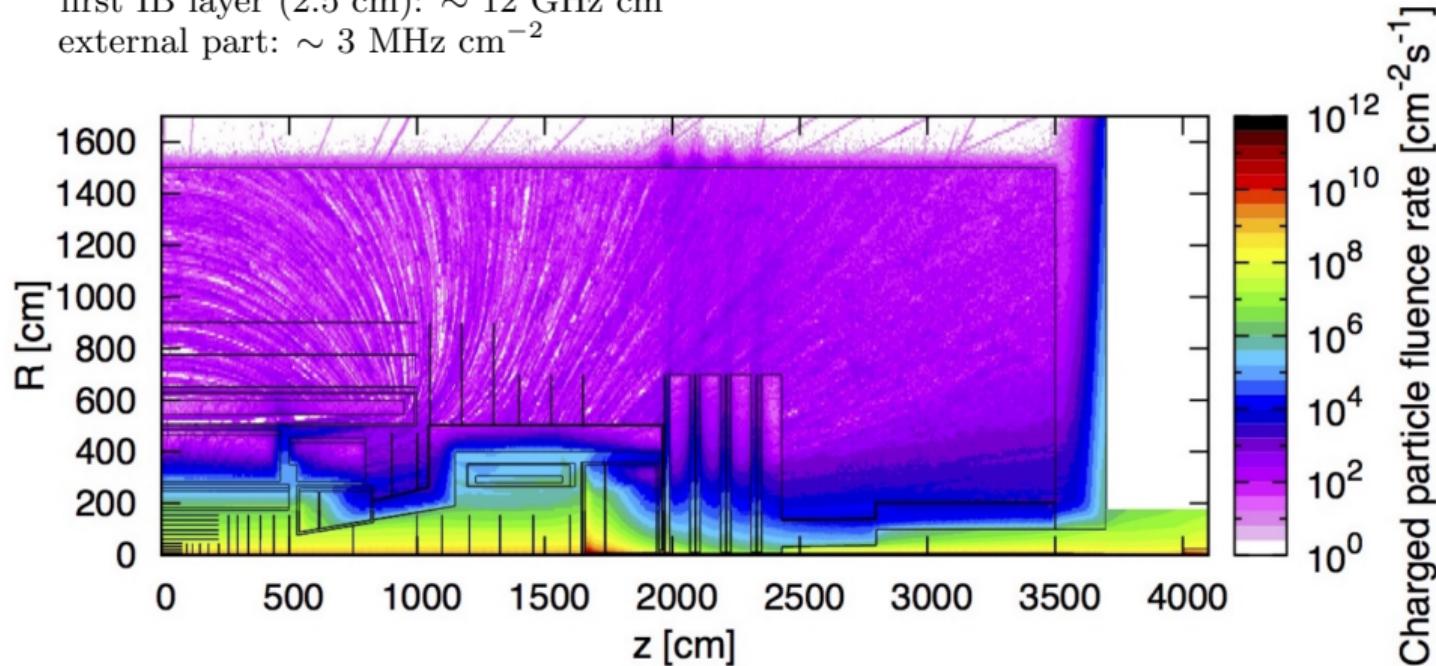


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Barrel & outer endcap muon chambers:

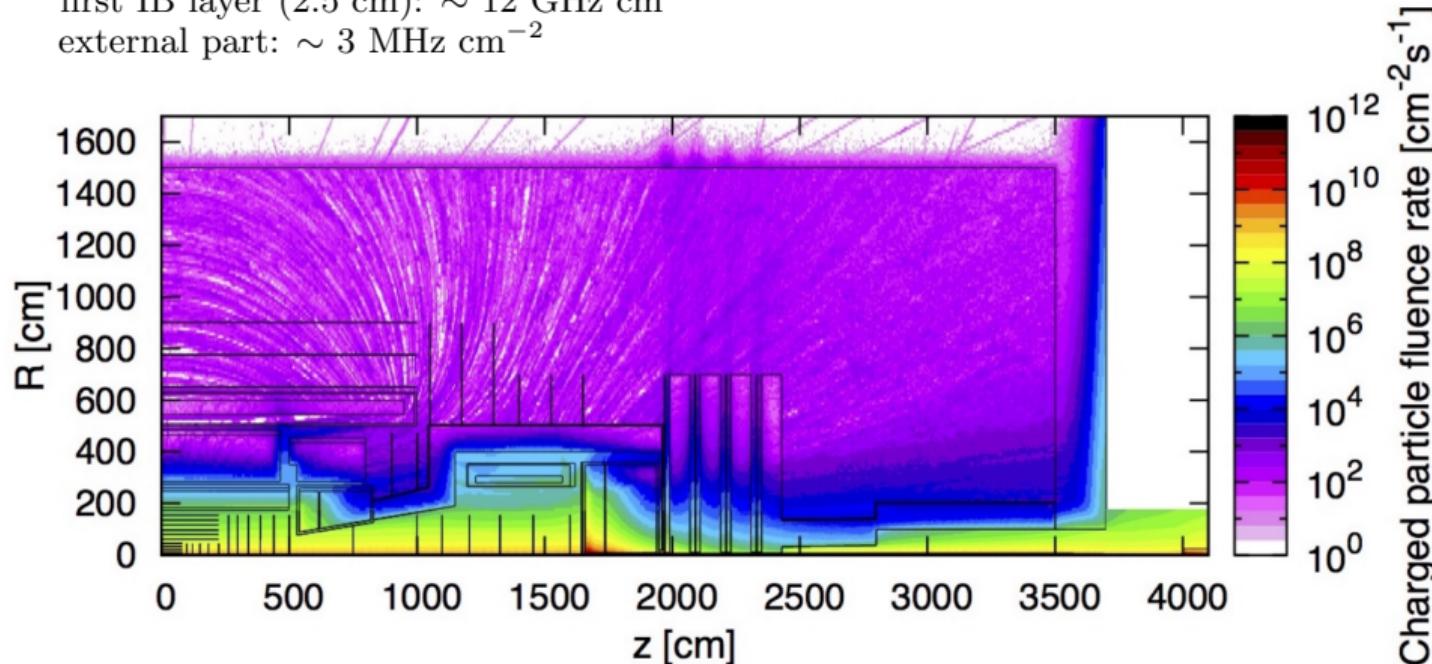
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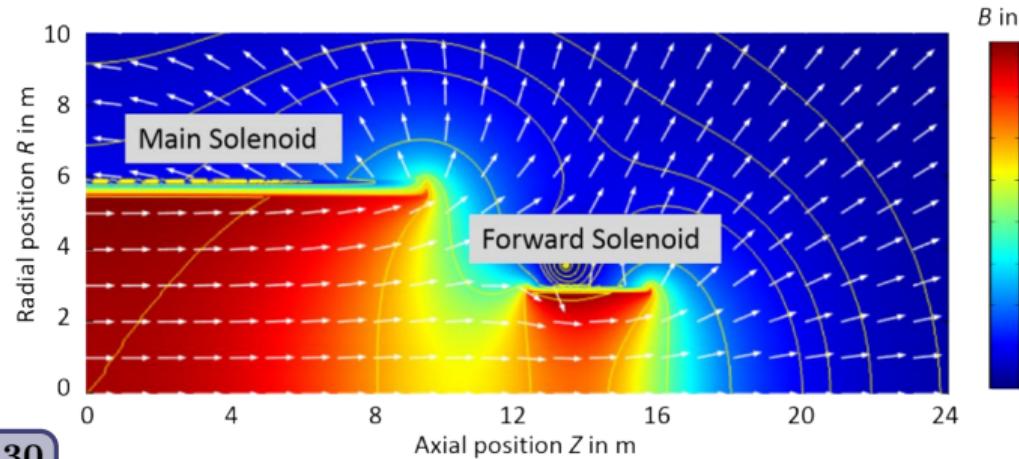
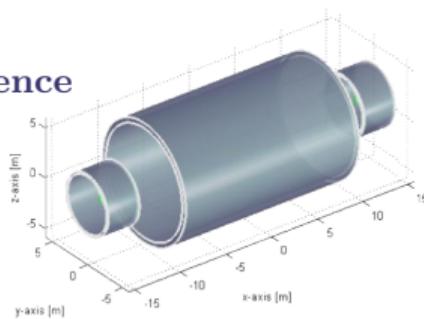


Barrel & outer endcap muon chambers:
 $<0.5 \text{ kHz cm}^{-2}$

Inner endcap muon chambers:
 $\sim 10 \text{ kHz cm}^{-2}$

Magnet

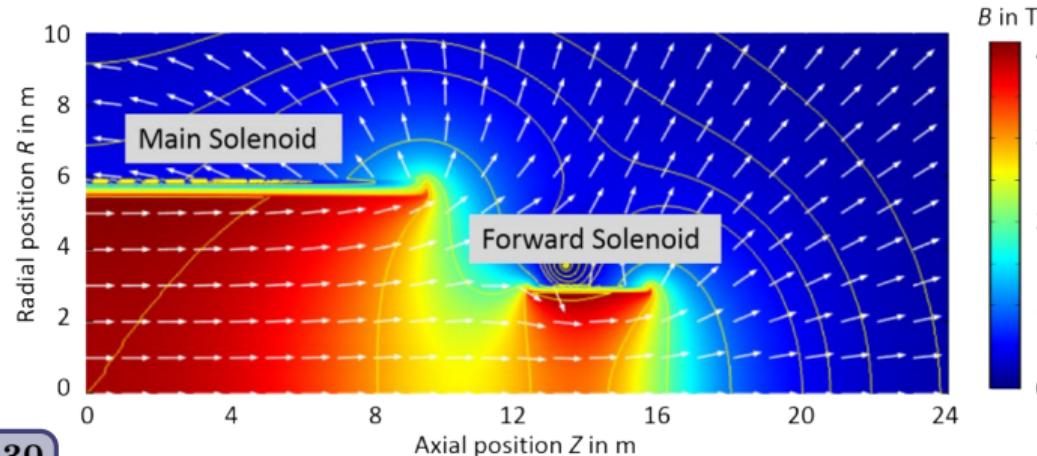
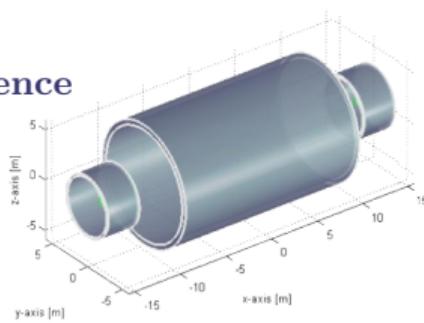
reference



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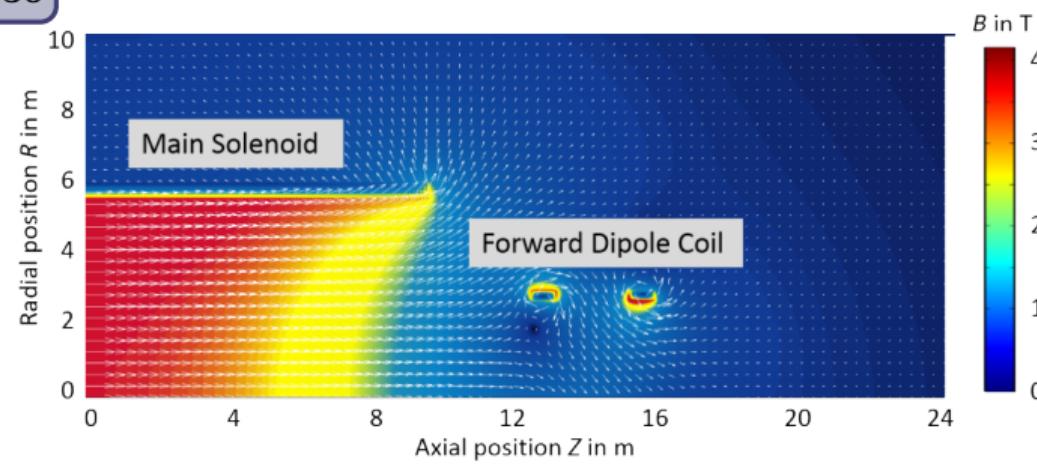
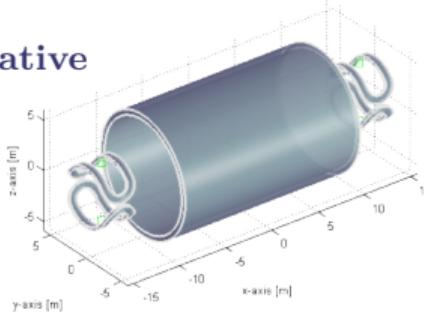
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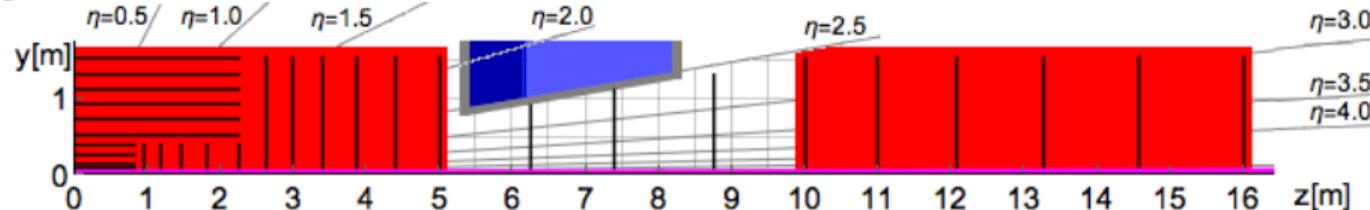


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alternative

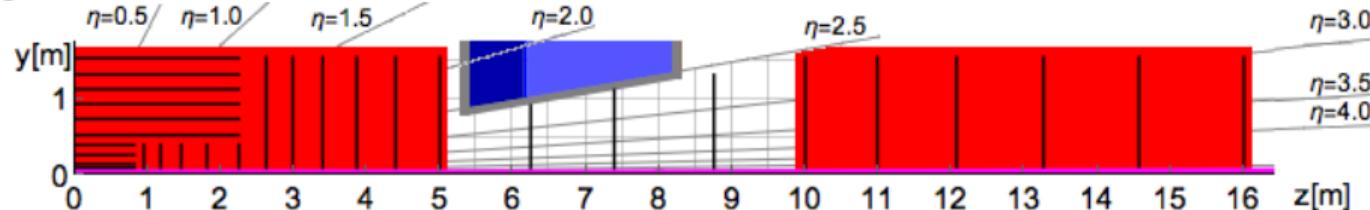


Magnet: momentum resolution

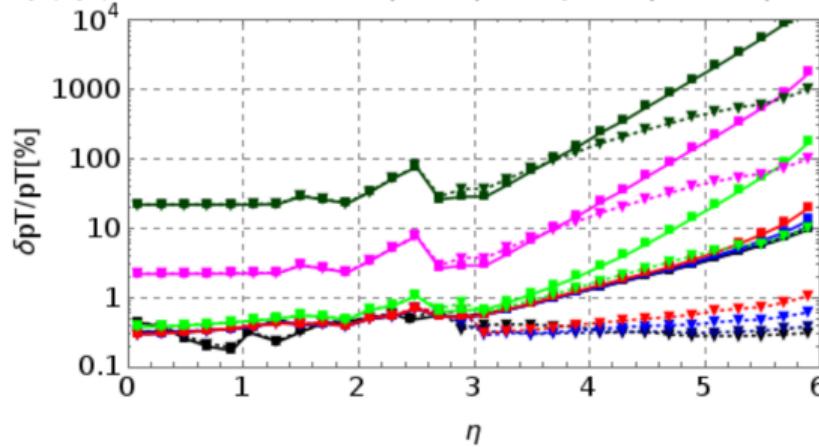


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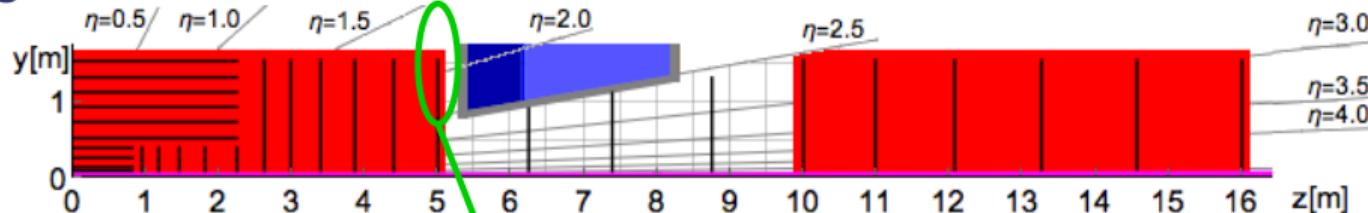
$\delta p_T/p_T$: FWD solenoid (solid) x dipole (dotted) \rightarrow X-axis



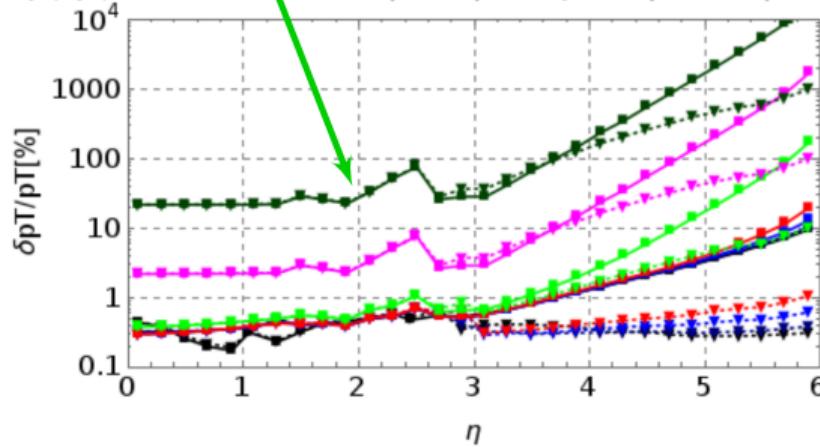
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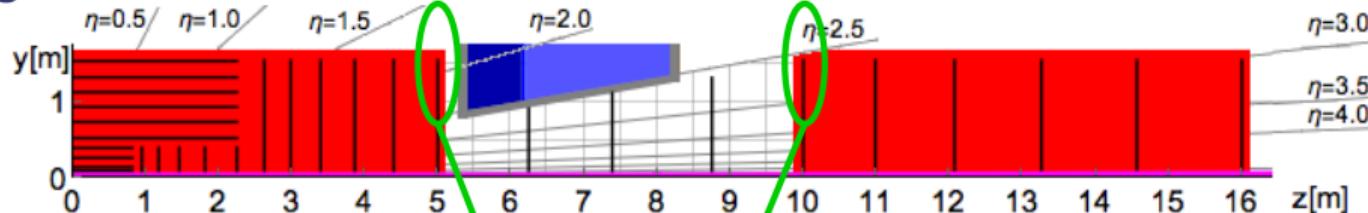
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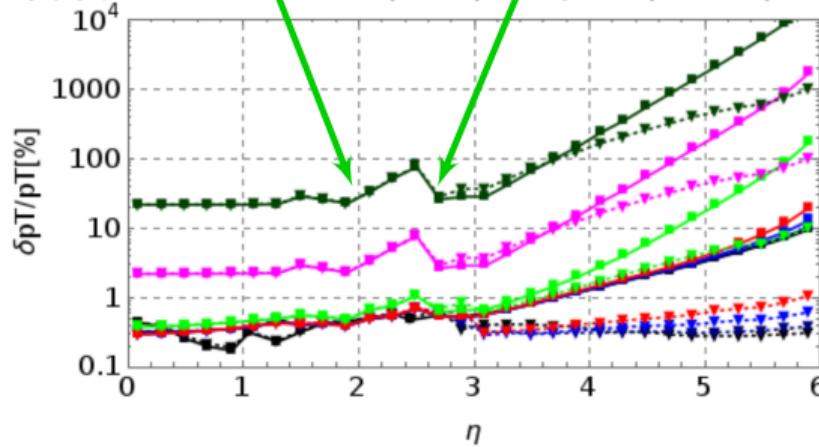
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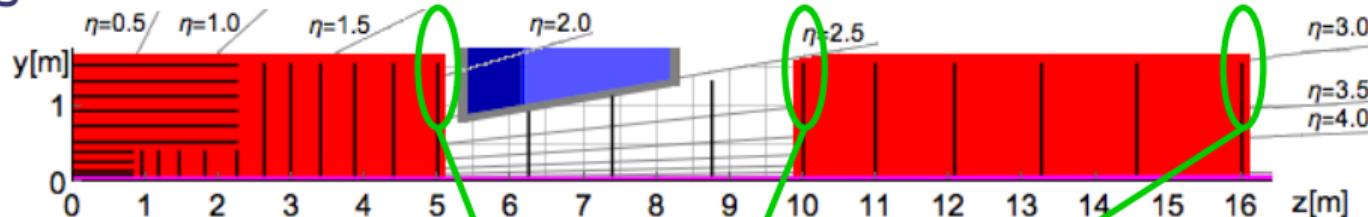
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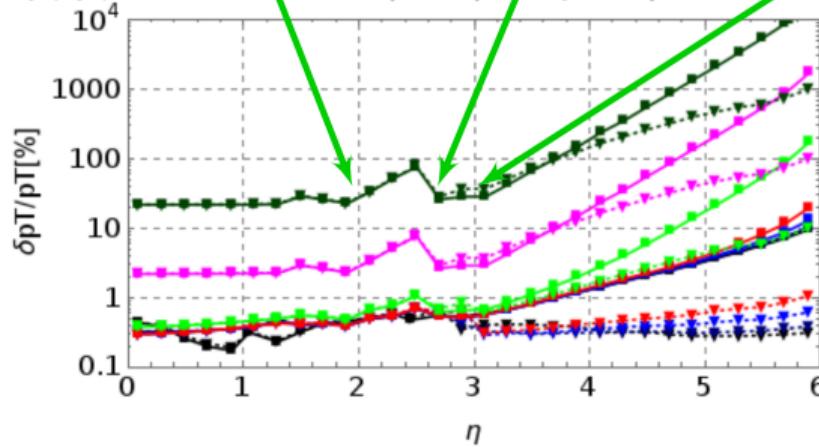
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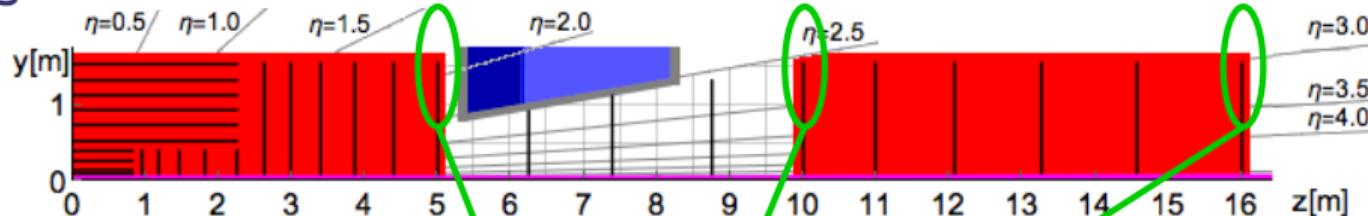
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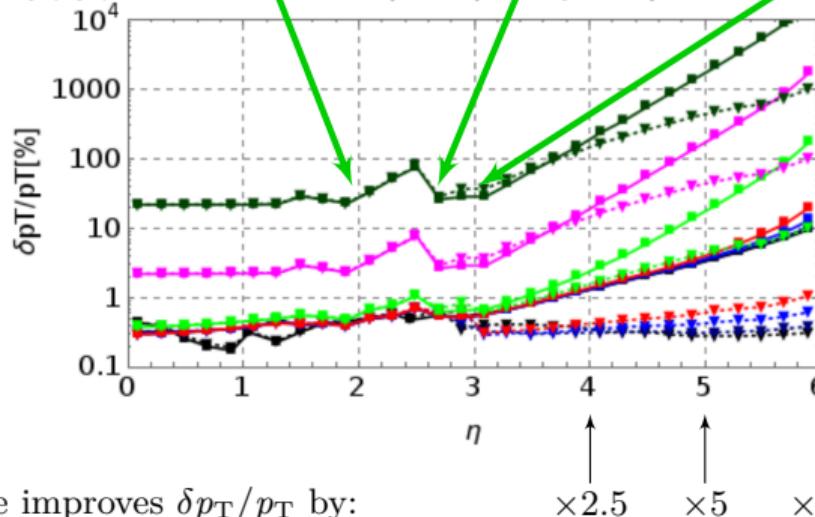
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Magnet: momentum resolution



$\delta p_T/p_T$: FWD solenoid (solid) x dipole (dotted) \rightarrow X-axis



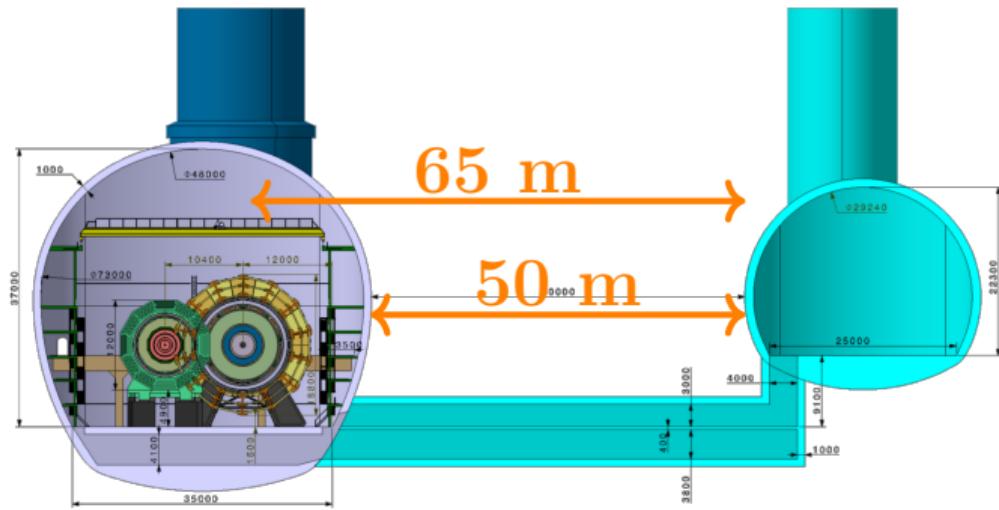
Dipole improves $\delta p_T/p_T$ by:

- $p_T = 10$ TeV/c
- $p_T = 1$ TeV/c
- $p_T = 100$ GeV/c
- $p_T = 10$ GeV/c
- $p_T = 5$ GeV/c
- $p_T = 1$ GeV/c

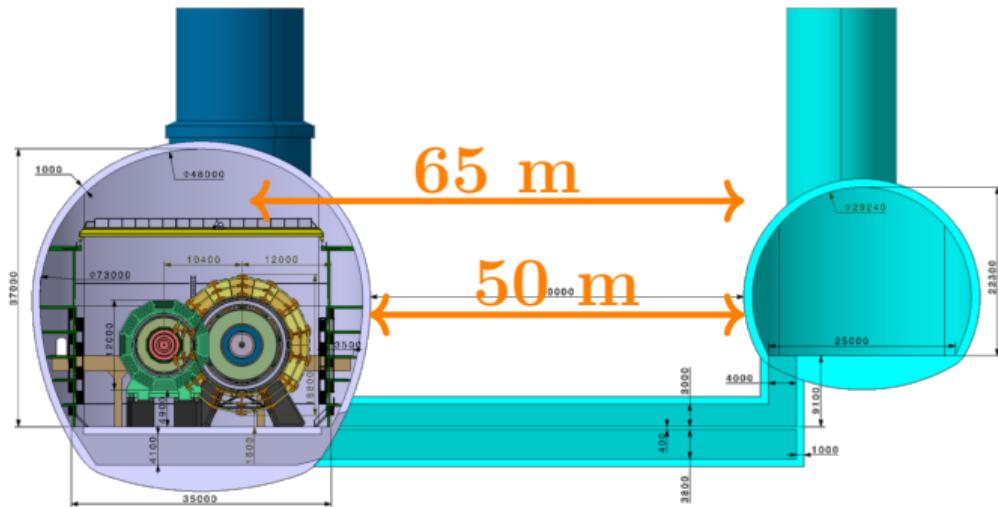
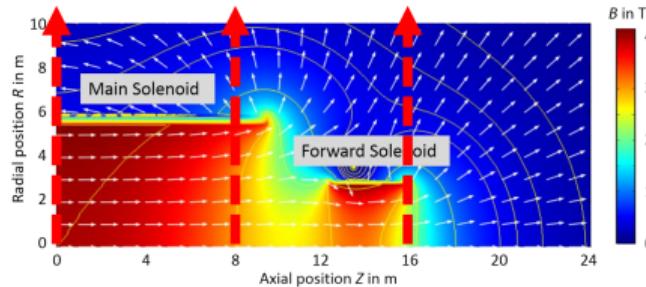
See talk by Zbyněk Drásal Thu 8:50

Stray field and service cavern

See talk by Erwin Bielert Thu 8:30

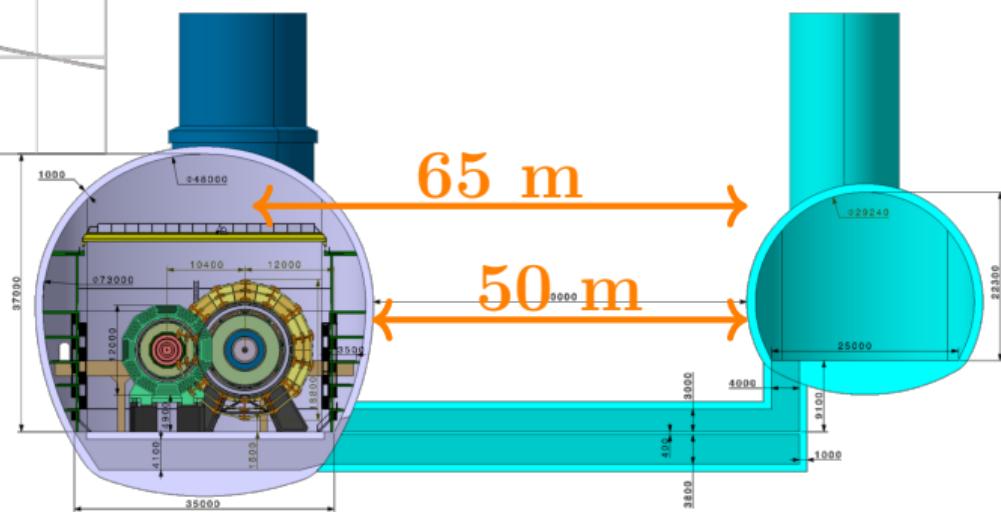
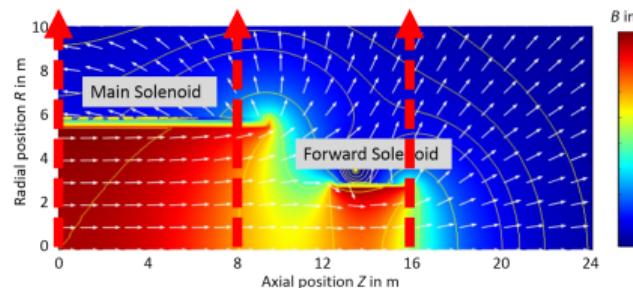
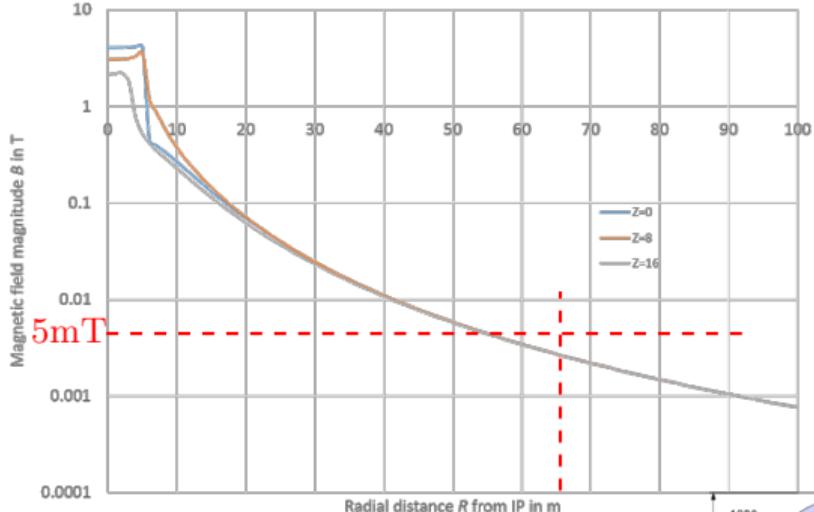


Stray field and service cavern

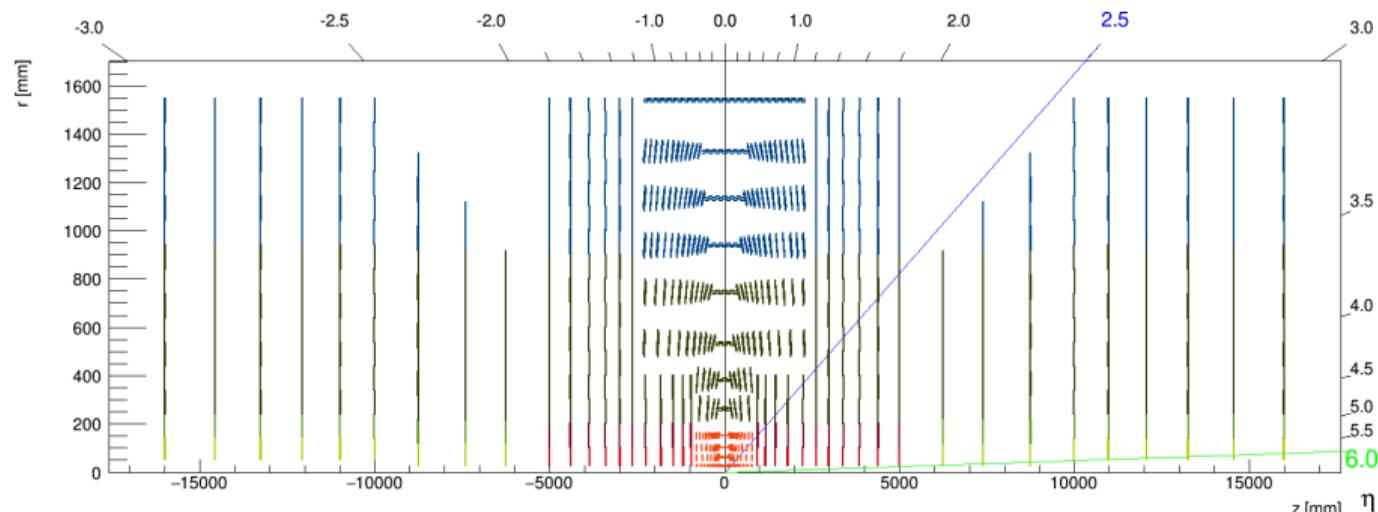


See talk by Erwin Bielert Thu 8:30

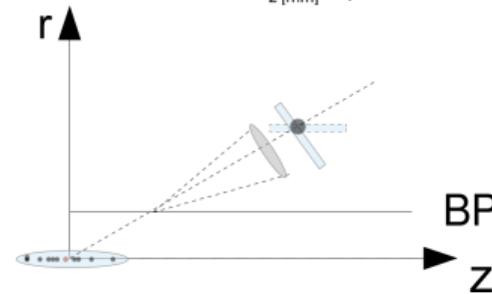
Stray field and service cavern



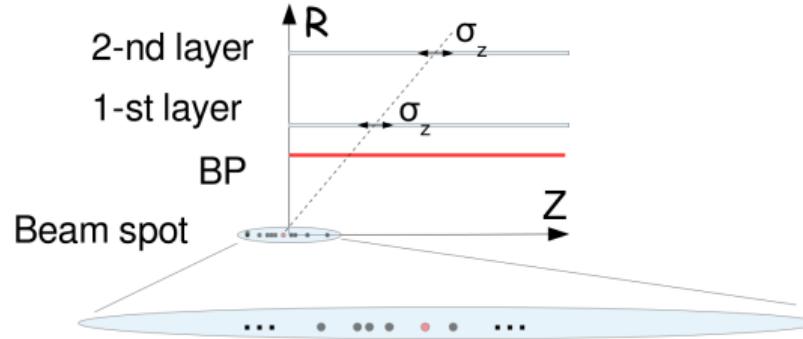
See talk by Erwin Bielert Thu 8:30



- Minimization of the effect of multiple scattering (material budget).
- Optimised by the pattern recognition and vertexing.
→ Inclined tracker modules.

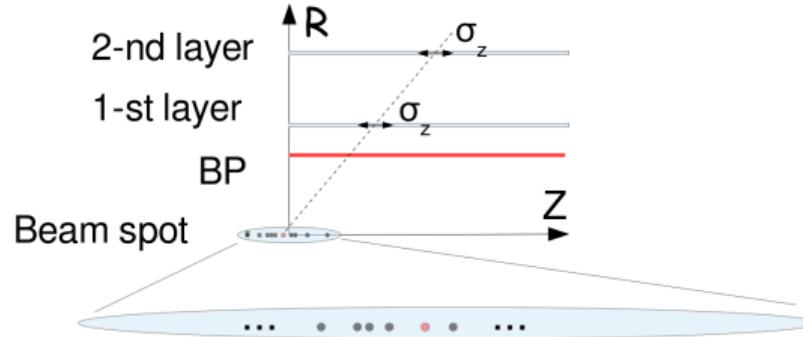


Tracker



See talk by Zbyněk Drásal **Thu 8:50**

Tracker

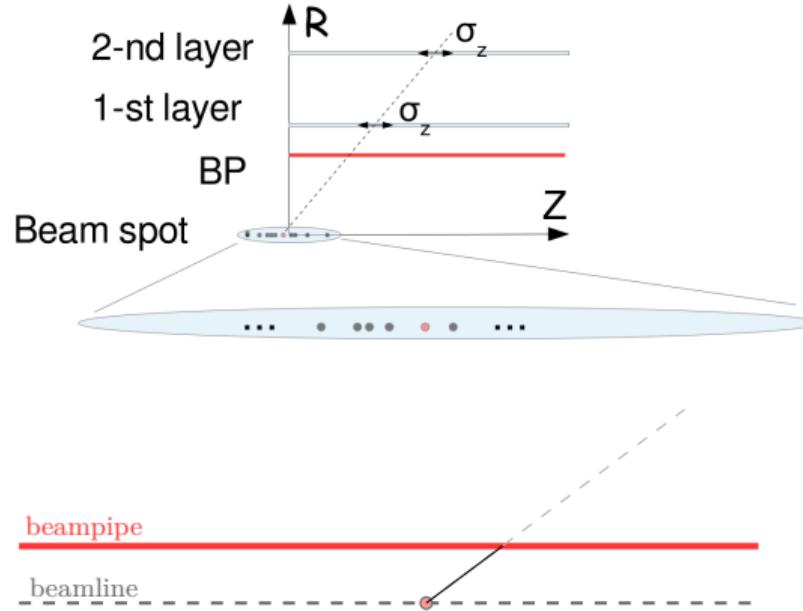


beampipe

beamline

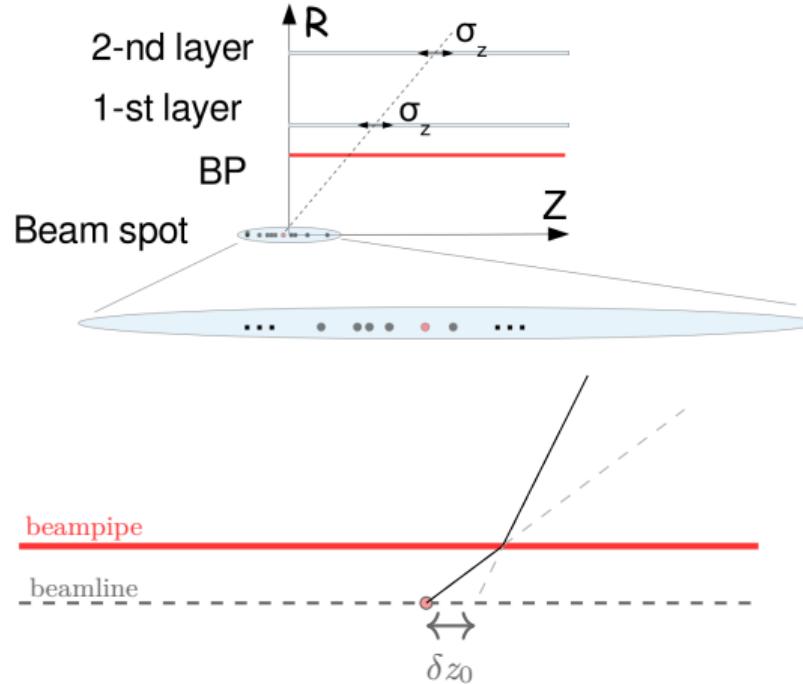
See talk by Zbyněk Drásal **Thu 8:50**

Tracker



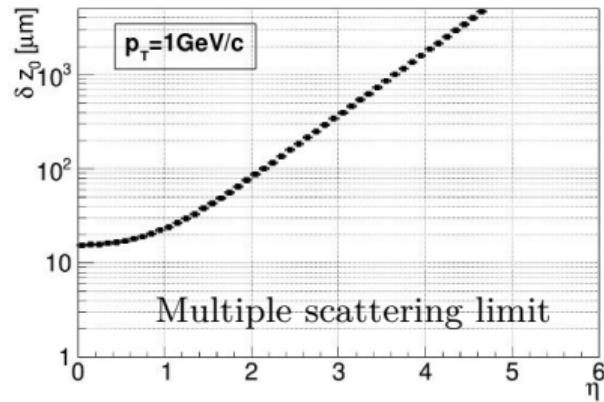
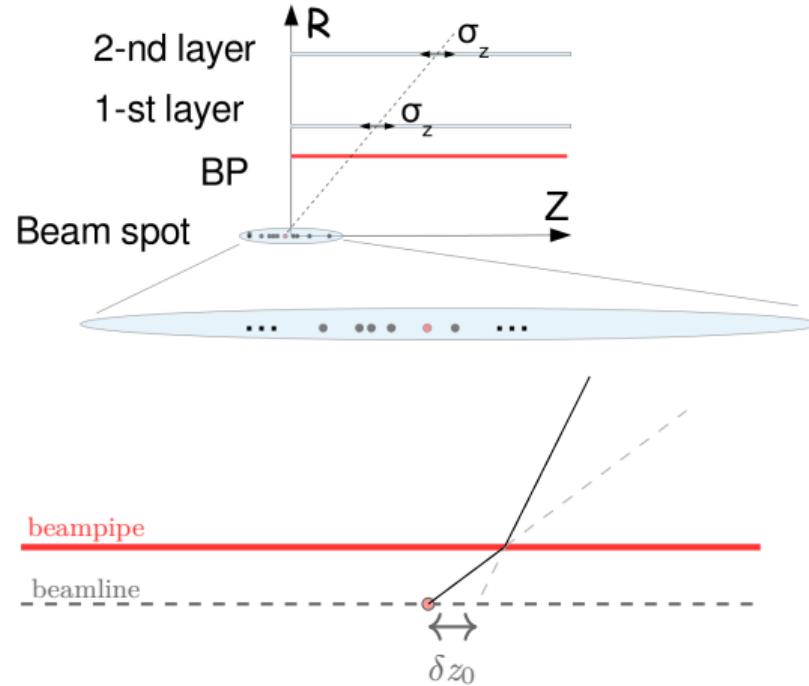
See talk by Zbyněk Drásal **Thu 8:50**

Tracker



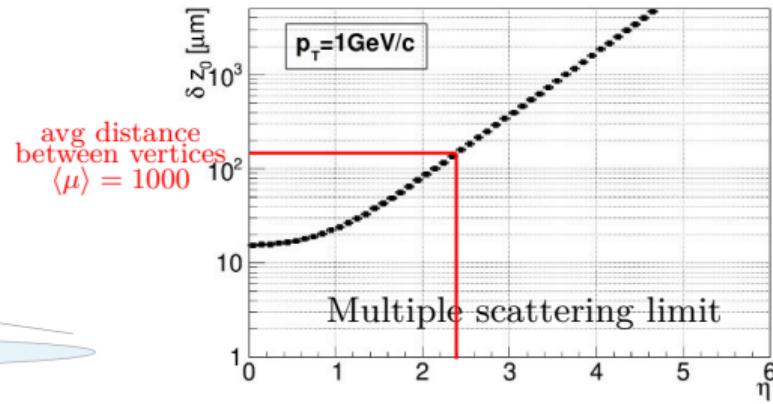
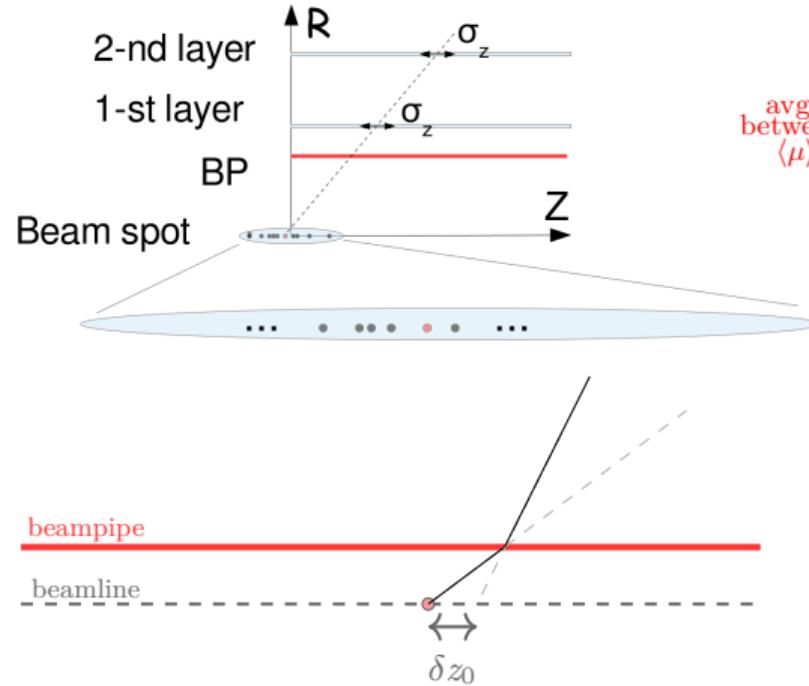
See talk by Zbyněk Drásal Thu 8:50

Tracker



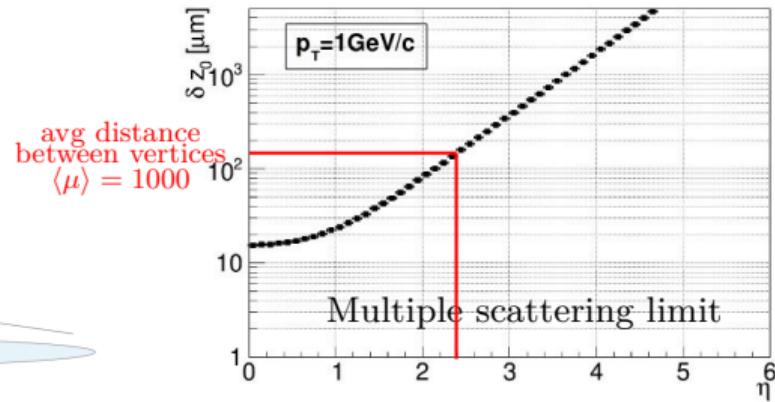
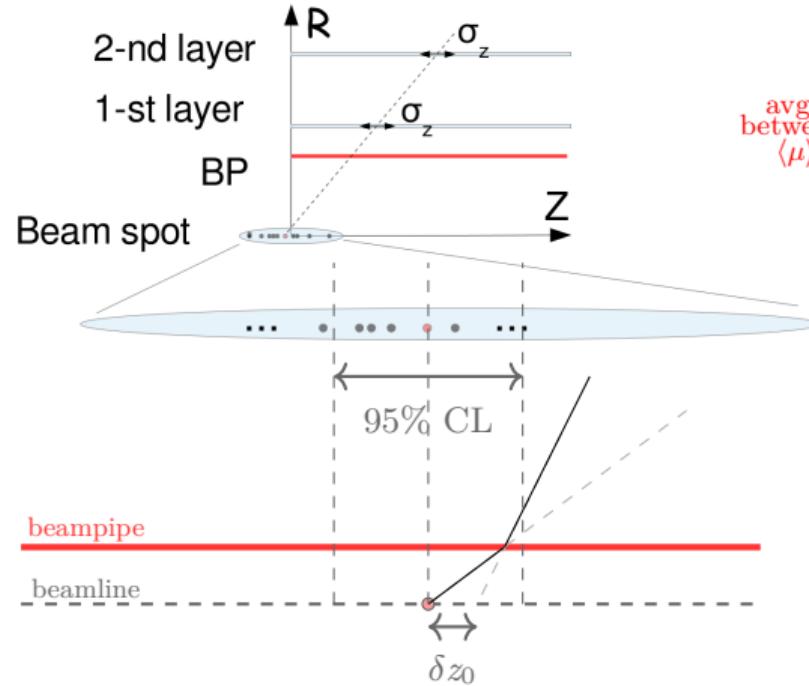
See talk by Zbyněk Drásal Thu 8:50

Tracker



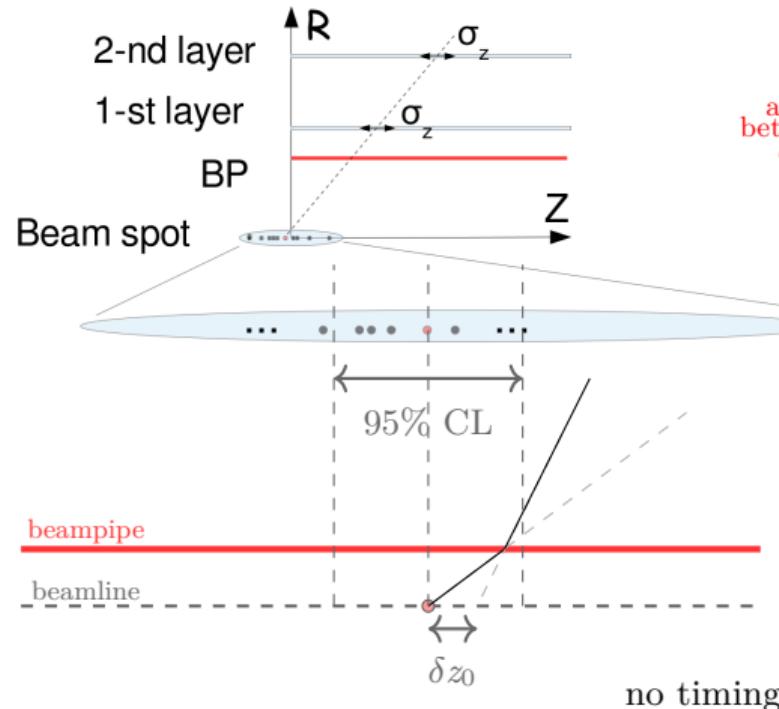
See talk by Zbyněk Drásal Thu 8:50

Tracker

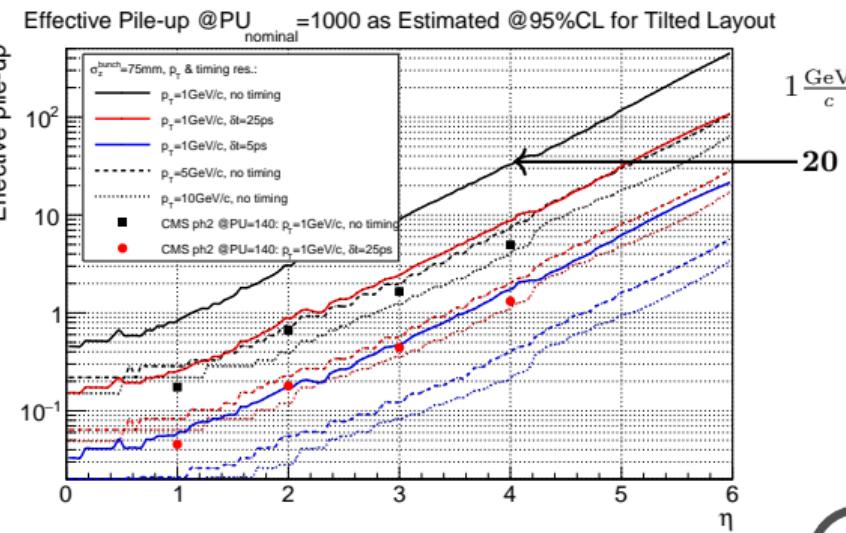
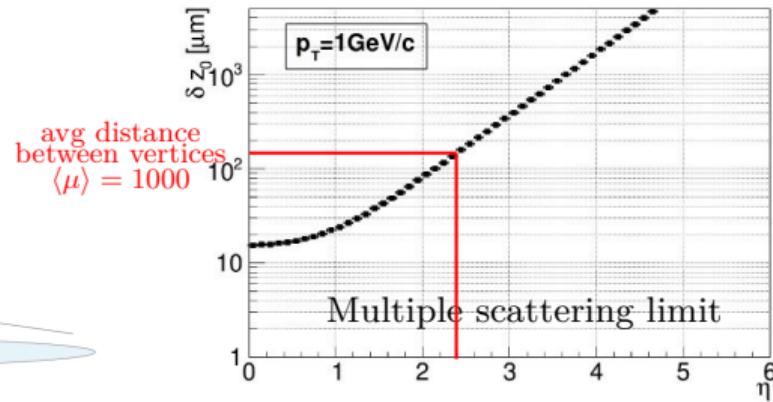


See talk by Zbyněk Drásal Thu 8:50

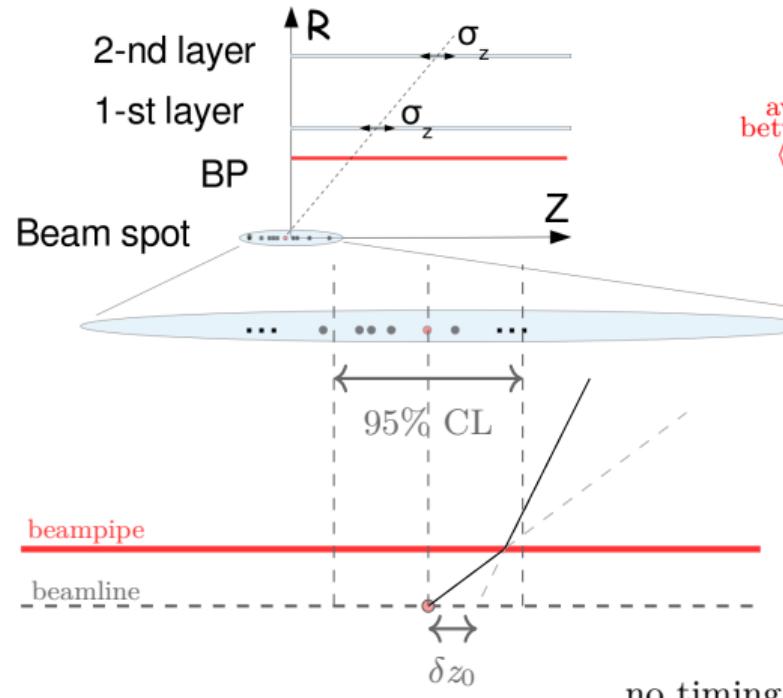
Tracker



See talk by Zbyněk Drásal Thu 8:50

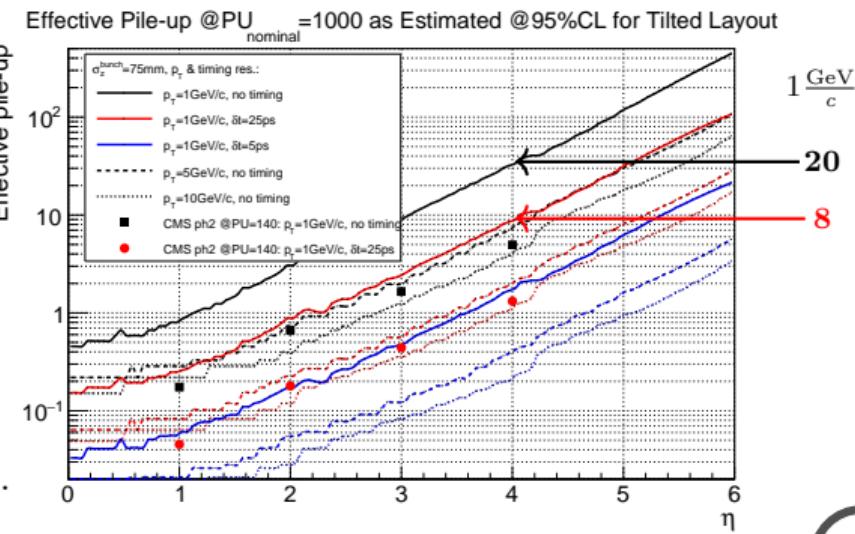
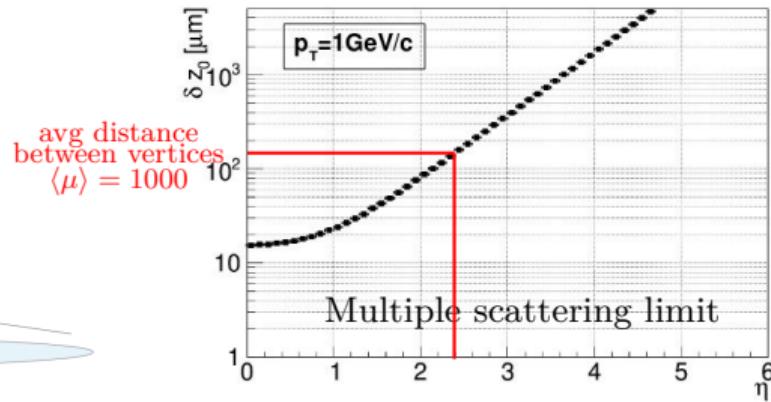


Tracker

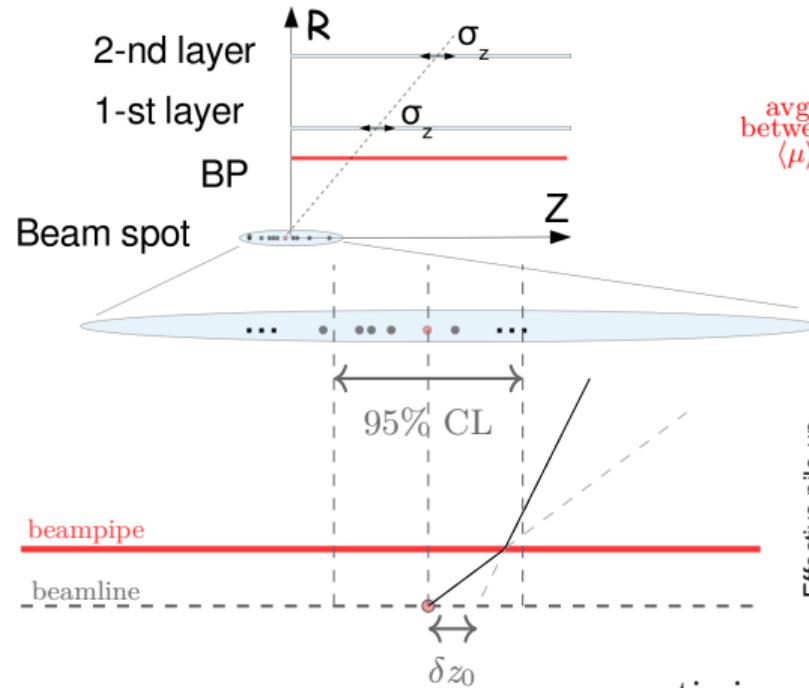


See talk by Zbyněk Drásal Thu 8:50

To mitigate the pile-up effect
tracking with precise timing information required.



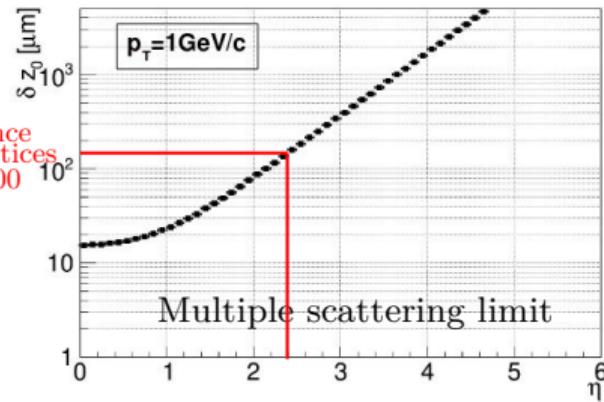
Tracker



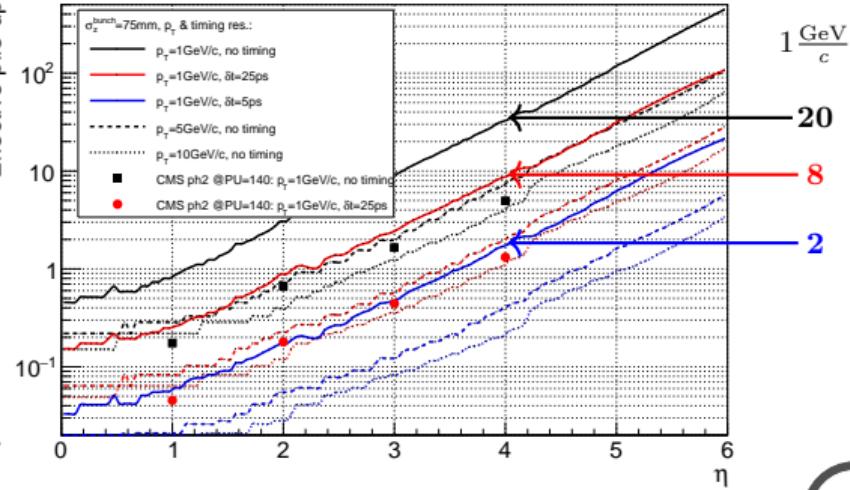
See talk by Zbyněk Drásal Thu 8:50

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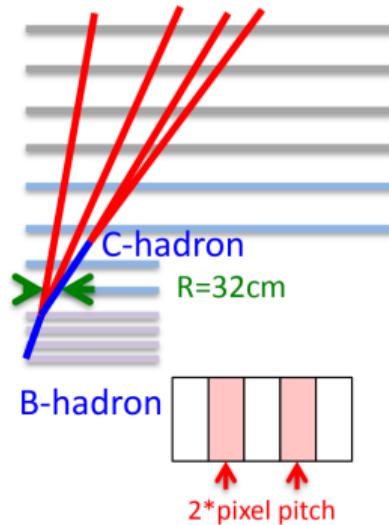
avg distance
between vertices
 $\langle \mu \rangle = 1000$



Effective Pile-up @PU_{nominal} = 1000 as Estimated @95%CL for Tilted Layout



Tracker: flavour tagging

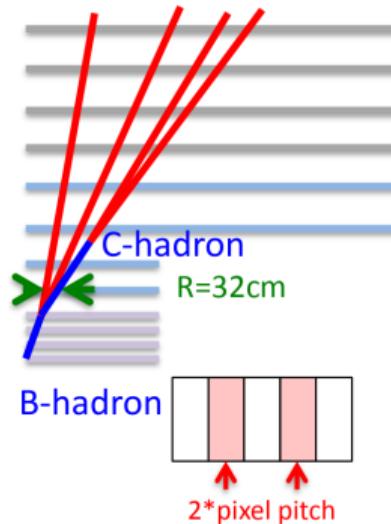


Only 71% 5 TeV b-hadrons decay < 5th layer.

- displaced vertices
- boosted daughters

See talk by Estel Perez Codina Thu 9:10

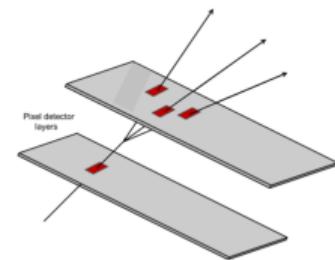
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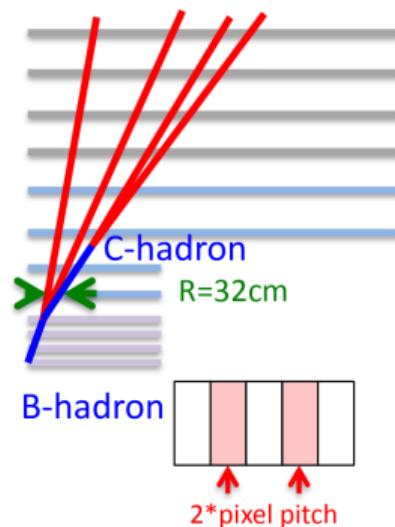
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See talk by Estel Perez Codina Thu 9:10



arXiv:1701:06832

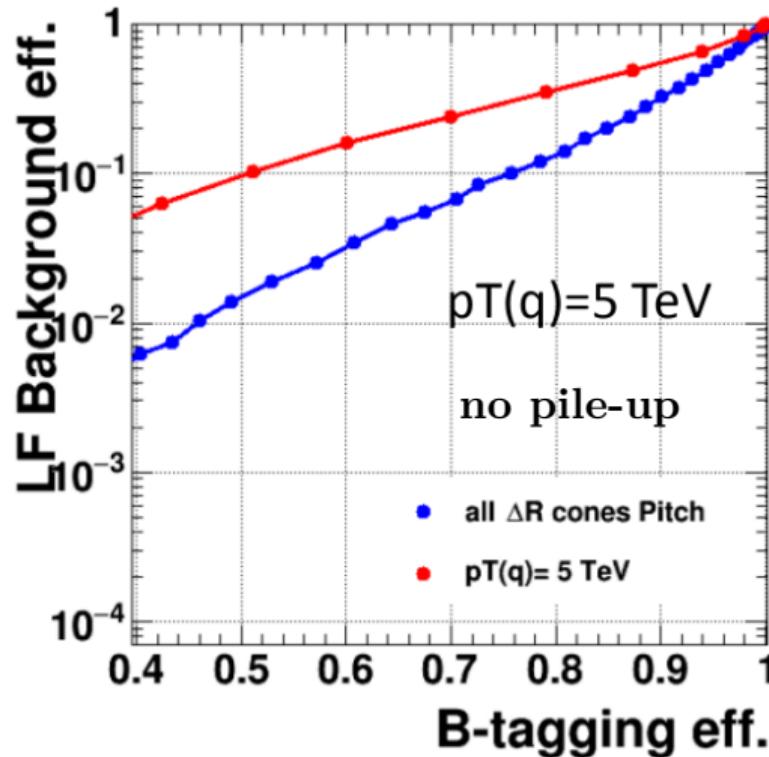
Tracker: flavour tagging



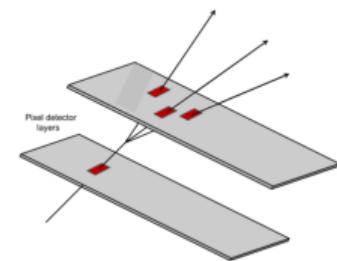
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Traditional tagger vs hit multiplicity tagger



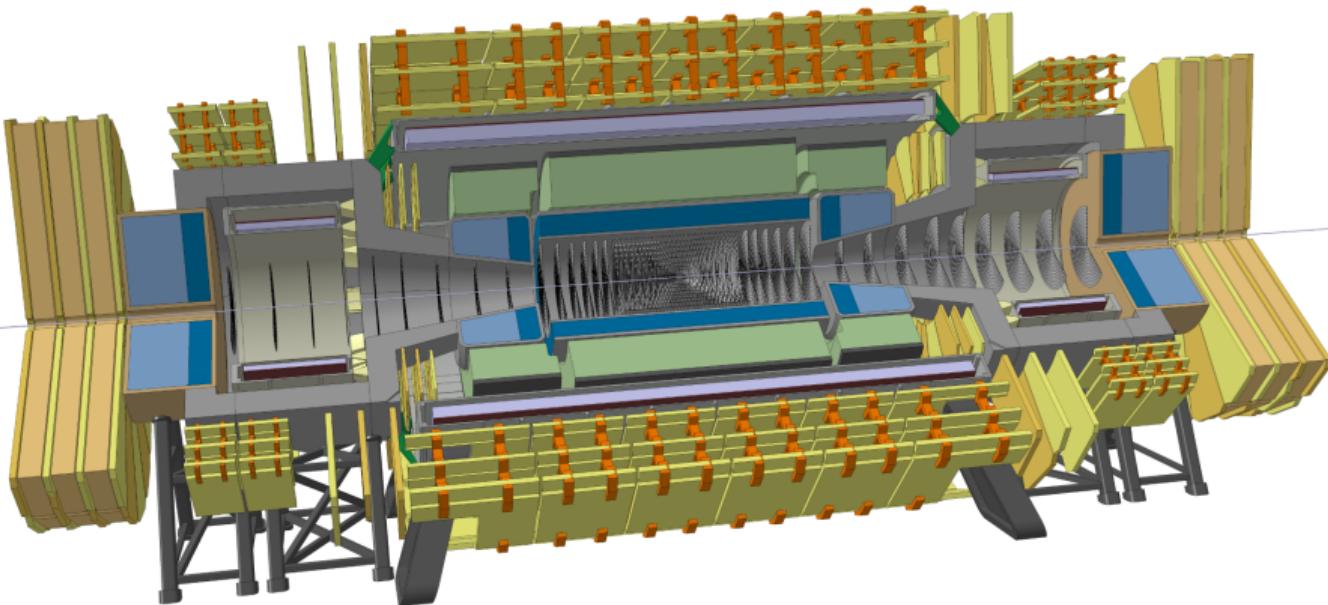
See talk by Estel Perez Codina Thu 9:10



arXiv:1701:06832

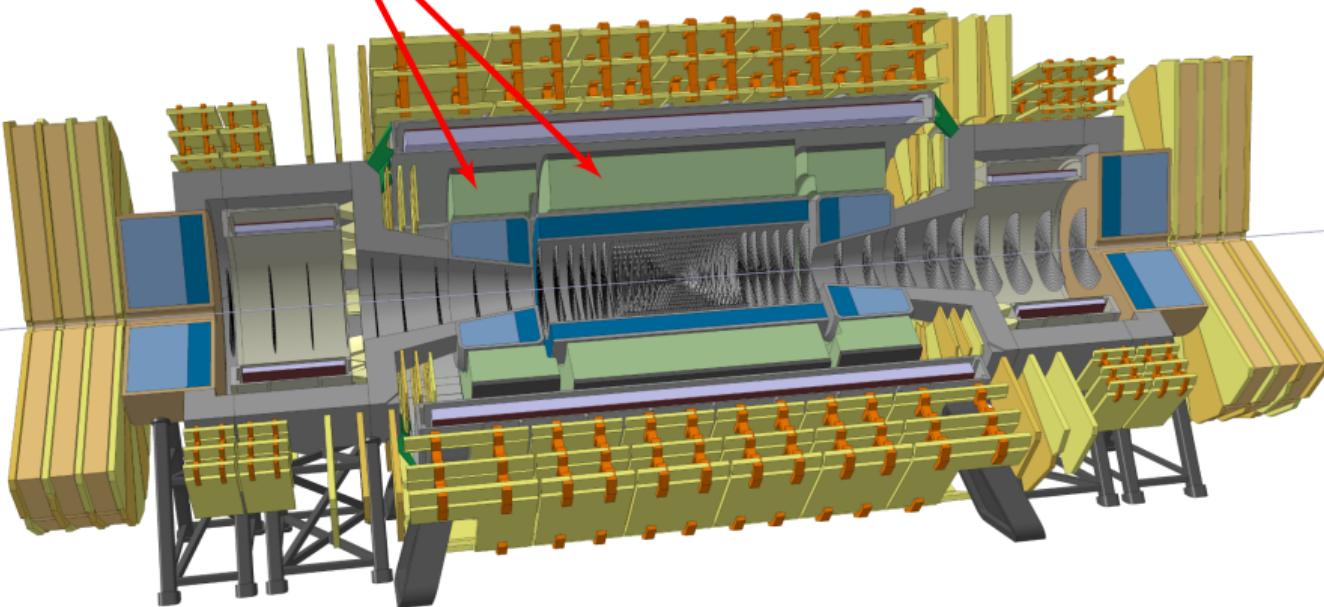
To be verified in high pile-up environment.

Calorimetry

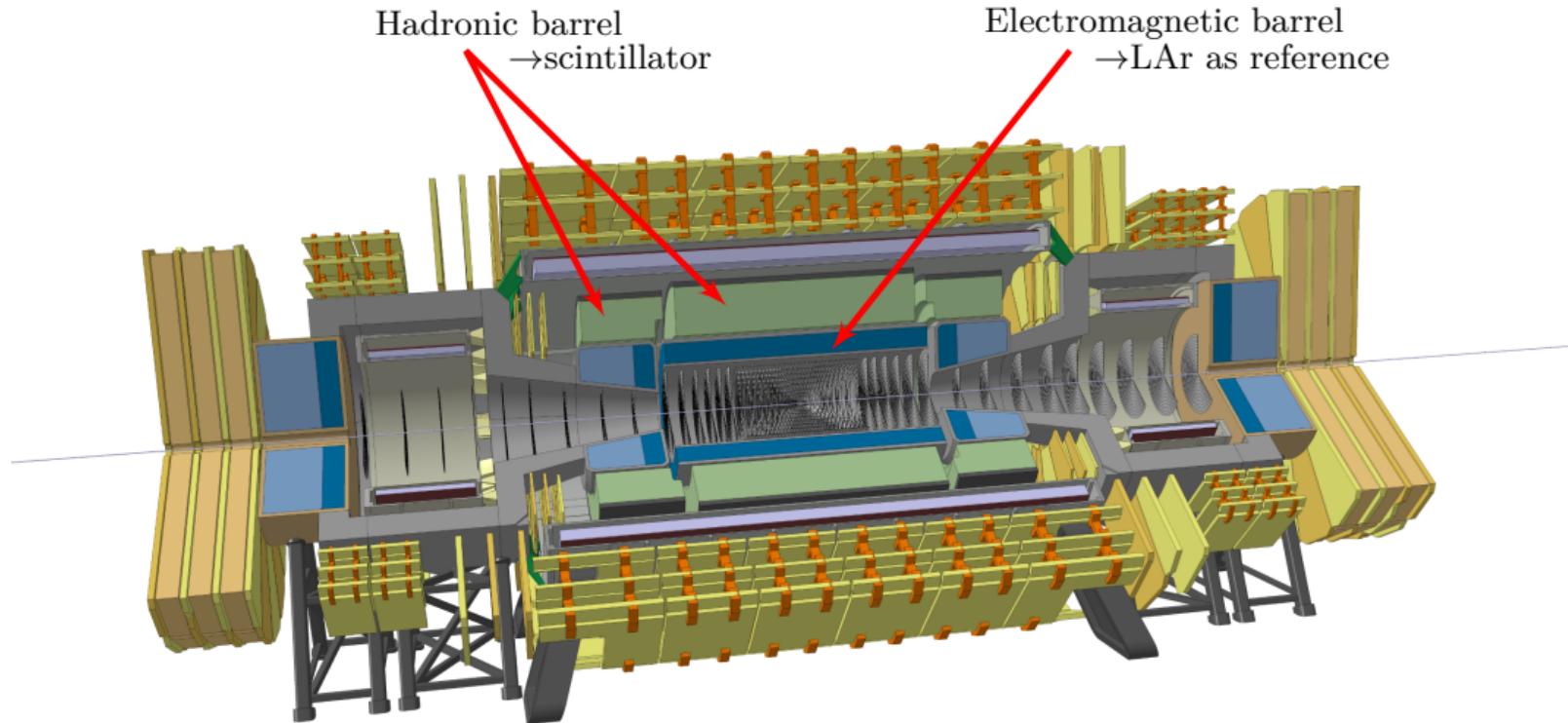


Calorimetry

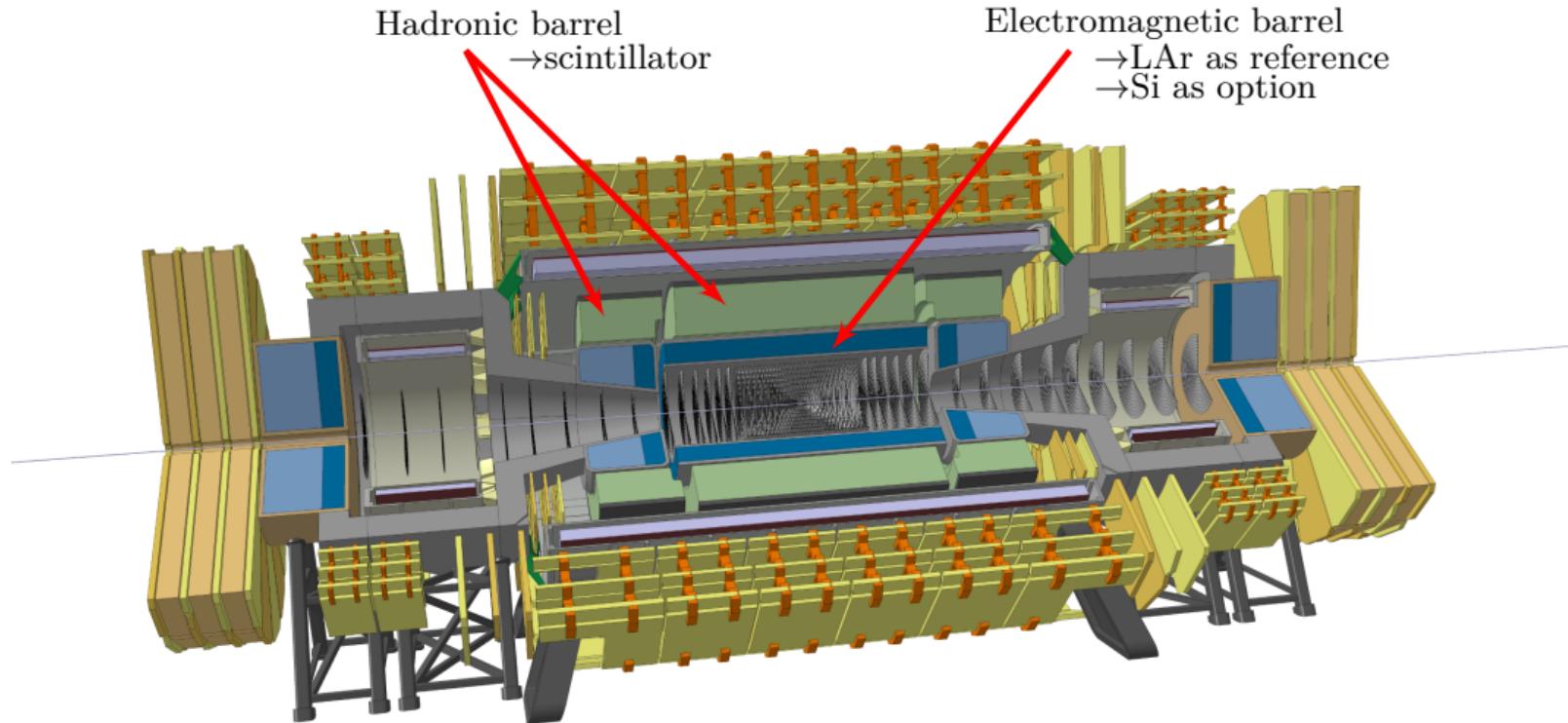
Hadronic barrel
→scintillator



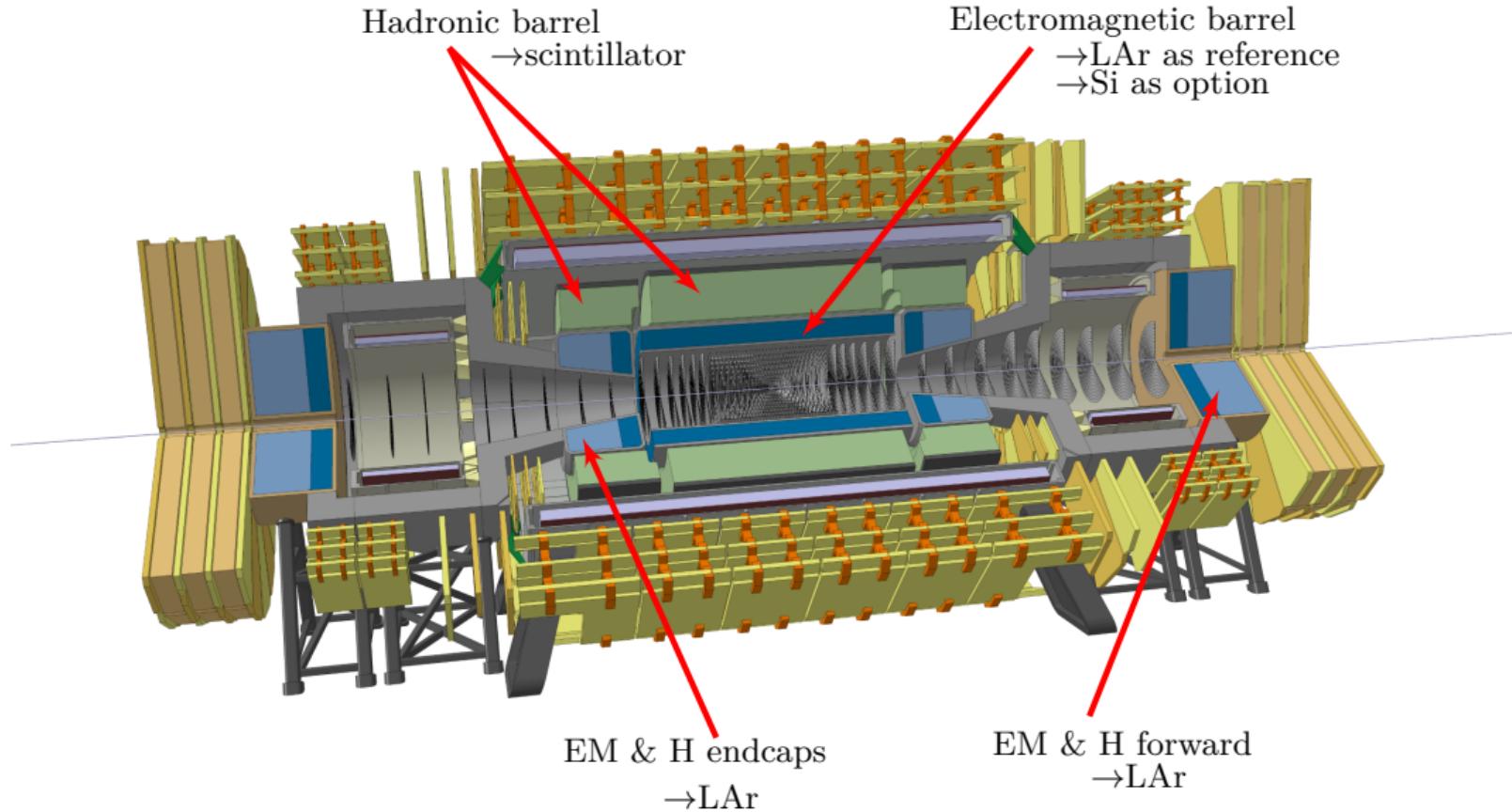
Calorimetry



Calorimetry

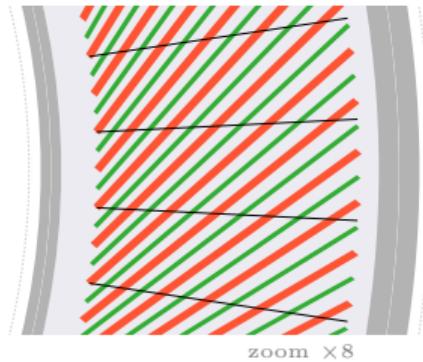


Calorimetry



LAr electromagnetic calorimeter

See talk by Anna Zaborowska Thu 9:25

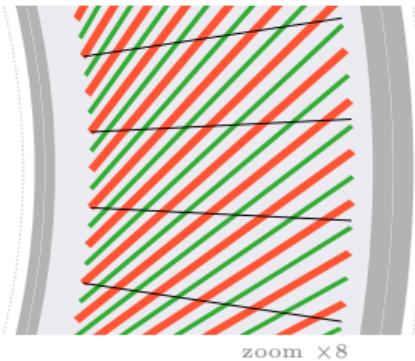


- Much more granular than ATLAS calorimeter ($\times 10$).
- High longitudinal and lateral segmentation possible with straight, multilayer electrodes.

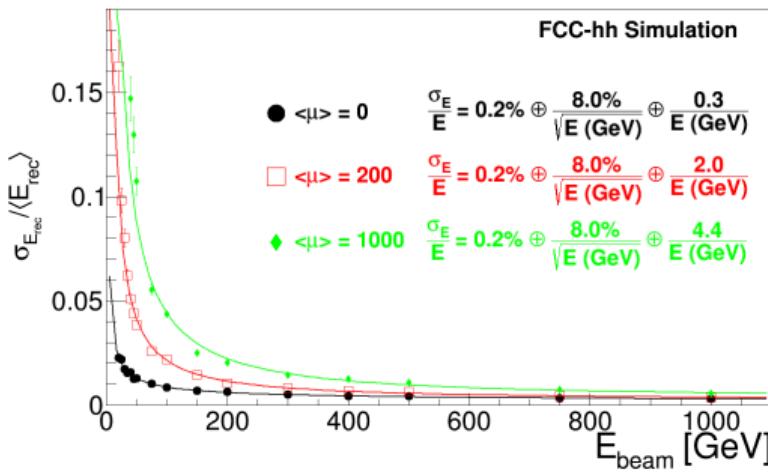
LAr electromagnetic calorimeter

See talk by Anna Zaborowska Thu 9:25

LAr
Pb
PCB



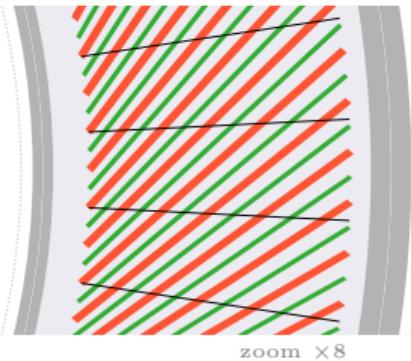
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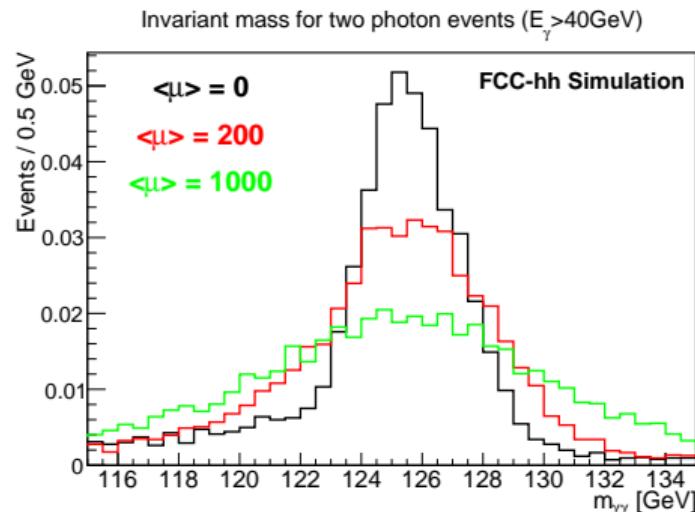
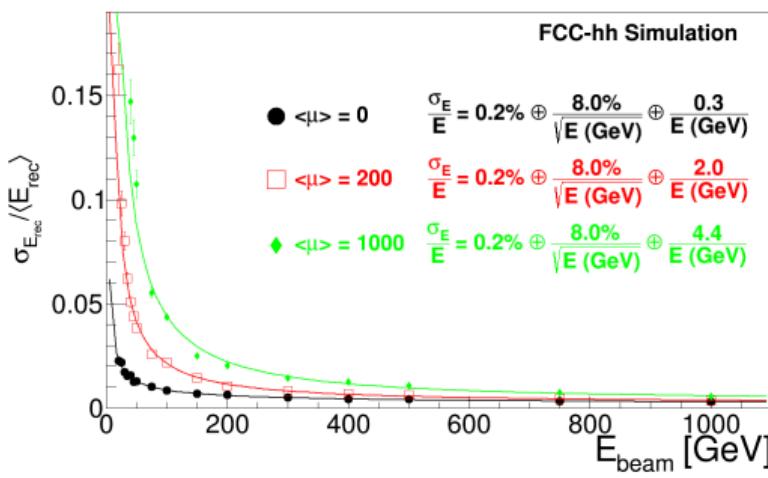
LAr electromagnetic calorimeter

See talk by Anna Zaborowska Thu 9:25

LAr
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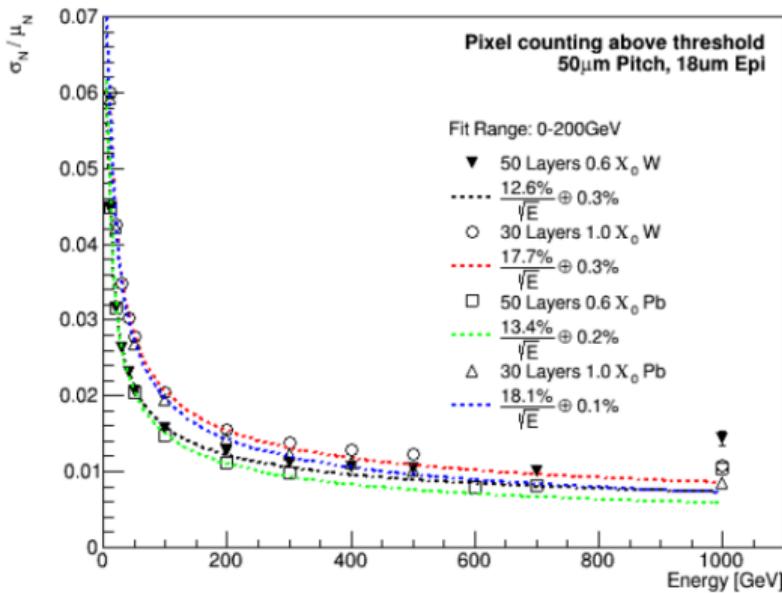
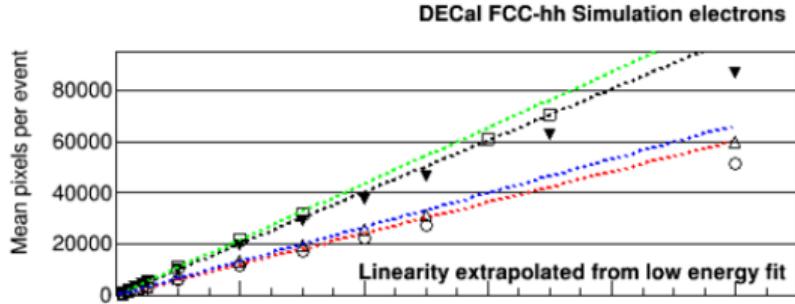
- Much more granular than ATLAS calorimeter ($\times 10$).
- High longitudinal and lateral segmentation possible with straight, multilayer electrodes.
- Huge impact of pile-up in calorimeter standalone measurements - need to subtract pile-up using pile-up track identification.



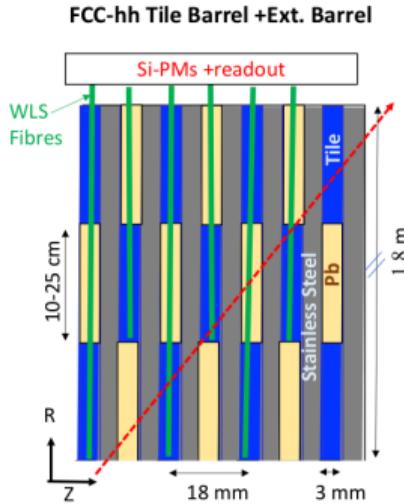
Si electromagnetic calorimeter

- Inspired by CALICE / CMS HGCAL / ALICE FoCal.
- Study of Pb and W absorbers.
- Study of digital and analogue readout.
- Connected with R&D of a reconfigurable, radiation hard CMOS MAPS device.

See talk by Tony Price Thu 10:30



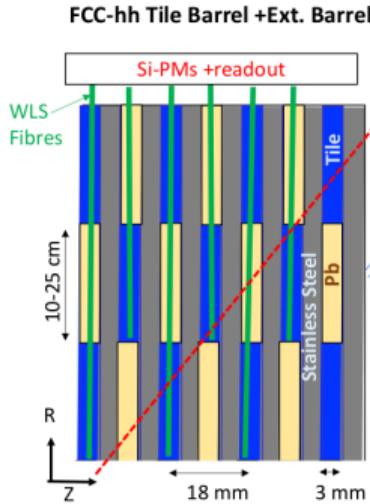
Hadronic barrel calorimeter



- ATLAS-like tile calorimeter with scintillating tiles/WLS fibres + stainless steel and lead (1: 3.3:1.3)
- SiPM readout: faster, less noise, less space
- 3-4 times higher granularity in $\Delta\eta\Delta\varphi = 0.025 \times 0.025$ and 10 layers

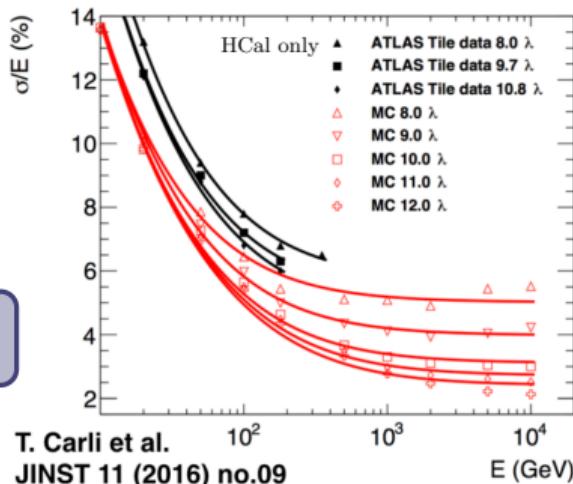
See talk by Coralie
Neubuser Thu 10:50

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calorimeter depth

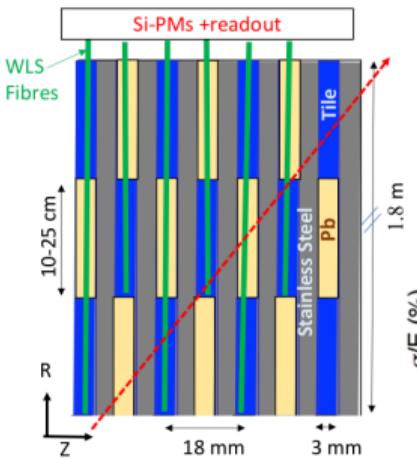


T. Carli et al.
JINST 11 (2016) no.09

See talk by Coralie
Neubauer Thu 10:50

Hadronic barrel calorimeter

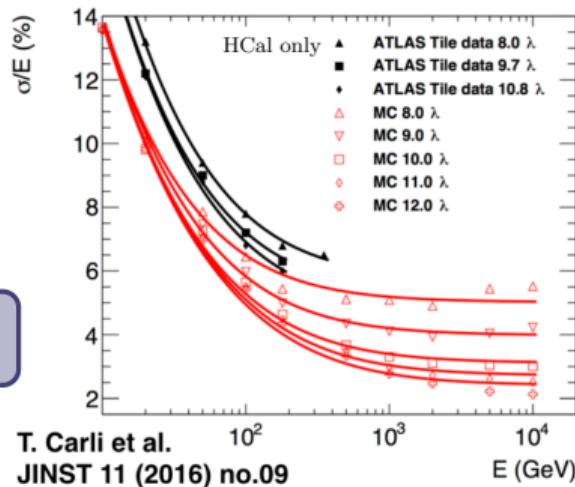
FCC-hh Tile Barrel +Ext. Barrel



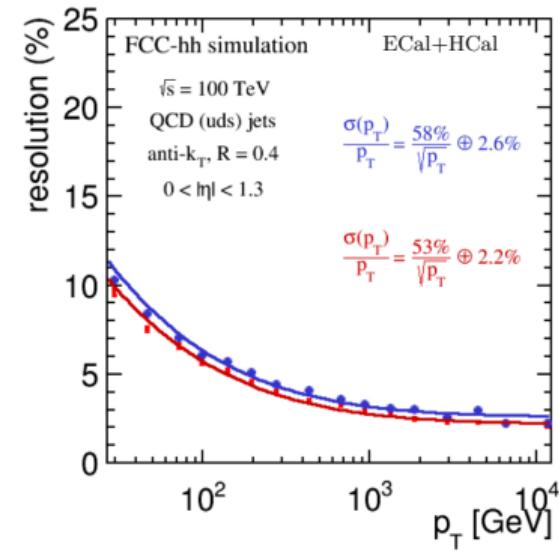
See talk by Coralie
Neubauer Thu 10:50

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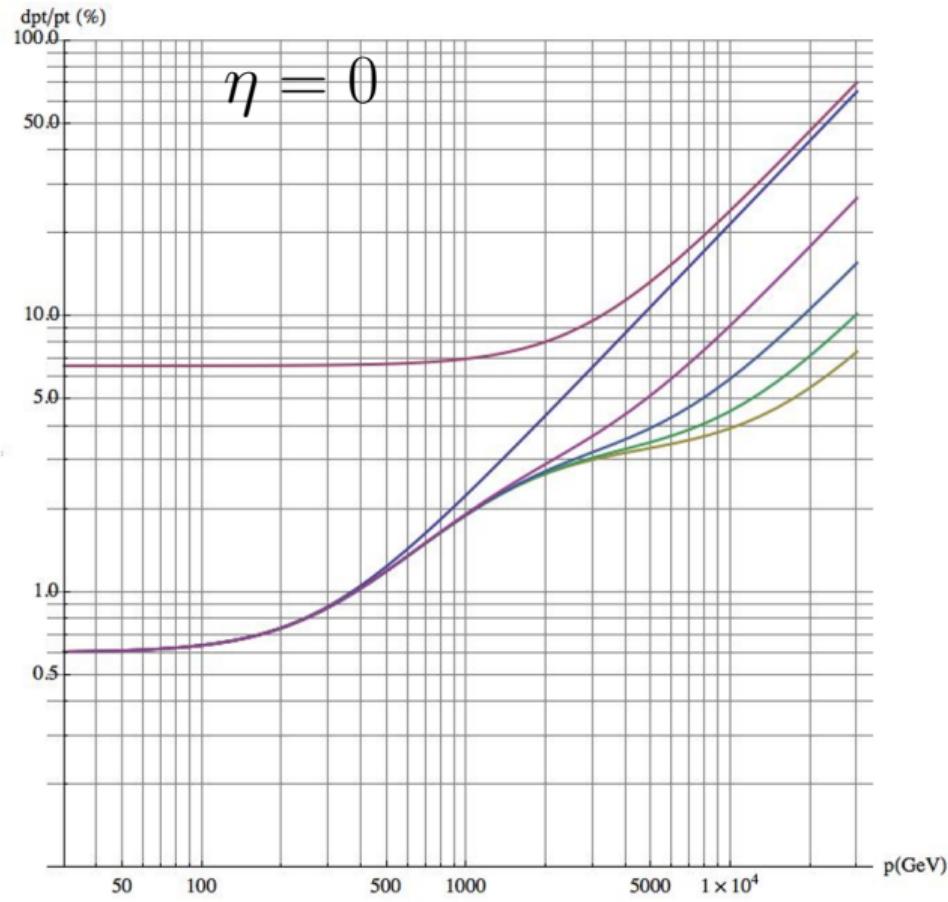
calorimeter depth



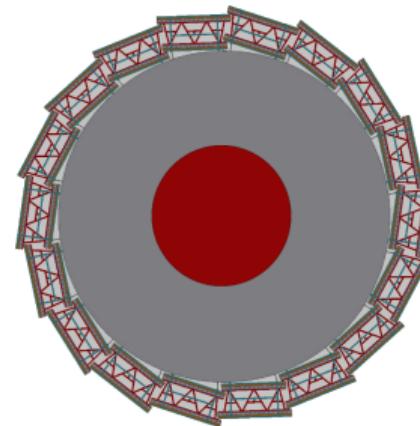
jet resolution



Muon chambers



See talk by Hubert Kroha Thu 11:10

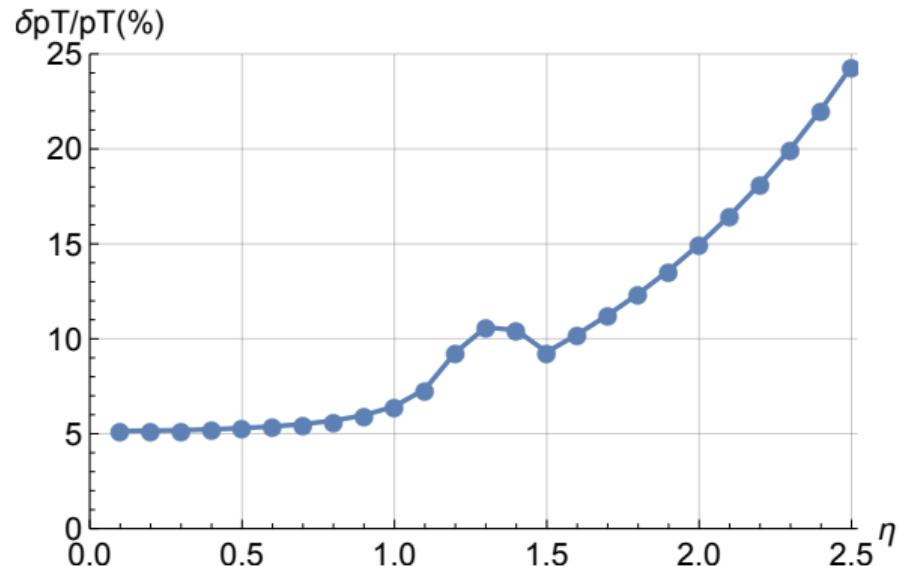
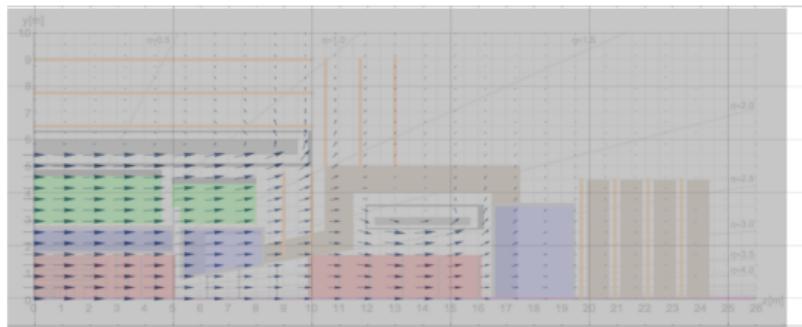


- FCC Tracker
- FCC Muon standalone 70uRad Angular Resolution
- FCC Combined M.S. Limit
- FCC combined 25um Muon Position Resolution
- FCC combined 50um Muon Position Resolution
- FCC combined 100um Muon Position Resolution

See talk by Paolo Giacomelli Thu 16:30

Muon standalone performance

- 200 X_0 of material in front of muon system
- perfect muon chamber resolution



Example: ATLAS Phase-II:

- Calorimetry will be digitized at 40 MHz and sent via optical fibers to L1 electronics outside the cavern at **25 TB/s** to create the L1 Trigger.
- Muon system will also be read out at 40 MHz to produce a L1 Trigger.

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FCC-hh detector:

- Reading out the FCC detector calorimetry and muon system at 40 MHz result in **200-300 TB/s**: seems feasible.

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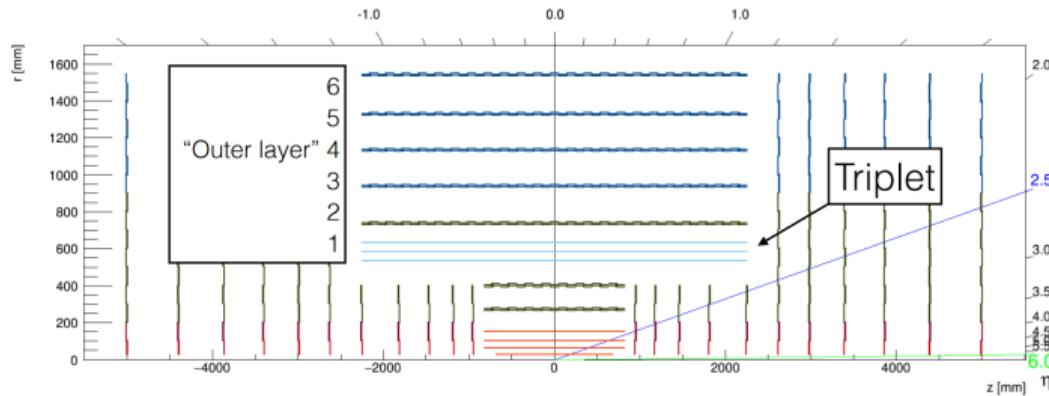
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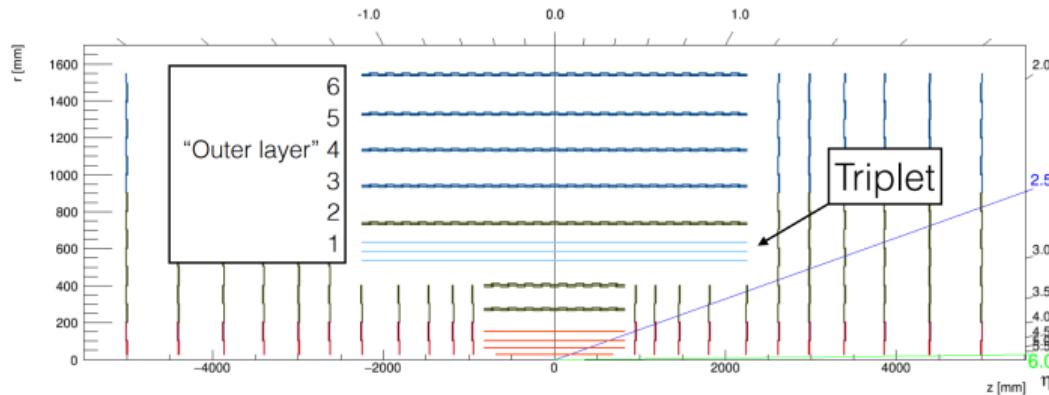
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- Can the L1 Calo+Muon Trigger have enough selectivity to allow readout of the tracker at a reasonable rate of e.g. 1 MHz ?
 - Reading tracker at 40 MHz results in **~800 TB/s**.
 - Untriggered detector readout at 40 MHz would result in over **1 PB/s** over optical links to the underground service cavern and/or a HLT computing farm on the surface.



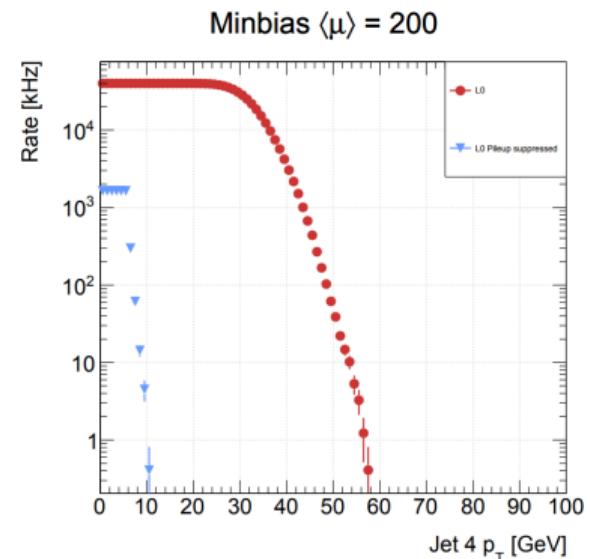
- Trigger based on part of outer barrel: replacing existing layer with the triplet.

Trigger: tracker

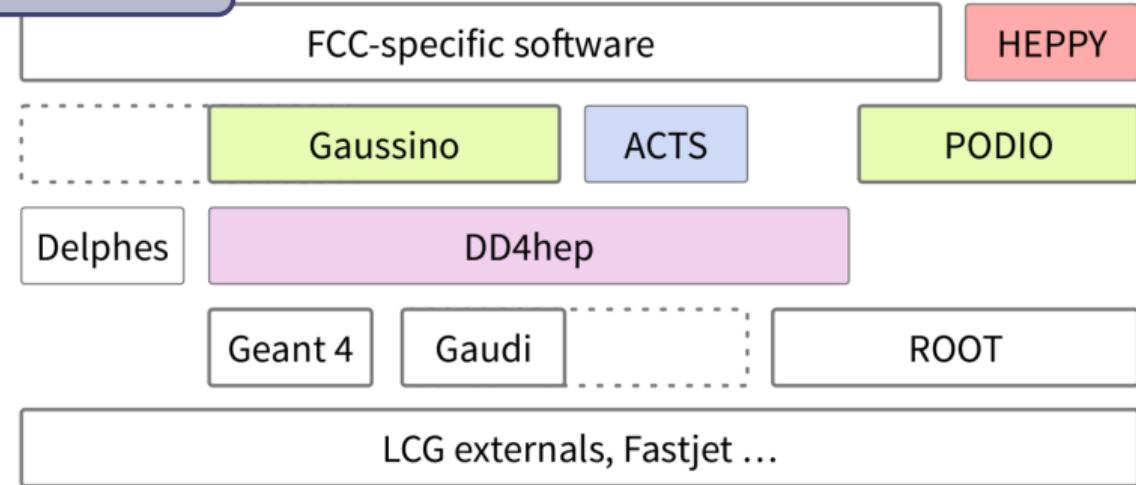
See talk by William Fawcett Thu 9:45



- Trigger based on part of outer barrel: replacing existing layer with the triplet.
- Instead of locating primary vertex: find primary bin with largest $\sum p_T$ of tracks.
- If the PV can be identified (93% efficiency for pileup 200), a massive decrease in the multijet trigger rate.



See talk by Valentin Volkl **Thu 14:00**

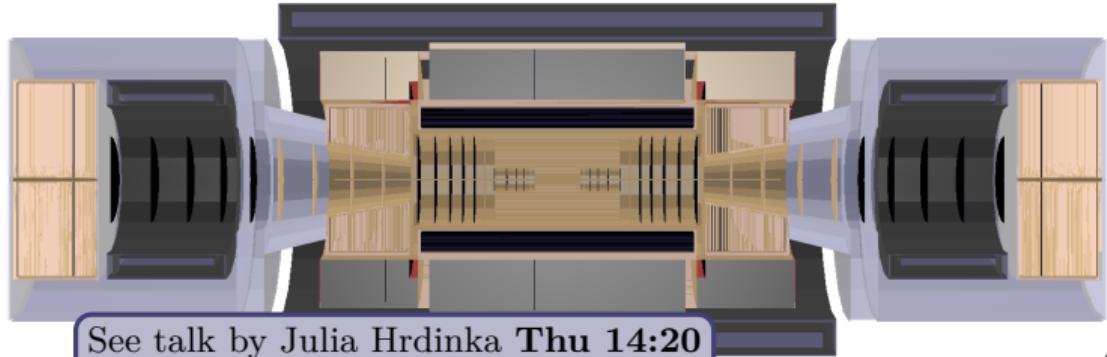
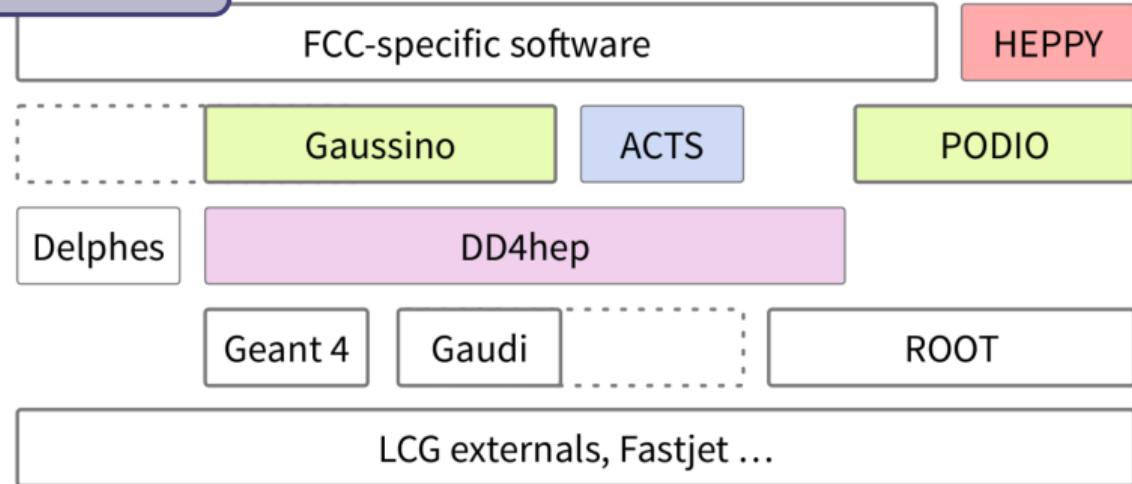


See talk by Julia Hrdinka **Thu 14:20**

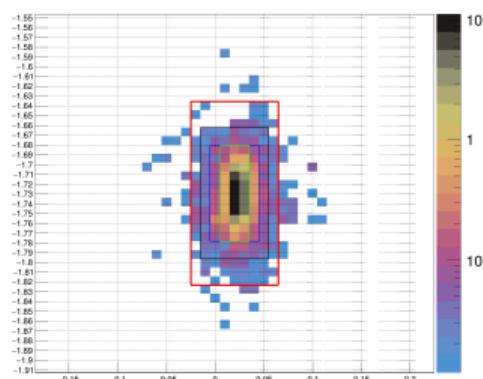
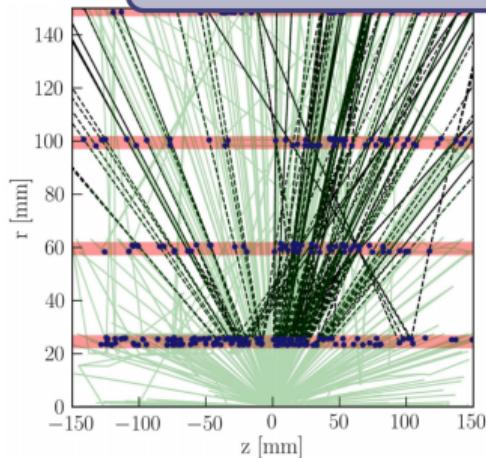
FCC Common Software

See talk by Clement Helsens **Thu 13:30**

See talk by Valentin Volkl **Thu 14:00**



See talk by Valentin Volkl **Thu 14:00**



FCC-specific software

HEPPY

Gaussino

ACTS

PODIO

Delphes

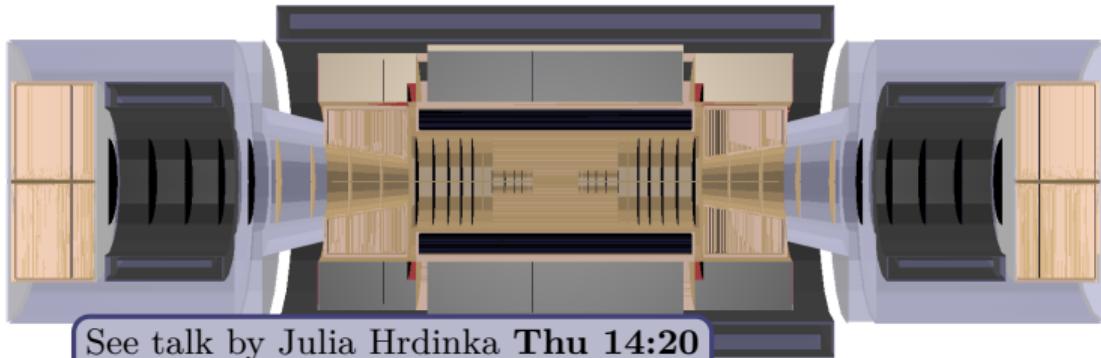
DD4hep

Geant 4

Gaudi

ROOT

LCG externals, Fastjet ...



See talk by Julia Hrdinka **Thu 14:20**

Physics benchmarks

Measurement of Higgs properties

- $H \rightarrow ZZ$, $H \rightarrow \gamma\gamma$, $H \rightarrow Z\gamma$, $H \rightarrow \mu\mu$
- $t\bar{t}H$, $H \rightarrow \gamma\gamma$, $t\bar{t}H$, $H \rightarrow$ multileptons, $t\bar{t}H$,
 $H \rightarrow bb$ (boosted)

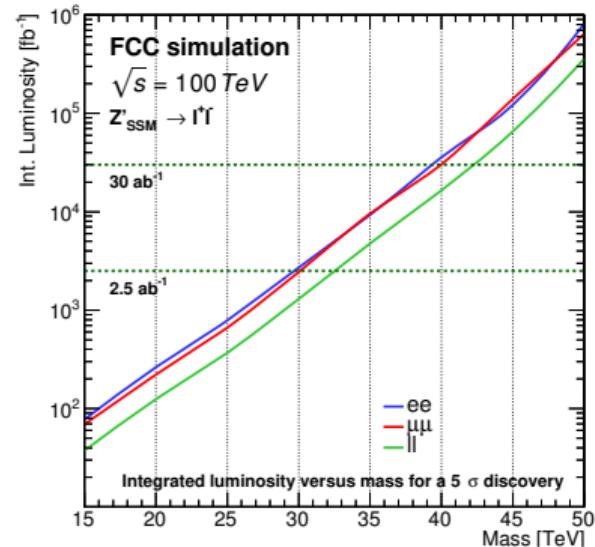
Measurement of di-Higgs production

- $HH \rightarrow bb\gamma\gamma$, $HH \rightarrow bbWW / bbZZ$, $HH \rightarrow bb\tau\tau$,
 $HH \rightarrow bbbb$ (boosted)

Measurement of Vector Boson Scattering

Searches for new physics

- Resonances: ee, $\mu\mu$, jj
- Resonances: WW, $t\bar{t}$
- Supersymmetry: stop
- Dark Matter: monojet + DM, $t\bar{t} + DM$
- Dark Matter: disappearing tracks



See talks by Filip Moortgat, Michele Selvaggi, Giacomo Ortona, Andreas Papaefstathiou **Wed 13:30 - 15:00**

See talks by Clement Helsens, Loukas Gouskos, Ryu Sawada, Ilkay Turk Cakir **Wed 15:30 - 17:00**



EP R&D

Created to determine the needs of future experiments (post HL-LHC phase II):

- Silicon detectors
- Gas detectors
- Calorimetry and light based detectors
- Detector Mechanics
- IC technologies
- High Speed Links
- Software
- Detector Magnets

<https://ep-dep.web.cern.ch/rd-experimental-technologies>

Next Workshop: 25 Sep 2018

R&D
**on EXPERIMENTAL
TECHNOLOGIES**

CERN's Experimental Physics department has launched a process to define its R&D programme on new Experimental Technologies. The R&D work would span a 5-year period from 2020 onwards (with a possible extension by another 5 years), and cover detector hardware, electronics and software for new experiments and detector upgrades beyond LHC Phase II.

8 working group sessions
Special R&D proposals

- Silicon detectors
- Gas detectors
- Calorimetry and light based detectors
- Detector Mechanics
- IC technologies
- High Speed Links
- Software
- Detector Magnets

1st Workshop
16 March 2018 (full day)
CERN, main auditorium

Please register!
<http://indico.cern.ch/e/EP-RD-Workshop1>

 CERN | Experimental Physics Department R&D on Experimental Technologies

FCC Week 2018

	FCC Week 2018 Program Overview																																				
Day	Monday (9 APRIL)			Tuesday (10 APRIL)					Wednesday (11 APRIL)					Thursday (12 APRIL)					Friday (13 APRIL)																		
Room	Plenary Room 0.4 Effectenbeurszaal		Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 6 Room 1.2 Minder + Kamer	Plenary Room 0.4 Effectenbeurszaal	Room																	
08:30-09:00	Registration (0.3 Beurskamer)	Opening, study status and physics perspectives	Welcome	FCC-hh accelerator: design I (review)	Conductor NBS: State of the art & characterization	FCC-ee Physics & Exp.: Detector Designs (review)	SRF Direction for R&D	Special Tech.: Beam Vacuum System Conceptual Design I	FCC-ee accelerator: parameters and optics (review)	EuroCirCol 16 T Other tasks	FCC-physics	Civil engineering, geodesy, alignment, transport, logistics (review)	FCC-hh Physics & Exp.: Detector Magnet, Tracker, ECAL	FCC-ee injector (review)	Special Tech.: Beam stoppers, collimators and dumps	FCC-ee: Technical developments	EuroCirCol WPA coordination (closed session)	Summaries Machines and Technologies	FCC-ee design	08:30-09:00																	
09:00-09:30			Physics at FCC																FCC-hh design	09:00-09:30																	
09:30-10:00			Study status & further plans	Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					i&O/Special Technologies	09:30-10:00																	
10:00-10:30		Coffee Break (0.2 Grote Zaal)		FCC-hh accelerator: design II (review)	Conductor Development for FCC	FCC-ee Physics & Exp.: Machine detector interface (review)	SRF cavity technology	Special Tech.: Beam Vacuum System Conceptual Design II	FCC-ee accelerator: MDI (review)	16 T R&D Magnets and models	FCC-physics	Cryogenics (review)	Special Tech.: Injection & extraction II	FCC-hh Physics & Exp.: Detector Muons, HCAL, Trigger	FCC-ee accelerator: energy calibration & polarization (review)	Special Tech.: Electronics & instrumentation	EASitran: superconducting thin films and manufacturing	EuroCirCol WPA coordination (closed session)	Magnets/WF	Magnets/WF	10:00-10:30																
10:30-11:00																			Coffee Break (0.2 Grote Zaal)	10:30-11:00																	
11:00-11:30		Status Machines (overview)	FCC-hh machine design																Summaries Physics and Experiments	FCC-ee	11:00-11:30																
11:30-12:00			FCC-ee machine design	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					FCC-ee	11:30-12:00																	
12:00-12:30	HE-LHC machine		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Closing remarks		12:30-13:00																	
12:30-13:00	Lunch (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Closing remarks		13:00-13:30																	
13:00-13:30	Lunch (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Closing remarks		13:00-13:30																	
13:30-14:00	Lunch (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Closing remarks		13:30-14:00																	
14:00-14:30	Status Technologies and Infrastructure (overview)	Civil Engineering, I&O	FCC-hh accelerator: collimation (review)	FCC-ee Physics & Exp.: Other superconductors	FCC-ee Physics & Exp.: precision measurements (review)	SRF studies	HE LHC Optics and beam-beam	FCC-ee accelerator: collective effects and top-up (review)	Other programs	FCC-ee Physics & Exp.: Higgs, top and electroweak precision physics	Cooling & ventilation, electric, distribution, energy management (review)	EASitran CC (closed session)	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects I (review)	EASitran: superconducting wires	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects I (review)	EASitran: superconducting wires	14:00-14:30														
14:30-15:00			Special Technologies R&D	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)								14:30-15:00															
15:00-15:30	16 T Magnet R&D - SRF R&D		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)		15:00-15:30																	
15:30-16:00	Coffee Break (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)		15:30-16:00																	
16:00-16:30	Status Experiments and Detectors (overview)	FCC-hh and HE LHC experiments and detector	FCC-hh and HE LHC experiments and detector	FCC-ee Physics & Exp.: Higgs, flavour, neutrinos, QCD (review)	SRF Innovation	CEPC and others	Other magnets for FCC	FCC-ee Physics & Exp.: Searches	Operation, reliability, radiation (review)	FCC-hh: Collider beam transfer and injector II (review)	Common Technologies	HE LHC collimation and beam dynamics (review)	Special Tech.: Machine protection, circuit and powering	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	16:00-16:30											
16:30-17:00			FCC-ee experiments and detector	LHC and FCC-hh experiments					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)		16:30-17:00																
17:00-17:30	Cold refreshments (0.2 Grote Zaal)		Poster Session 0.2 Grote Zaal					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)		17:00-17:30																	
17:30-18:00	Cold refreshments (0.2 Grote Zaal)		Poster Session 0.2 Grote Zaal					Netherlands specific session	Gravitational waves: A new route to fundamental physics and cosmology					FCC & EuroCirCol Collab. Boards, EASTrain SS8 (closed session)	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	17:30-18:00												
18:00-18:30	Strategy Roadmaps Plenary Session	HEP and collider activities in the Americas	HEP and collider activities in the Americas	Poster Session 0.2 Grote Zaal						High Energy Physics detector R&D													18:00-18:30														
18:30-19:00			HEP and collider activities in Asia	Poster Session 0.2 Grote Zaal						Research in High Magnetic Fields													18:30-19:00														
19:00-19:30			HEP and collider activities in Europe & Strategy update	Poster Session 0.2 Grote Zaal						Superconductivity R&D in the Netherlands													19:00-19:30														
19:30-20:00	Summary of the APPEC Strategy Update		Poster Session 0.2 Grote Zaal					0.4 Effectenbeurszaal	0.4 Effectenbeurszaal					0.4 Effectenbeurszaal	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	19:30-20:00												

FCC Week 2018

	FCC Week 2018 Program Overview																																																		
Day	Monday (9 APRIL)			Tuesday (10 APRIL)					Wednesday (11 APRIL)					Thursday (12 APRIL)					Friday (13 APRIL)																																
Room	Plenary Room 0.4 Effectenbeurszaal		Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Bergen zaal	Parallel 5 Room 1.20 Villengang	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Bergen zaal	Parallel 5 Room 1.20 Villengang	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Bergen zaal	Parallel 5 Room 1.20 Villengang	Parallel 6 Room 1.2 Midden + Kamer	Plenary Room 0.4 Effectenbeurszaal	Room	Time																														
08:30-09:00	Registration (0.3 Beursoyer)	Welcome	FCC-hh accelerator: design I (review)	Conductor: Nb3Sn: State of the art & characterization	FCC-ee Physics & Exp.: Detector Designs (review)	SRF Direction for R&D	Special Tech.: Beam Vacuum System Conceptual Design I	FCC-ee accelerator: parameters and optics (review)	EuroCirCol 16 T Other tasks	FCC-physics	Civil engineering, geodesy, alignment, transport, logistics (review)	Special Tech.: Injection & extraction I	FCC-hh Physics & Exp.: Detector Magnet, Tracker, ECAL	FCC-ee injector (review)	Special Tech.: Beam stoppers, collimators and dumps	FCC-ee: Technical developments	EuroCirCol Wk4 coordination (closed session)	Summaries Machines and Technologies	FCC-ee design	08:30-09:00																															
09:00-09:30		Physics at FCC																	FCC-ee design	09:00-09:30																															
09:30-10:00		Study status & further plans	Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)						i&O/Special Technologies	09:30-10:00																															
10:00-10:30		Coffee Break (0.2 Grote Zaal)		FCC-hh accelerator: design II (review)	Conductor: Development for FCC	FCC-ee Physics & Exp.: Machine detector interface (review)	SRF cavity technology	Special Tech.: Beam Vacuum System Conceptual Design II	FCC-ee accelerator: MDI (review)	16 T R&D Magnets and models	FCC-physics	Cryogenics (review)	Special Tech.: Injection & extraction II	FCC-hh Physics & Exp.: Detector Muons, HCAL, Trigger	FCC-ee accelerator: energy calibration & polarization (review)	Special Tech.: Electronics & instrumentation	EASitran: superconducting thin films and manufacturing	EuroCirCol Wk4 coordination (closed session)		Magnets/WF	10:00-10:30																														
10:30-11:00																		Coffee Break (0.2 Grote Zaal)	10:30-11:00																																
11:00-11:30		Status Machines (overview)	FCC-hh machine design															FCC-ee	11:00-11:30																																
11:30-12:00		FCC-ee machine design	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Summaries Physics and Experiments	FCC-ee	11:30-12:00																															
12:00-12:30		HE-LHC machine	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)							Closing remarks	12:30-13:00																														
12:30-13:00		Lunch (0.2 Grote Zaal)																			13:00-13:30																														
13:00-13:30		Lunch (0.2 Grote Zaal)																			13:30-14:00																														
13:30-14:00		Lunch (0.2 Grote Zaal)		FCC-hh accelerator: collimation (review)	Conductor: Other superconductors	FCC-ee Physics & Exp.: Higgs precision measurements (review)	SRF studies	HE LHC Optics and beam-beam	FCC-ee accelerator: collective effects and top-up (review)	Other programs	FCC-hh Physics & Exp.: Higgs, top and electroweak precision physics	Cooling & ventilation, electric distribution, energy management (review)	EASitran CC (closed session)	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects I (review)	EASitran: superconducting wires			14:00-14:30																														
14:00-14:30	Status Technologies and Infrastructure (overview)	Civil Engineering, I&O	14:30-15:00																																																
14:30-15:00		Special Technologies R&D	Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)							15:00-15:30																															
15:00-15:30	16 T Magnet R&D - SRF R&D		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)							15:30-16:00																															
15:30-16:00	Coffee Break (0.2 Grote Zaal)		FCC-hh: Collider beam transfer and injector I (review)	EuroCirCol 16 T Designs for the FCC CDR	FCC-ee Physics & Exp.: Higgs, flavour, neutrinos, QCD (review)	SRF Innovation		CEPC and others	Other magnets for FCC	FCC-hh Physics & Exp.: Searches	Operation, reliability, radiation (review)	FCC-hh: Collider beam transfer and injector II (review)	Common Technologies	HE LHC collimation and beam dynamics (review)	Special Tech.: Machine protection, circuit and powering	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics			16:00-16:30																															
16:00-16:30	Status Experiments and Detectors (overview)	FCC-hh and HE LHC experiments and detector																		16:30-17:00																															
16:30-17:00		FCC-ee experiments and detector	Cold refreshments (0.2 Grote Zaal)					Cold refreshments (0.2 Grote Zaal)					Cold refreshments (0.2 Grote Zaal)							17:00-17:30																															
17:00-17:30	LHC and FCC-ee experiments		Poster Session 0.2 Grote Zaal					Netherlands specific session	Cold refreshments (0.2 Grote Zaal)					Cold refreshments (0.2 Grote Zaal)						17:30-18:00																															
17:30-18:00	Cold refreshments (0.2 Grote Zaal)									Gravitational waves: A new route to fundamental physics and cosmology					Gravitational waves: A new route to fundamental physics and cosmology					18:00-18:30																															
18:00-18:30	Strategy Roadmaps Plenary Session	HEP and collider activities in the Americas							High Energy Physics detector R&D					High Energy Physics detector R&D						18:30-19:00																															
18:30-19:00		HEP and collider activities in Asia	Research in High Magnetic Fields							Research in High Magnetic Fields					Research in High Magnetic Fields					19:00-19:30																															
19:00-19:30		HEP and collider activities in Europe & Strategy update	Superconductivity R&D in the Netherlands						Superconductivity R&D in the Netherlands					Superconductivity R&D in the Netherlands					19:30-20:00																																
19:30-20:00	Summary of the APPEC Strategy Update		0.4 Effectenbeurszaal					0.4 Effectenbeurszaal					0.4 Effectenbeurszaal							20:00-20:30																															

FCC Week 2018

	FCC Week 2018 Program Overview																															
Day	Monday (9 APRIL)			Tuesday (10 APRIL)					Wednesday (11 APRIL)					Thursday (12 APRIL)					Friday (13 APRIL)													
Room	Plenary Room 0.4 Effectenbeurszaal		Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 6 Room 1.2 Minder + Kamer	Plenary Room 0.4 Effectenbeurszaal	Room												
08:30-09:00	Registration (0.3 Beursoyer)	Opening, study status and physics perspectives	Welcome	FCC-hh accelerator: design I (review)	Conductor NBS: State of the art & characterization	FCC-ee Physics & Exp.: Detector Designs (review)	SRF Direction for R&D	Special Tech.: Beam Vacuum System Conceptual Design I	FCC-ee accelerator: parameters and optics (review)	EuroCirCol 16 T Other tasks	FCC-physics	Civil engineering, geodesy, alignment, transport, logistics (review)	FCC-hh Physics & Exp.: Detector Magnet, Tracker, ECAL	FCC-ee injector (review)	Special Tech.: Beam stoppers, collimators and dumps	FCC-ee: Technical developments	EuroCirCol Wk4 coordination (closed session)	Summaries Machines and Technologies	FCC-ee design	08:30-09:00												
09:00-09:30			Physics at FCC																FCC-hh design	09:00-09:30												
09:30-10:00			Study status & further plans	Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)						i&O/Special Technologies	09:30-10:00											
10:00-10:30		Coffee Break (0.2 Grote Zaal)		FCC-hh accelerator: design II (review)	Conductor Development for FCC	FCC-ee Physics & Exp.: Machine detector interface (review)	SRF cavity technology	Special Tech.: Beam Vacuum System Conceptual Design II	FCC-ee accelerator: MDI (review)	16 T R&D Magnets and models	FCC-physics	Cryogenics (review)	Special Tech.: Injection & extraction II	FCC-hh Physics & Exp.: Detector HCAL, Muons, Trigger	FCC-ee accelerator: energy calibration & polarization (review)	Special Tech.: Electronics & instrumentation (review)	EASitran: superconducting thin films and manufacturing	EuroCirCol Wk4 coordination (closed session)	Summaries Physics and Experiments	Magnets/RF	10:00-10:30											
10:30-11:00																			Coffee Break (0.2 Grote Zaal)	10:30-11:00												
11:00-11:30		Status Machines (overview)	FCC-hh machine design	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					FCC-hh	11:00-11:30												
11:30-12:00			FCC-ee machine design	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)						11:30-12:00												
12:00-12:30		HE-LHC machine		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Closing remarks		12:30-13:00											
12:30-13:00	Lunch (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)		13:00-13:30												
13:00-13:30	Lunch (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)		13:30-14:00												
13:30-14:00	Lunch (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)		14:00-14:30												
14:00-14:30	Status Technologies and Infrastructure (overview)	Civil Engineering, I&O	FCC-hh accelerator: collimator (review)	Conductor: Other superconductors	FCC-ee Physics & Exp.: EW precision measurements (review)	SRF studies	HE LHC Optics and beam-beam	FCC-ee accelerator: collective effects and top-up (review)	Other programs	FCC-ee Physics & Exp.: Higgs, top and electroweak precision physics	Cooling & ventilation, electric, distribution, energy management (review)	EASitran CC (closed session)	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects I (review)	EASitran: superconducting wires	Common software	14:00-14:30													
14:30-15:00		Special Technologies R&D					1.2 Menden kamer					1.4 Verhey kamer							14:30-15:00													
15:00-15:30	16 T Magnet R&D - SRF R&D		Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)		15:00-15:30												
15:30-16:00	Coffee Break (0.2 Grote Zaal)		Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)		15:30-16:00												
16:00-16:30	Status Experiments and Detectors (overview)	FCC-hh and HE LHC experiments and detector	FCC-hh: Collider beam transfer and injector I (review)	EuroCirCol 16 T Designs for the FCC CDR	FCC-ee Physics & Exp.: Higgs, flavour, neutrinos, QCD (review)	SRF Innovation		CEPC and others	Other magnets for FCC	FCC-ee Physics & Exp.: Searches	Operation, reliability, radiation (review)	FCC-hh: Collider beam transfer and injector II (review)	Common technologies	HE LHC collimation and beam dynamics (review)	Special Tech.: Machine protection, circuit and powering	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	Common technologies	16:00-16:30													
16:30-17:00		FCC-ee experiments and detector																	16:30-17:00													
17:00-17:30	LHC and FCC-hh experiments		Poster Session 0.2 Grote Zaal					Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)					Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)					Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)		17:00-17:30												
17:30-18:00	Cold refreshments (0.2 Grote Zaal)		Poster Session 0.2 Grote Zaal					Netherlands specific session	Gravitational waves: A new route to fundamental physics and cosmology					FCC & EuroCirCol	Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)					17:30-18:00												
18:00-18:30	Strategy Roadmaps Plenary Session	HEP and collider activities in the Americas							High Energy Physics detector R&D					Collab. Boards, EASitran SS8 (closed session)	Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)					18:00-18:30												
18:30-19:00		HEP and collider activities in Asia							Research in High Magnetic Fields						Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)					18:30-19:00												
19:00-19:30		HEP and collider activities in Europe & Strategy update							Superconductivity R&D in the Netherlands					0.4 Effectenbeurszaal	Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)					19:00-19:30												
19:30-20:00		Summary of the APPEC Strategy Update							0.4 Effectenbeurszaal						Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)					19:30-20:00												

FCC Week 2018

	FCC Week 2018 Program Overview																				
Day	Monday (9 APRIL)			Tuesday (10 APRIL)					Wednesday (11 APRIL)					Thursday (12 APRIL)					Friday (13 APRIL)		
Room	Plenary Room 0.4 Effectenbeurszaal		Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 6 Room 1.2 Minder + Kamer	Plenary Room 0.4 Effectenbeurszaal	Room	
08:30-09:00	Registration (0.3 Beursoyer)	Opening, study status and physics perspectives	Welcome	FCC-hh accelerator: design I (review)	Conductor NBSn: State of the art & characterization	FCC-ee Physics & Exp.: Detector Designs (review)	SRF Direction for R&D	Special Tech.: Beam Vacuum System Conceptual Design I	FCC-ee accelerator: parameters and optics (review)	EuroCirCol 16 T Other tasks	FCC-physics	Civil engineering, geodesy, alignment, transport, logistics (review)	FCC-hh Physics & Exp.: Detector Magnet, Tracker, ECAL	FCC-ee injector (review)	Special Tech.: Beam stoppers, collimators and dumps	FCC-ee: Technical developments	EuroCirCol WPA coordination (closed session)	Summaries Machines and Technologies	FCC-ee design	08:30-09:00	
09:00-09:30			Physics at FCC																FCC-hh design	09:00-09:30	
09:30-10:00			Study status & further plans	Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					i&O/Special Technologies	09:30-10:00	
10:00-10:30		Coffee Break (0.2 Grote Zaal)		FCC-hh: Development for FCC	FCC-ee Physics & Exp.: Machine detector interface (review)	SRF cavity technology	Special Tech.: Beam Vacuum System Conceptual Design II	FCC-ee accelerator: MDI (review)	16 T R&D Magnets and models	FCC-physics	Cryogenics (review)	Special Tech.: Injection & extraction II	FCC-hh Physics & Exp.: Detector Muons, HCAL, Trigger	FCC-ee accelerator: energy calibration & polarization (review)	Special Tech.: Electronics & instrumentation	EASitran: superconducting thin films and manufacturing	EuroCirCol WPA coordination (closed session)	Summaries Physics and Experiments	Magnets/RF	10:00-10:30	
10:30-11:00		Status Machines (overview)	FCC-hh machine design															Coffee Break (0.2 Grote Zaal)	10:30-11:00		
11:00-11:30			FCC-ee machine design															FCC-hh	11:00-11:30		
11:30-12:00	HE-LHC machine	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					FCC-ee	Lunch (0.2 Grote Zaal)			
12:00-12:30		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)						Closing remarks			
12:30-13:00	Status Technologies and Infrastructure (overview)	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Summaries Physics and Experiments	13:00-13:30			
13:00-13:30		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)						13:30-14:00			
13:30-14:00	Civil Engineering, I&O	FCC-hh: collimation (review)	Conductor: Other superconductors	FCC-ee Physics & Exp.: Higgs precision measurements (review)	SRF studies	HE LHC Optics and beam-beam	FCC-ee accelerator: collective effects and top-up (review)	Other programs	FCC-hh Physics & Exp.: Higgs, top and electroweak precision physics	Cooling & ventilation, electric, distribution, energy management (review)	EASitran CC (closed session)	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects I (review)	EASitran: superconduct. wires	Common sessions	14:00-14:30				
14:00-14:30		Special Technologies R&D				1.2 Mendes kamer					1.4 Verney kamer						14:30-15:00				
14:30-15:00	16 T Magnet R&D - SRF R&D	Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Common sessions	15:00-15:30			
15:00-15:30		Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)						15:30-16:00			
15:30-16:00	Coffee Break (0.2 Grote Zaal)					Poster Session 0.2 Grote Zaal					Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)					Common sessions	16:00-16:30				
16:00-16:30	Status Experiments and Detectors (overview)	FCC-hh and HE LHC experiments and detector I (review)	EuroCirCol 16 T Designs for the FCC CDR	FCC-ee Physics & Exp.: Higgs, flavour, neutrinos, QCD (review)	SRF Innovation	CEPC and others	Other magnets for FCC	FCC-hh Physics & Exp.: Searches	Operation, reliability, radiation (review)	FCC-hh: Collider beam transfer and injector II (review)	HE LHC collimation and beam dynamics (review)	Special Tech.: Machine protection, circuit and powering	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	16:30-17:00						
16:30-17:00		FCC-ee experiments and detector														17:00-17:30					
17:00-17:30	LHC and FCC-hh experiments					Poster Session 0.2 Grote Zaal					Cold refreshments (0.5 Graanbeurs, 0.3 Beursoyer)					Common sessions	17:30-18:00				
17:30-18:00	Cold refreshments (0.2 Grote Zaal)					Netherlands specific session	Gravitational waves: A new route to fundamental physics and cosmology					FCC & EuroCirCol Collab. Boards, EASTrain SS8 (closed session)					18:00-18:30				
18:00-18:30	Strategy Roadmaps Plenary Session	HEP and collider activities in the Americas					High Energy Physics detector R&D										18:30-19:00				
18:30-19:00		HEP and collider activities in Asia					Research in High Magnetic Fields										19:00-19:30				
19:00-19:30	HEP and collider activities in Europe & Strategy update						Superconductivity R&D in the Netherlands					0.4 Effectenbeurszaal					19:30-20:00				
19:30-20:00	Summary of the APPEC Strategy Update						0.4 Effectenbeurszaal														

FCC Week 2018

	FCC Week 2018 Program Overview																																								
Day	Monday (9 APRIL)			Tuesday (10 APRIL)					Wednesday (11 APRIL)					Thursday (12 APRIL)					Friday (13 APRIL)																						
Room	Plenary Room 0.4 Effectenbeurszaal		Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Bergen zaal	Parallel 5 Room 1.20 Villengang	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Bergen zaal	Parallel 5 Room 1.20 Villengang	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Graanbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Bergen zaal	Parallel 5 Room 1.20 Villengang	Parallel 6 Room 1.2 Midden + Kamer	Plenary Room 0.4 Effectenbeurszaal	Room	Time																				
08:30-09:00	Registration (0.3 Beurskamer)	Opening, study status and physics perspectives	Welcome	FCC-hh accelerator: design I (review)	Conductor NB35n: State of the art & characterizatio n	FCC-ee Physics & Exp.: Detector Designs (review)	SRF Direction for R&D	Special Tech.: Beam Vacuum System Conceptual Design I	FCC-ee accelerator: parameters and optics (review)	EuroCirCol 16 T Other tasks	FCC-physics	Civil engineering, geodesy, alignment, transport, logistics (review)	FCC-hh Physics & Exp.: Detector Magnet, Tracker, ECAL	FCC-ee injector (review)	Special Tech.: Beam stoppers, collimators and dumps	FCC-eh: Technical developments	EuroCirCol WP4 coordination (closed session)	Summaries Machines and Technologies	FCC-ee design	08:30-09:00																					
09:00-09:30			Physics at FCC																FCC-hh design	09:00-09:30																					
09:30-10:00			Study status & further plans	Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					i&O/Special Technologies	09:30-10:00																					
10:00-10:30		Coffee Break (0.2 Grote Zaal)		FCC-hh accelerator: design II (review)	Conductor: Development for FCC	FCC-ee Physics & Exp.: Detector interface (review)	SRF cavity technology	Special Tech.: Beam Vacuum System Conceptual Design II	FCC-ee accelerator: MDI (review)	16 T R&D Magnets and models	FCC-physics	Cryogenics (review)	Special Tech.: Injection & extraction II	FCC-hh Physics & Exp.: Detector Muons, HCAL, Trigger	FCC-ee accelerator: energy calibration & polarization (review)	Special Tech.: Electronics & Instrumentation	EASitran: superconducting thin films and manufacturing	EuroCirCol WP4 coordination (closed session)		Magnets/WF	10:00-10:30																				
10:30-11:00		Coffee Break (0.2 Grote Zaal)																Coffee Break (0.2 Grote Zaal)	10:30-11:00																						
11:00-11:30		Status Machines (overview)	FCC-hh machine design															Coffee Break (0.2 Grote Zaal)	11:00-11:30																						
11:30-12:00			FCC-ee machine design	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Closing remarks	12:30-13:00																					
12:00-12:30	HE-LHC machine		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					13:00-13:30																							
12:30-13:00	Lunch (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					13:30-14:00																							
13:00-13:30	Lunch (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					14:00-14:30																							
13:30-14:00	Lunch (0.2 Grote Zaal)		Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					14:30-15:00																							
14:00-14:30	Status Technologies and Infrastructure (overview)	Civil Engineering, I&O accelerator: collimation (review)	Other superconductors	FCC-ee Physics & Exp.: Higgs, precision measurements (review)	SRF studies	HE LHC Optims and beam-beam	FCC-ee accelerator: collective effects and top-up (review)	Other programs	FCC-ee Physics & Exp.: Higgs, top and electroweak precision physics	Cooling & ventilation, electric, distribution, energy management (review)	EASitran CC (closed session)	Common software	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh accelerator: collective effects I (review)	EASitran: superconducting wires	EASitran: superconducting wires				15:00-15:30																				
14:30-15:00																					15:30-16:00																				
15:00-15:30	16 T Magnet R&D - SRF R&D		Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					16:00-16:30																							
15:30-16:00	Coffee Break (0.2 Grote Zaal)		Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)					16:30-17:00																							
16:00-16:30	Status Experiments and Detectors (overview)	FCC-hh and HE LHC experiments and detector (review)	Collider beam and transfer and injector I (review)	EuroCirCol 16 T Designs for the FCC CDR	FCC-ee Physics & Exp.: Higgs, flavour, neutrinos, QCD (review)	SRF Innovation	CEPC and others	Other magnets for FCC	FCC-ee Physics & Exp.: Searches	Operation, reliability, radiation (review)	FCC-hh: Collider beam transfer and injector II (review)	Common Technologies	HE LHC collimation and beam dynamics (review)	Special Tech.: Machine protection, circuit and powering	FCC-hh accelerator: collective effects II (review)	EASitran: cryogenics	EASitran: cryogenics				17:00-17:30																				
16:30-17:00																					17:30-18:00																				
17:00-17:30	LHC and FCC-hh experiments		Poster Session 0.2 Grote Zaal					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)					Cold refreshments (0.5 Graanbeurs, 0.3 Beurskamer)					18:00-18:30																							
17:30-18:00	Cold refreshments (0.2 Grote Zaal)		Poster Session 0.2 Grote Zaal					Netherlands specific session	Gravitational waves: A new route to fundamental physics and cosmology					FCC & EuroCirCol Collab. Boards, EASitran SS8 (closed session)					18:30-19:00																						
18:00-18:30	Strategy Roadmaps Plenary Session	HEP and collider activities in the Americas							High Energy Physics detector R&D												19:00-19:30																				
18:30-19:00									Research in High Magnetic Fields												19:30-20:00																				
19:00-19:30		HEP and collider activities in Europe & Strategy update							Superconductivity R&D in the Netherlands												19:30-20:00																				
19:30-20:00	Summary of the APPEC Strategy Update		0.4 Effectenbeurszaal					0.4 Effectenbeurszaal					0.4 Effectenbeurszaal					20:00-20:30																							

Summary

FCC Week 2018

	FCC Week 2018 Program Overview																				
Day	Monday (9 APRIL)			Tuesday (10 APRIL)					Wednesday (11 APRIL)					Thursday (12 APRIL)					Friday (13 APRIL)		Day
Room	Plenary Room 0.4 Effectenbeurszaal		Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Grandbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Grandbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 1 Room 0.4 Effectenbeurszaal	Parallel 2 Room 0.5 Grandbeurszaal	Parallel 3 Room 1.1 Administratief	Parallel 4 Room 1.9 Begeleidzaal	Parallel 5 Room 1.20 Vilegzaal	Parallel 6 Room 1.2 Minder + Kamer	Plenary Room 0.4 Effectenbeurszaal	Room	
08:30-09:00	Registration (0.3 Beursoyer)	Welcome	FCC-hh accelerator: design I (review)	Conductor NBS: State of the art & characterization	FCC-ee Physics & Exp.: Detector Designs (review)	SRF Direction for R&D	Special Tech.: Beam Vacuum System Conceptual Design I	FCC-ee accelerator: parameters and optics (review)	EuroCirCol 16 T Other tasks	FCC-physics	Civil engineering, geodesy, alignment, transport, logistics (review)	FCC-hh Physics & Exp.: Detector Magnet, Tracker, ECAL	FCC-ee injector (review)	Special Tech.: Beam stoppers, collimators and dumps	FCC-ee: Technical developments	EuroCirCol WPA coordination (closed session)	FCC-ee design	08:30-09:00			
09:00-09:30		Physics at FCC																FCC-hh design	09:00-09:30		
09:30-10:00		Study status & further plans	Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					i&O/Special Technologies	09:30-10:00		
10:00-10:30		Coffee Break (0.2 Grote Zaal)		FCC-hh: Development for FCC	FCC-ee Physics & Exp.: Machine detector interface (review)	SRF cavity technology	Special Tech.: Beam Vacuum System Conceptual Design II	FCC-ee accelerator: MDI (review)	16 T R&D Magnets and models	FCC-physics	Cryogenics (review)	FCC-hh Physics & Exp.: HCAL, Muons, Trigger	FCC-ee accelerator: energy calibration & polarization (review)	Special Tech.: Electronics & instrumentation	EASitran: superconducting thin films and manufacturing	EuroCirCol WPA coordination (closed session)	Magnets/RF	10:00-10:30			
10:30-11:00		Status Machines (overview)	FCC-hh machine design															Coffee Break (0.2 Grote Zaal)	10:30-11:00		
11:00-11:30			FCC-ee machine design															Summarys Physics and Experiments	11:00-11:30		
11:30-12:00		HE-LHC machine	Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)					Lunch (0.2 Grote Zaal)						13:00-13:30		
12:00-12:30		Lunch (0.2 Grote Zaal)		FCC-hh: collimation (review)	FCC-ee Physics & Exp.: precision measurements (review)	SRF studies	HE LHC Optims and beam-beam	FCC-ee accelerator: effects and top-up (review)	Other programs	FCC-hh Physics & Exp.: Higgs, top and electroweak precision physics	Cooling & ventilation, electric distribution, energy management (review)	EASitran CC (closed session)	HE LHC Parameters and optics (review)	Special Tech.: Development of new manufacturing technologies	FCC-hh: collective effects I (review)	EASitran: superconducting wires			13:30-14:00		
13:30-14:00		Status Technologies and Infrastructure (overview)	Civil Engineering, I&O																14:00-14:30		
14:00-14:30			Special Technologies R&D																14:30-15:00		
14:30-15:00			16 T Magnet R&D - SRF R&D	Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)					Coffee Break (0.2 Grote Zaal)						15:30-16:00	
15:00-15:30			Coffee Break (0.2 Grote Zaal)		FCC-hh: transfer and injector I (review)	EuroCirCol 16 T Designs for the FCC CDR	FCC-ee Physics & Exp.: Higgs, flavour, neutrinos, QCD (review)	SRF Innovation												16:00-16:30	
15:30-16:00			FCC-hh and HE LHC experiments and defector																16:30-17:00		
16:00-16:30		Status Experiments and Detectors (overview)	FCC-ee experiments and detector																	17:00-17:30	
16:30-17:00			LHC and FCC-hh experiments	Poster Session 0.2 Grote Zaal					Cold refreshments (0.2 Grote Zaal, 0.3 Beursoyer)					Cold refreshments (0.2 Grote Zaal, 0.3 Beursoyer)						17:30-18:00	
17:00-17:30		Cold refreshments (0.2 Grote Zaal)		Netherlands specific session																18:00-18:30	
17:30-18:00																			18:30-19:00		
18:00-18:30	Strategy Roadmaps Plenary Session	HEP and collider activities in the Americas	Gravitational waves: A new route to fundamental physics and cosmology																	19:00-19:30	
18:30-19:00		HEP and collider activities in Asia																		19:30-20:00	
19:00-19:30		HEP and collider activities in Europe & Strategy update																			
19:30-20:00	Summary of the APPEC Strategy Update																				

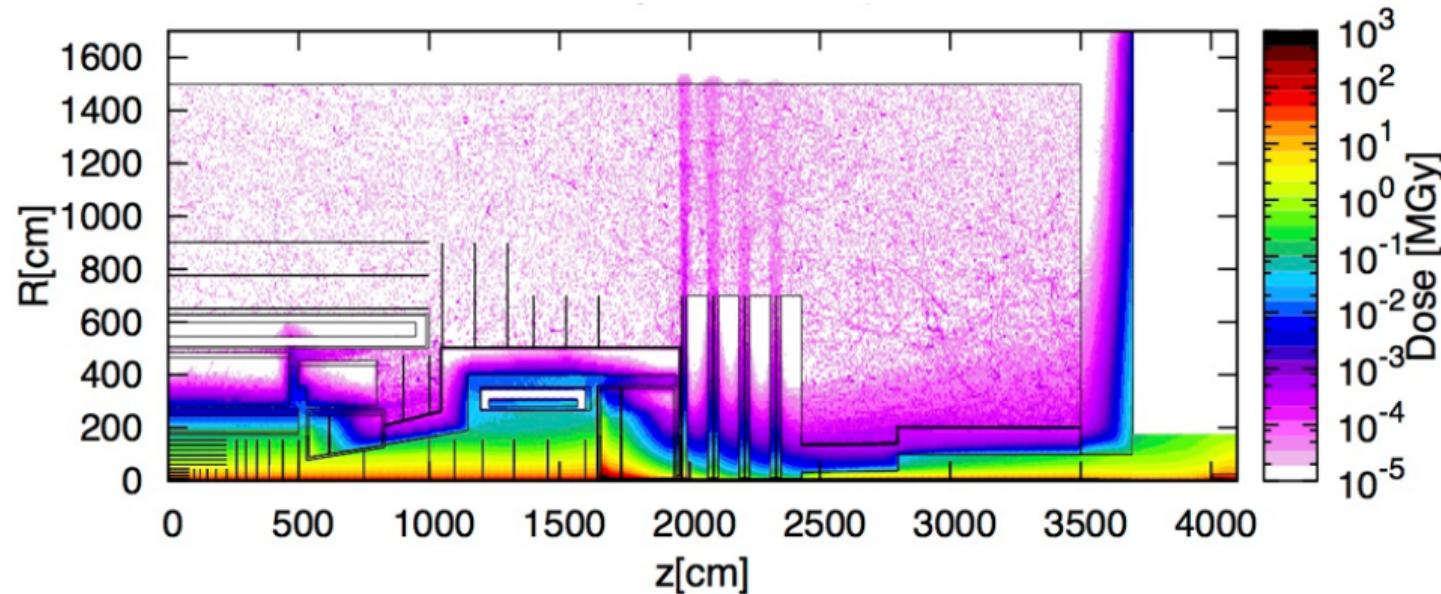
Detectors

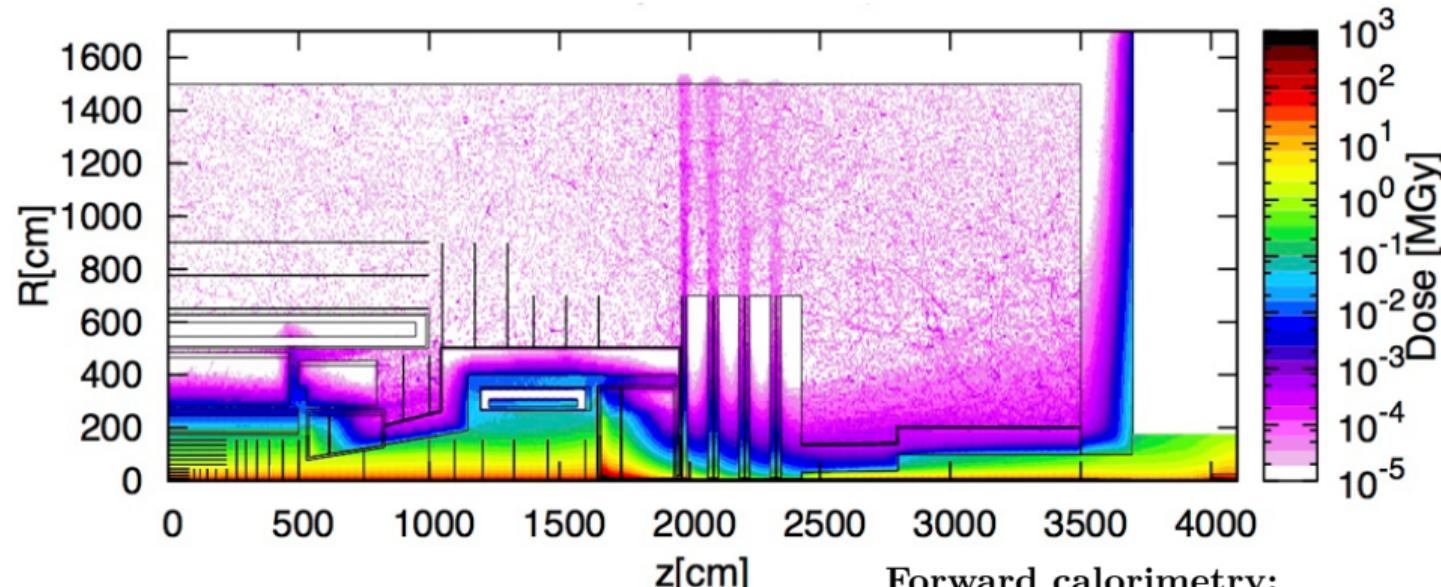
Physics

Common sessions

Backup

Dose for 30 ab^{-1}





Forward calorimetry:

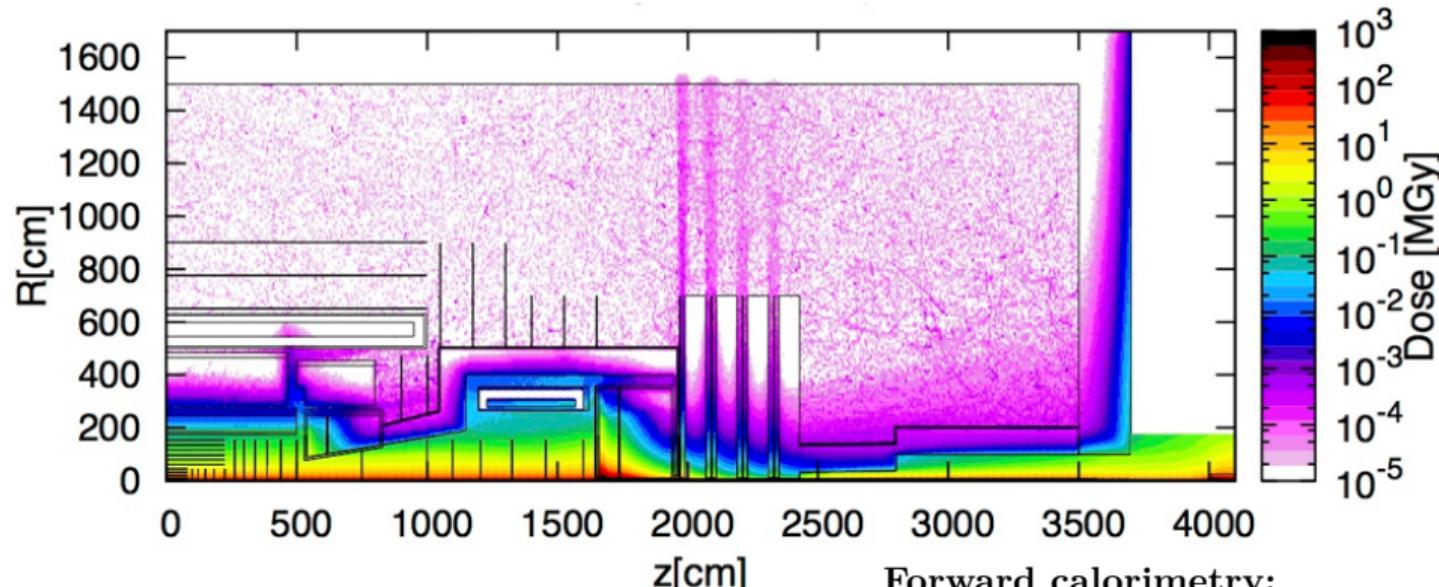
ECal at $\sim 5 \text{ GGy}$

HCal at $\sim 1 \text{ GGy}$

Dose for 30 ab⁻¹

Central tracker:

first IB layer (2.5 cm): ~ 400 MGy



Forward calorimetry:

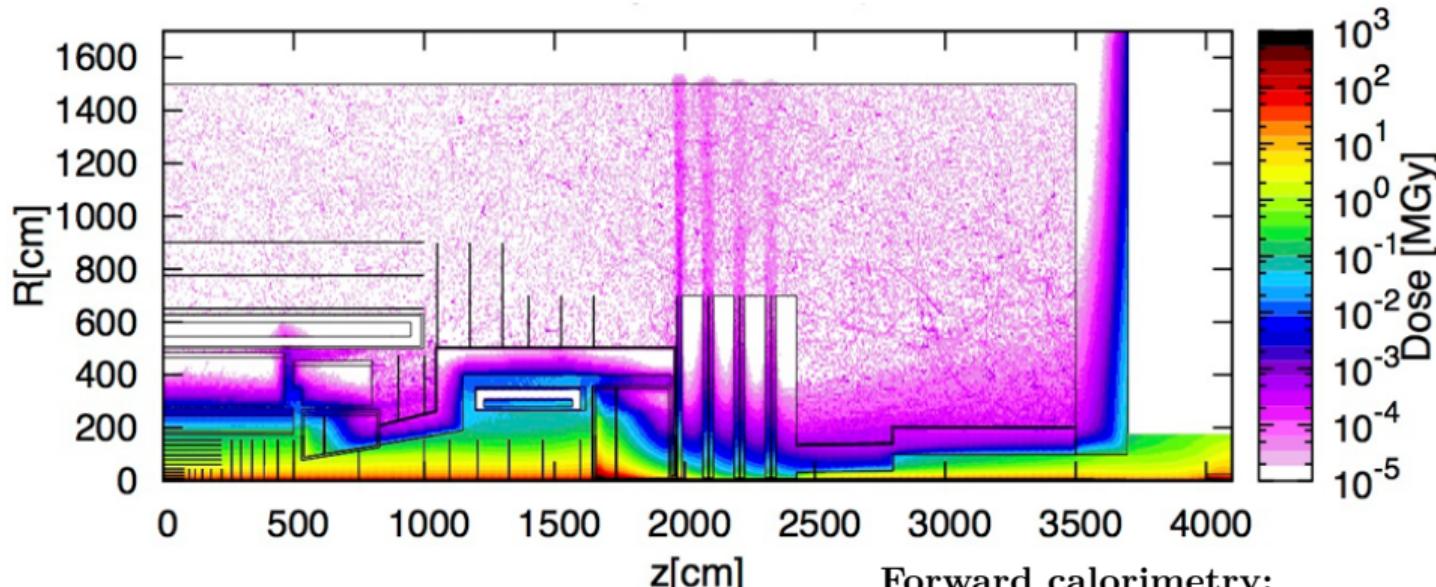
ECal at ~ 5 GGy

HCal at ~ 1 GGy

Dose for 30 ab⁻¹

Central tracker:

first IB layer (2.5 cm): ~ 400 MGy
external part: ~ 0.1 MGy



Forward calorimetry:

ECal at ~ 5 GGy
HCal at ~ 1 GGy