Status of Computing

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Sezione di Torino

Friday, 15th March, 2013
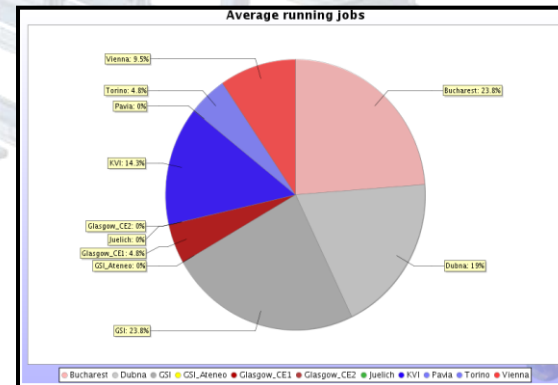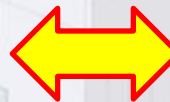
The PandaRoot framework

ROOT (5.34.1)

September 2012

Virtual Monte-Carlo (v617)

dynamic data structure
(based on ROOT Trees and Folders)
use of many ROOT application
(TGeo, EVE, TMVA, PROOF, TSQLServer)

same geometry/code for
Geant3 - Geant4 (9.5.1)

compiled and running on more than 10 Linux platforms + Mac OS X

Alien2 based GRID
Tracking TDR data production
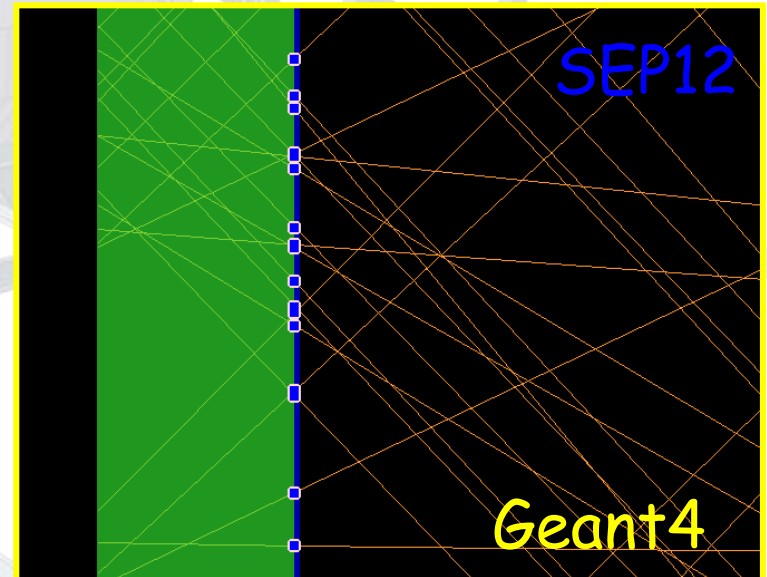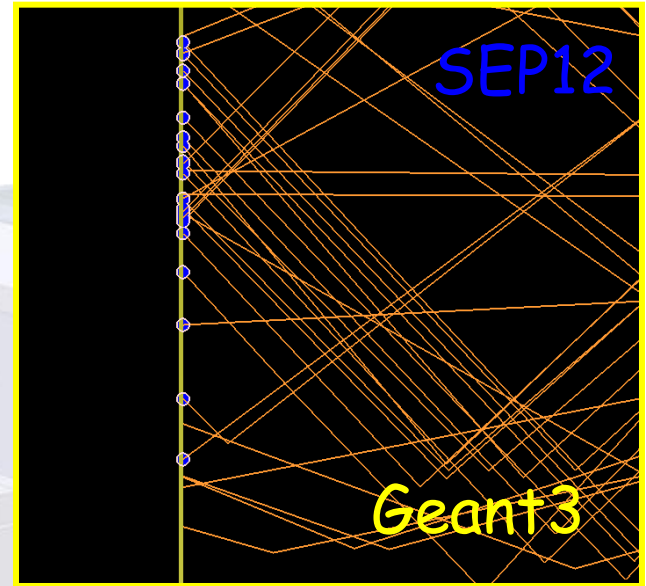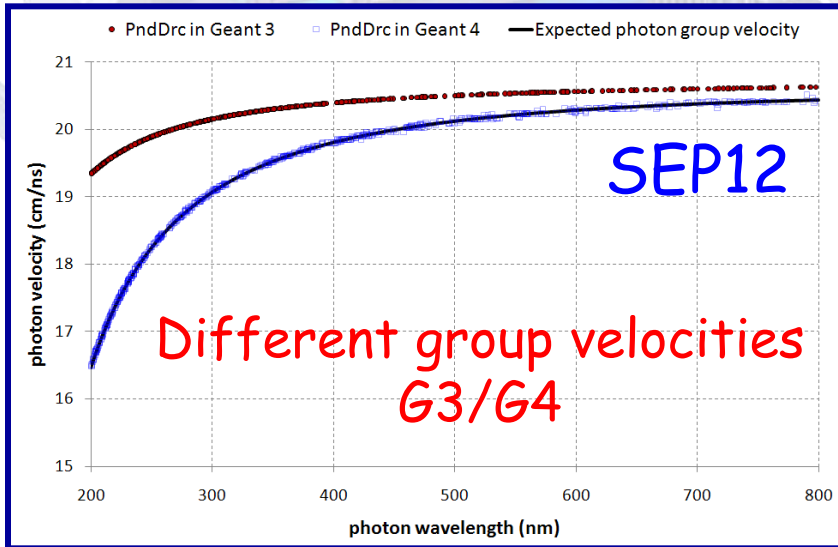
collaboration with external developers

CERN/ALICE
FAIR/HADES-CBM-R3B

Soon new external packages
(end of March, beginning of April)

in particular
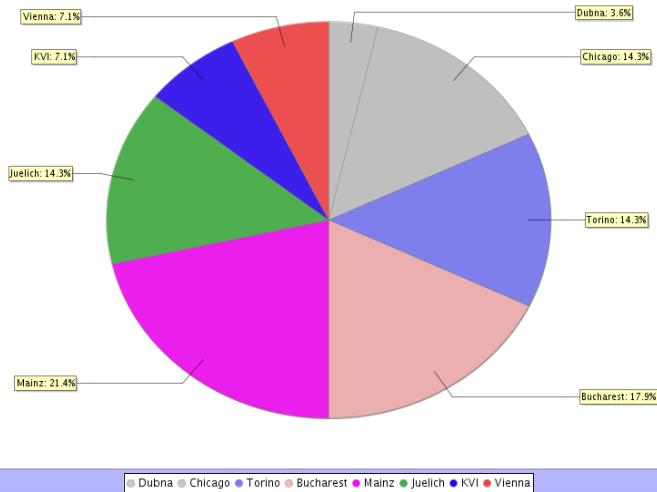Fixes in Cherenkov propagation
in Virtual MonteCarlo

SEP12

Geant3

SEP12

Geant4

Maria Patsyuk

Different group velocities
G3/G4

SEP12

Production on PandaGrid

- ➤ New sites in the last months (SUT, Talca, Chicago)
- ➤ Moving central services, DB, Monalisa Glasgow→GSI,Torino
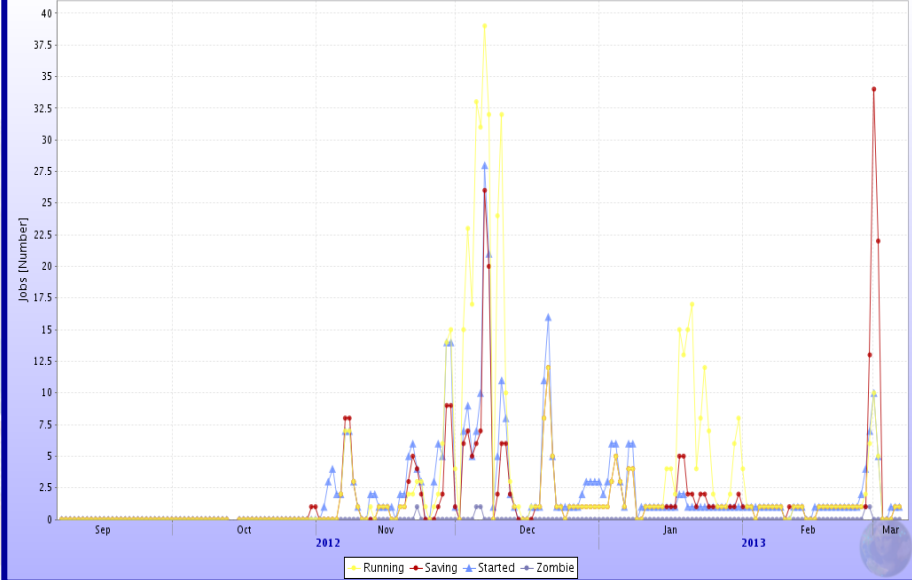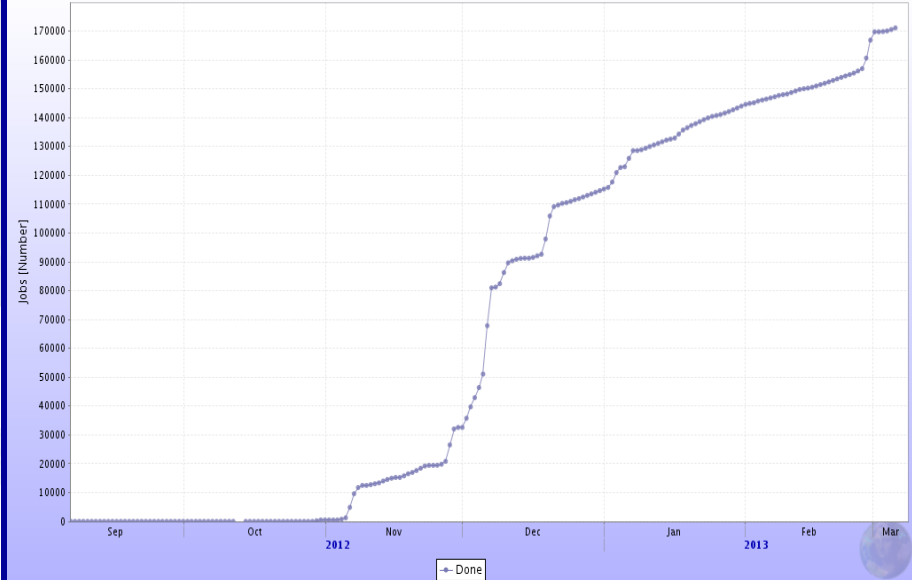- ➤ Now fully operational

Next PandaGrid meeting
15-19 April, CERN

Last six months

Average running jobs

Vienna: 7.1%
KVI: 7.1%
Juelich: 14.3%
Mainz: 21.4%
Dubna: 3.6%
Chicago: 14.3%
Torino: 14.3%
Bucharest: 17.9%

Dubna ● Chicago ● Torino ● Bucharest ● Mainz ● Juelich ● KVI ● Vienna
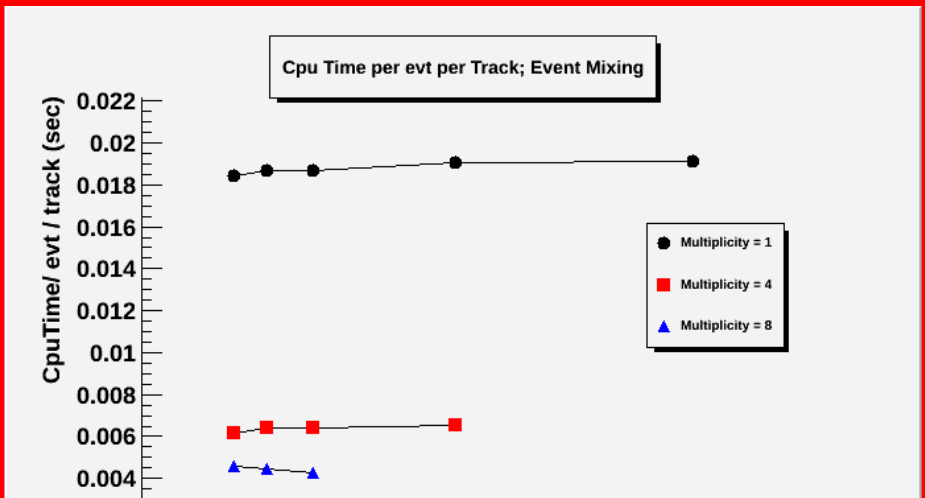
Jobs status

Running ● Saving ● Started ● Zombie

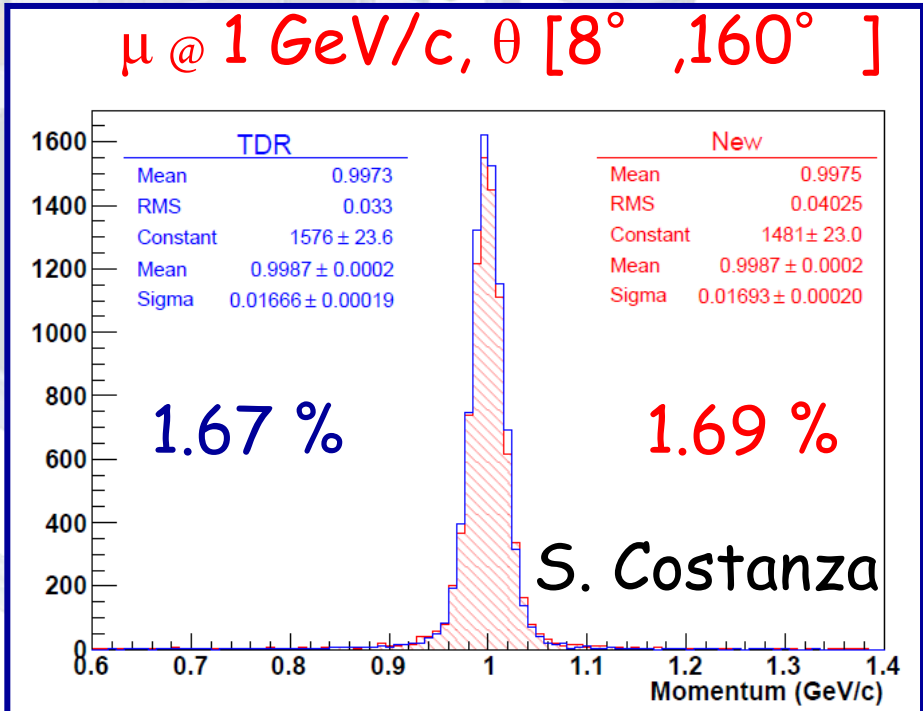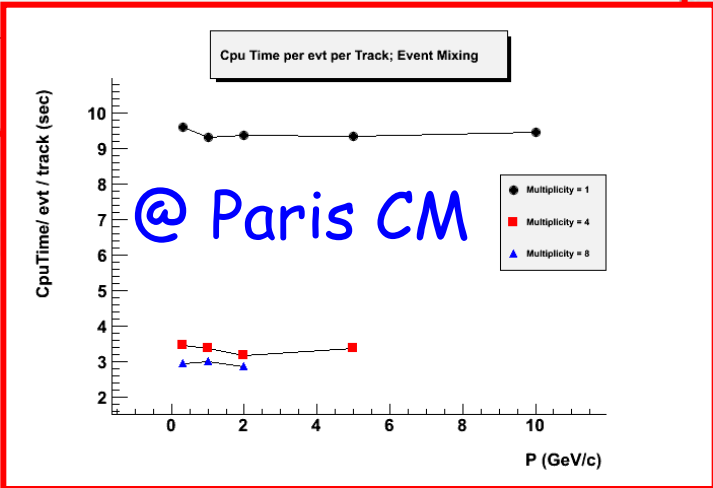Jobs cummulative parameters

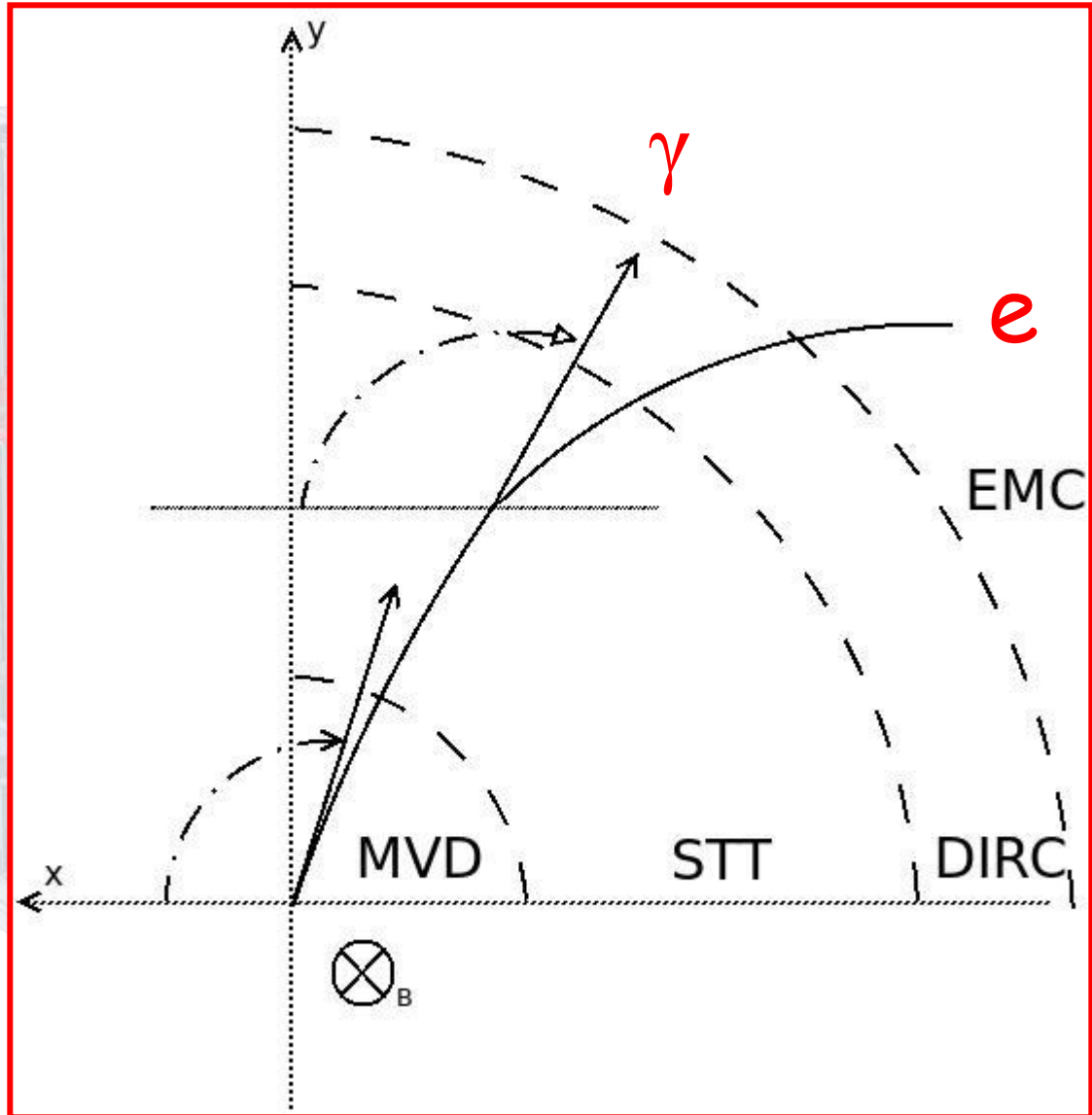Done

Still too few users
Fear of the GRID?

Barrel Tracking Activities

Improvements in CPU time at (almost) the same performances

G. Boca

@ Paris CM

μ @ 1 GeV/c, θ [8° ,160°]

	TDR		New	
Mean	0.9973		Mean	0.9975
RMS	0.033		RMS	0.04025
Constant	1576 ± 23.6		Constant	1481± 23.0
Mean	0.9987 ± 0.0002		Mean	0.9987 ± 0.0002
Sigma	0.01666± 0.00019		Sigma	0.01693± 0.00020

1.67 %

1.69 %

S. Costanza

Electron Tracking
(bremsstrahlung)

10^5 e$^-$ 1 GeV/c, ϑ=90°, ϕ = 120°, μ hypothesis, Eγ > 1MeV, reconstruction with KF
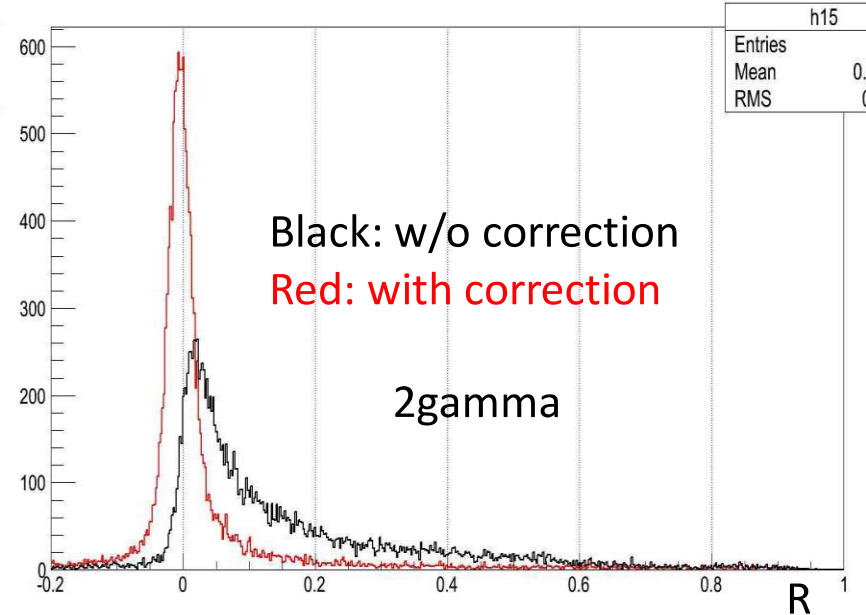

$$R = (P_{MC} - P_{rec})/P_{MC}$$

Binsong Ma
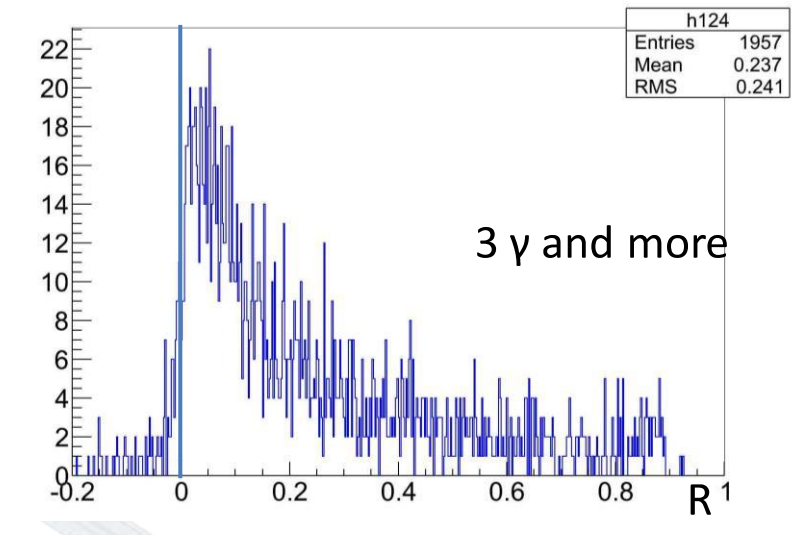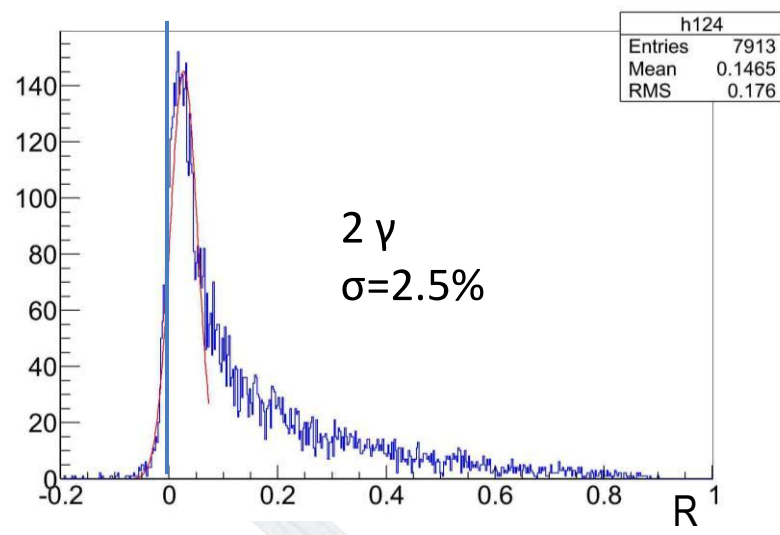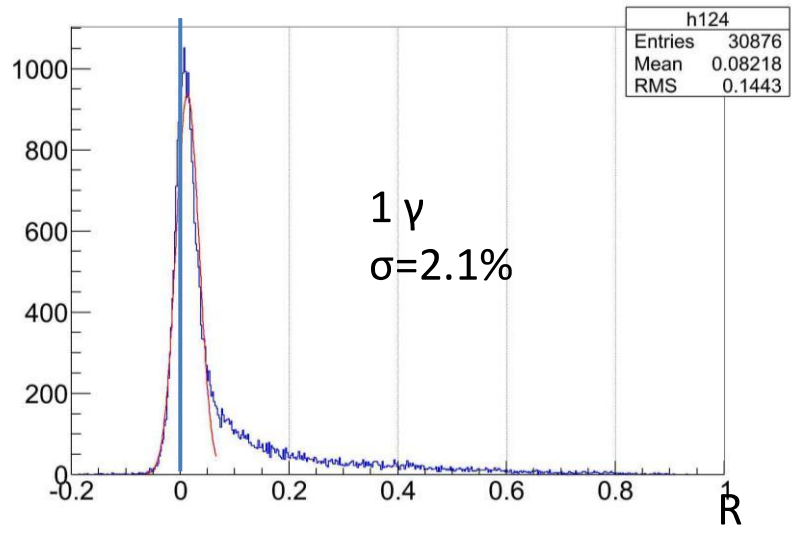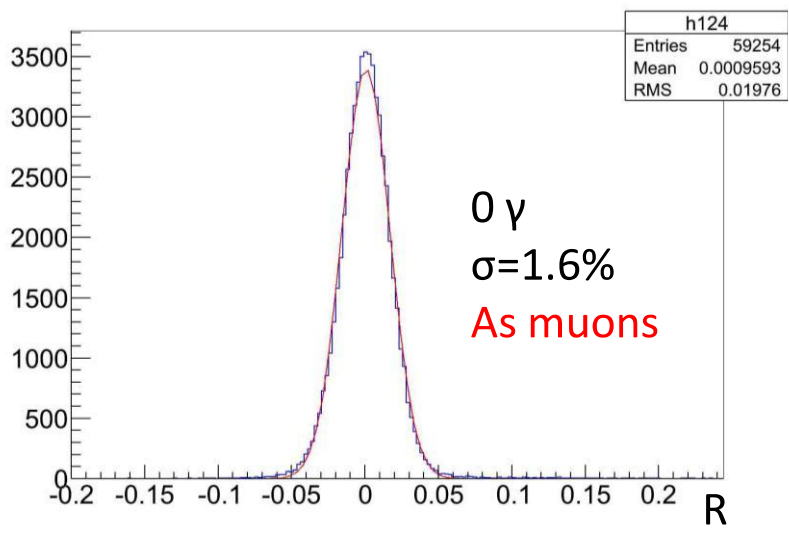
10^5 e$^-$ P$_t$=0.5GeV/c, ϑ=[5°,140°], φ=[0°,360°], μ hypothesis

Momentum resolution with correction(1gamma)

h13	
Entries	32310
Mean	0.02148
RMS	0.1095

Black: w/o correction
Red: with correction

1 gamma

Momentum resolution with correction(2gamma)

h15	
Entries	
Mean	0.
RMS	0
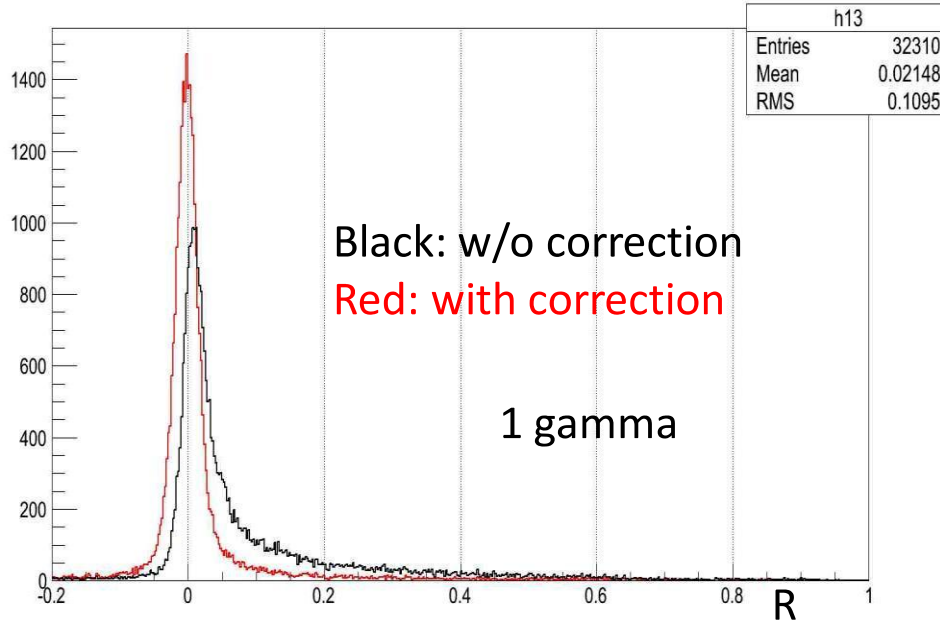
Black: w/o correction
Red: with correction

2gamma

N(γ)		Mean(gauss fit)	Sigma(gauss fit)	Evts inside 2sigma	
1 gamma (32.3%)	With E(γ)	<0.1%	1.7%	71.1%	
	w/o E(γ)	1.2%	1.9%	51.5%	improved
2 gamma (16.8%)	With E(γ)	<0.1%	2.2%	65.4%	
	w/o E(γ)	2.4%	2.4%	33.2%	

Binsong Ma
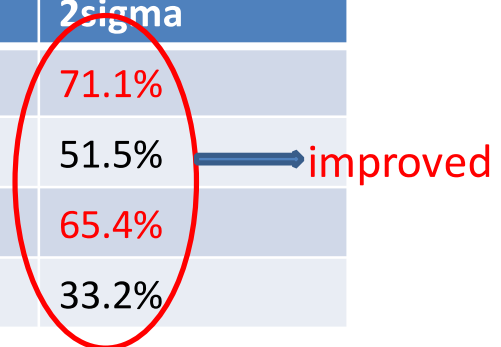
Forward Tracking Studies

Counts per straw tube
pbarp @ 15 GeV/c
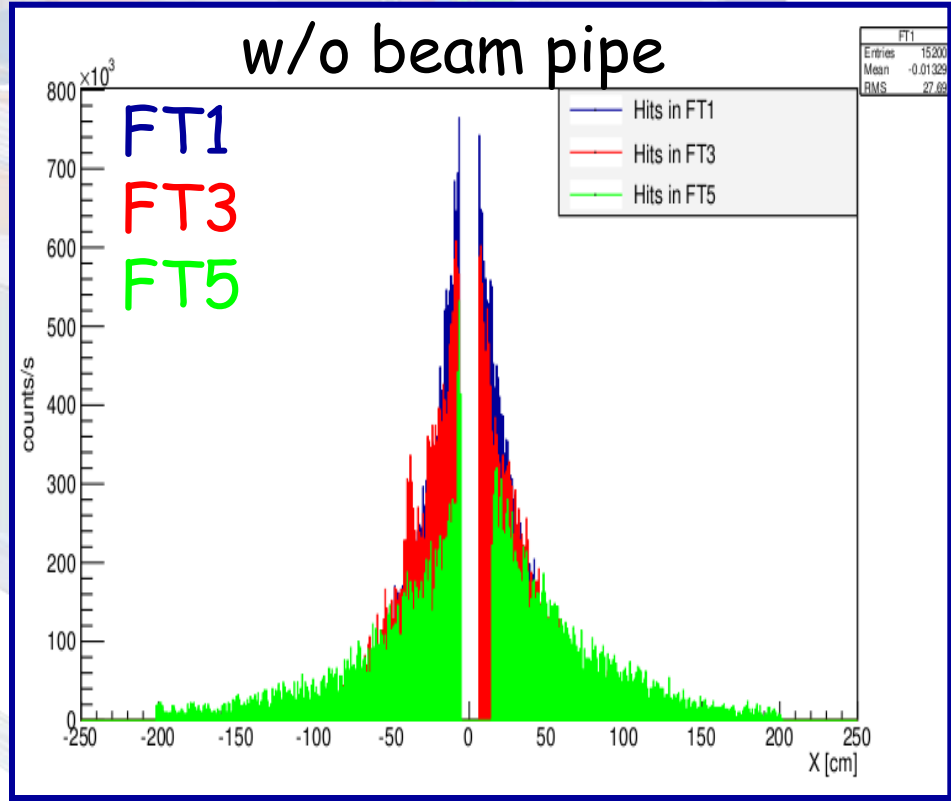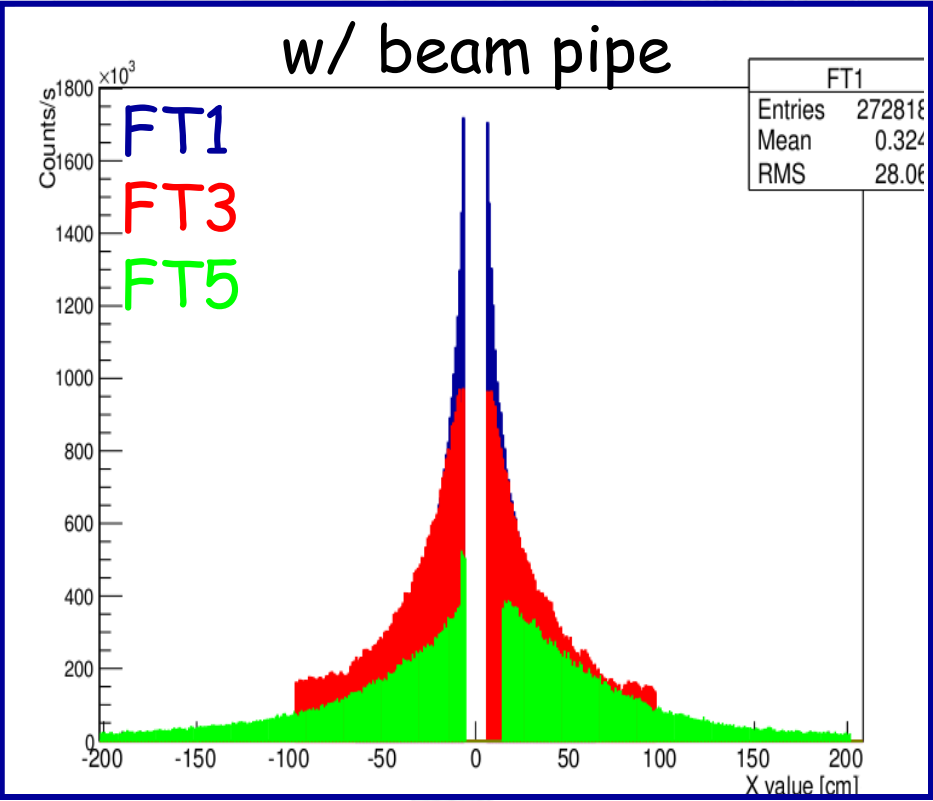
Higher numbers than old calculations

Jacek Biernat

J. Biernat
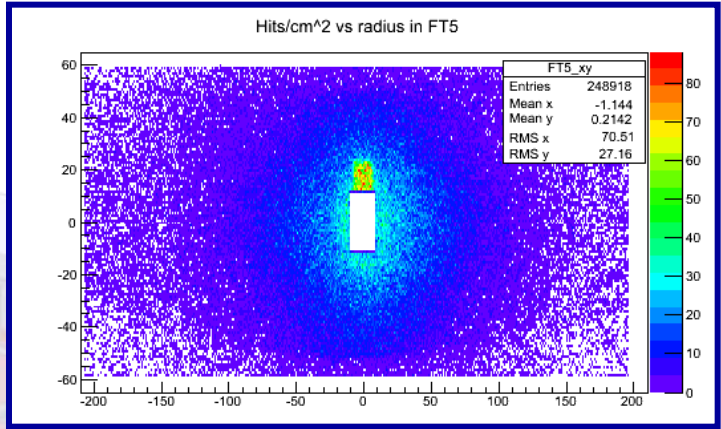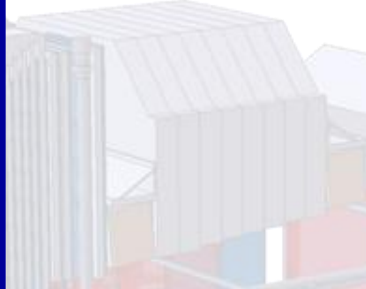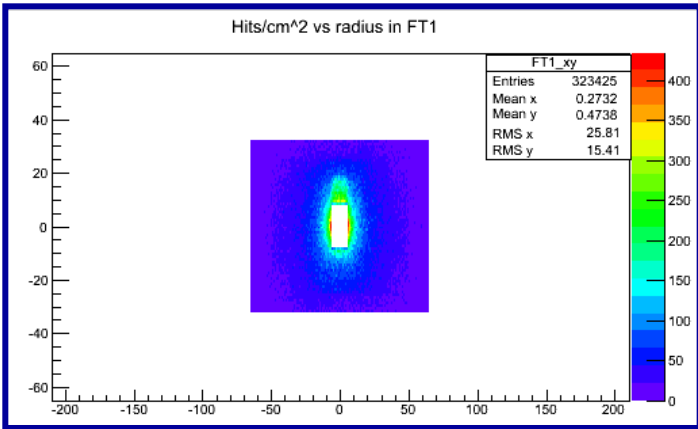
Different FTS geometries

Z s.geo&   Z s_v2.geo&

Elisa Fioravanti/Isabella Garzia
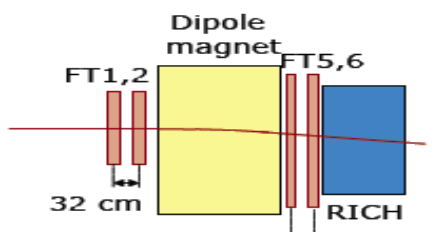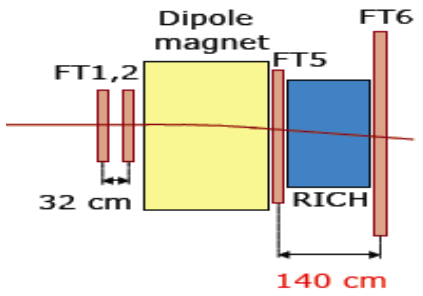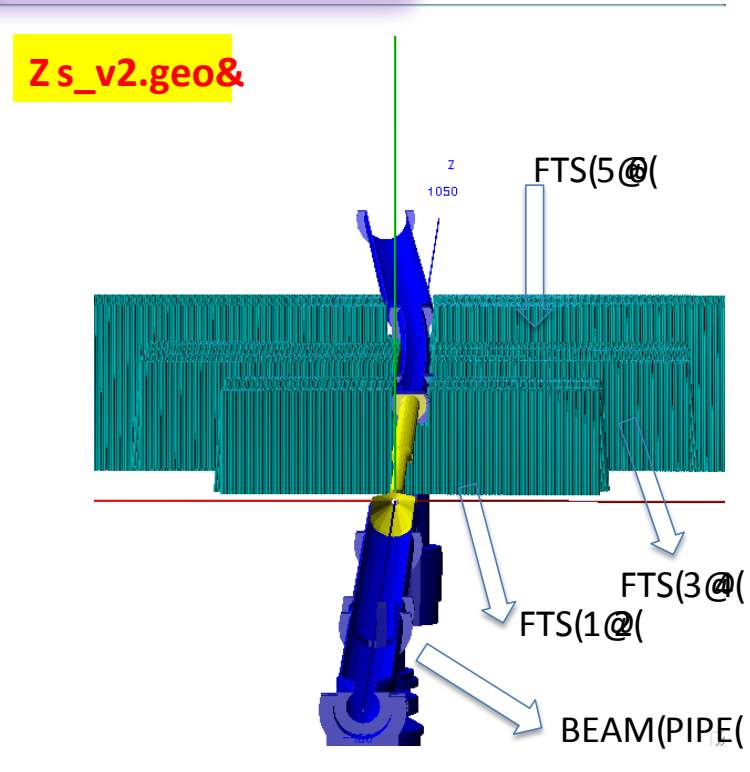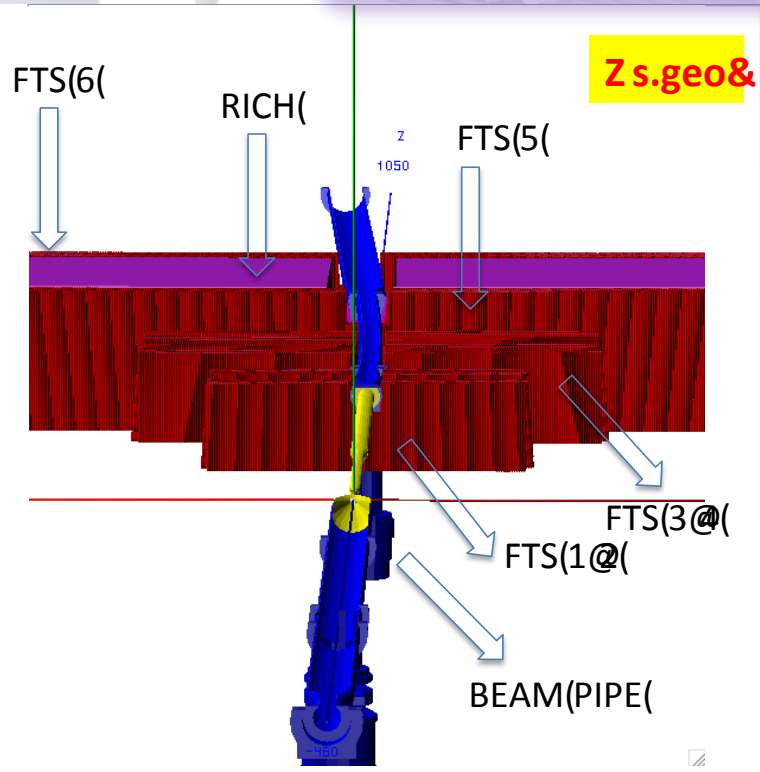
Geometrical Acceptance

Geometry v1
(Rich between FTS 5 and FTS 6)
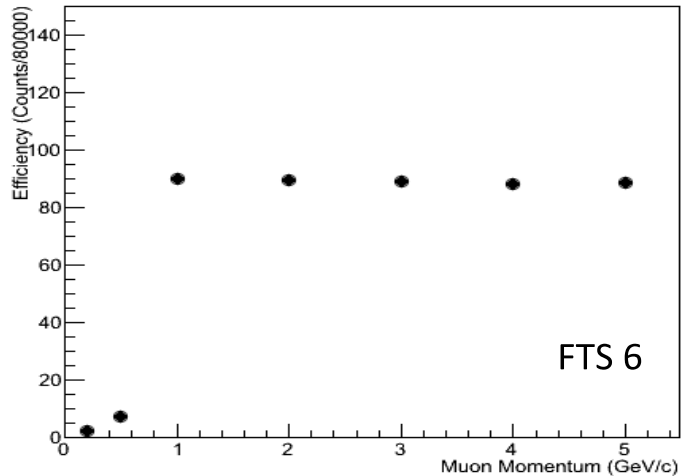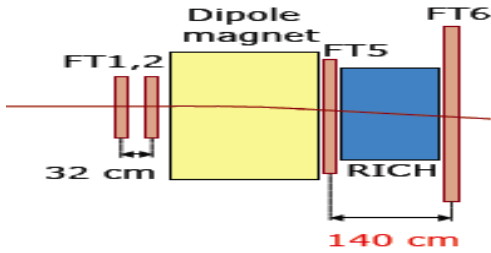
Geometry v2
(FTS 5 close to FTS 6)

FTS 6
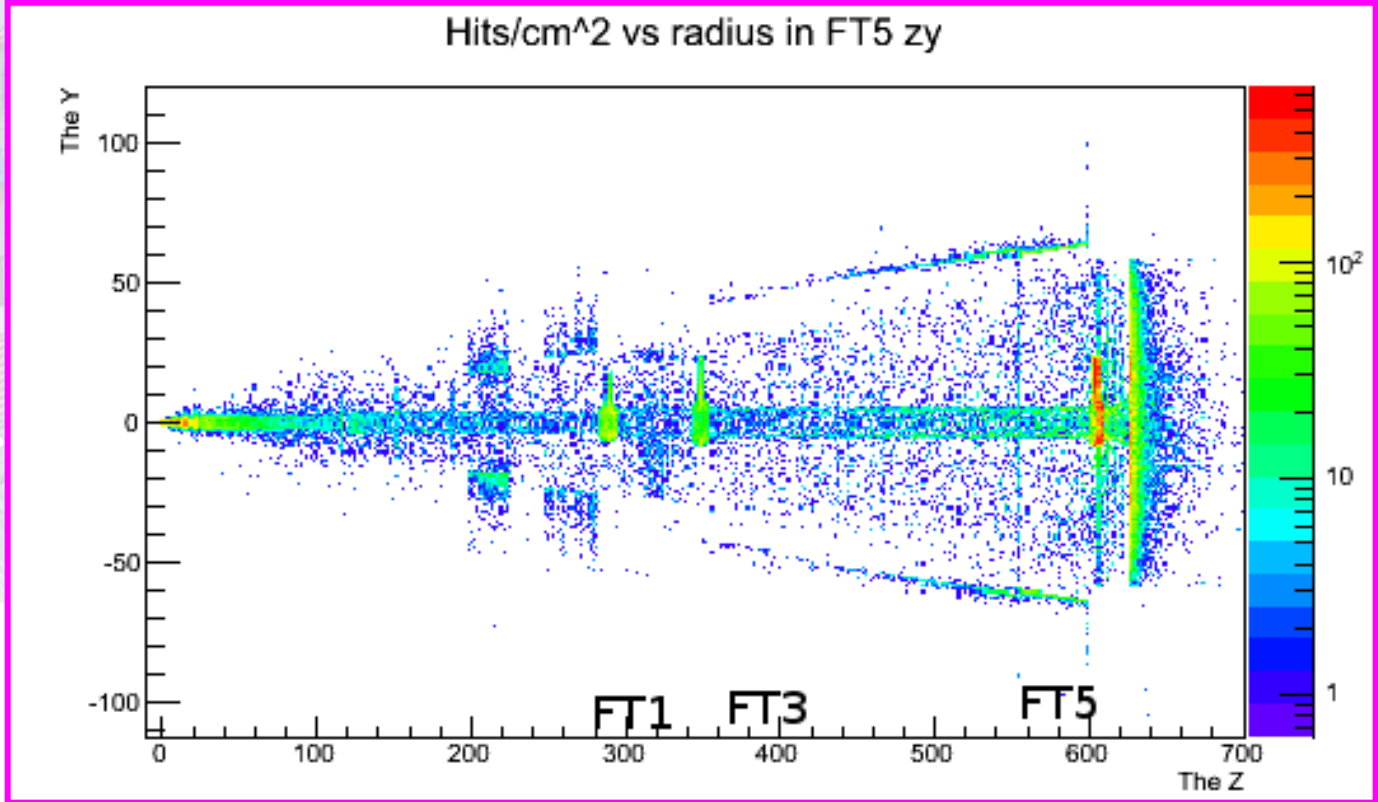
FTS 6
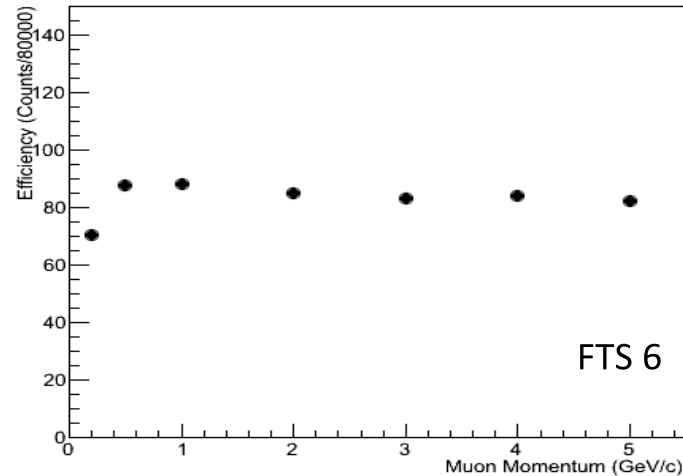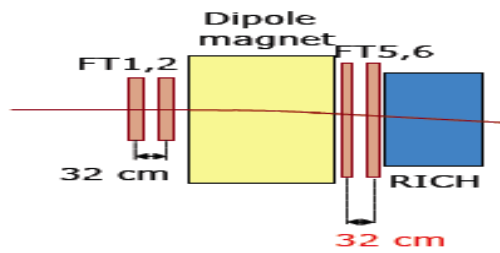
The big difference is at very low muon's momentum (0.200 GeV/c and 0.500 GeV/c): in the first geometry configuration, the majority of muons are stopped inside the RICH and doesn't reach the last station.

For muon's higher momentum, with the geometry v2 configuration, we lose around 4% of events

22

Elisa Fioravanti/Isabella Garzia

Momentum Resolution

Theta Range [0-10] degree

- FTS GEO V1
- FTS GEO v2
- FTS GEO 1256

Standard Setup
Compact Setup
No Dipole Chambers

MVD+GEM+FTS
Ideal tracking
@ 15 GeV/c

Elisa Fioravanti/Isabella Garzia
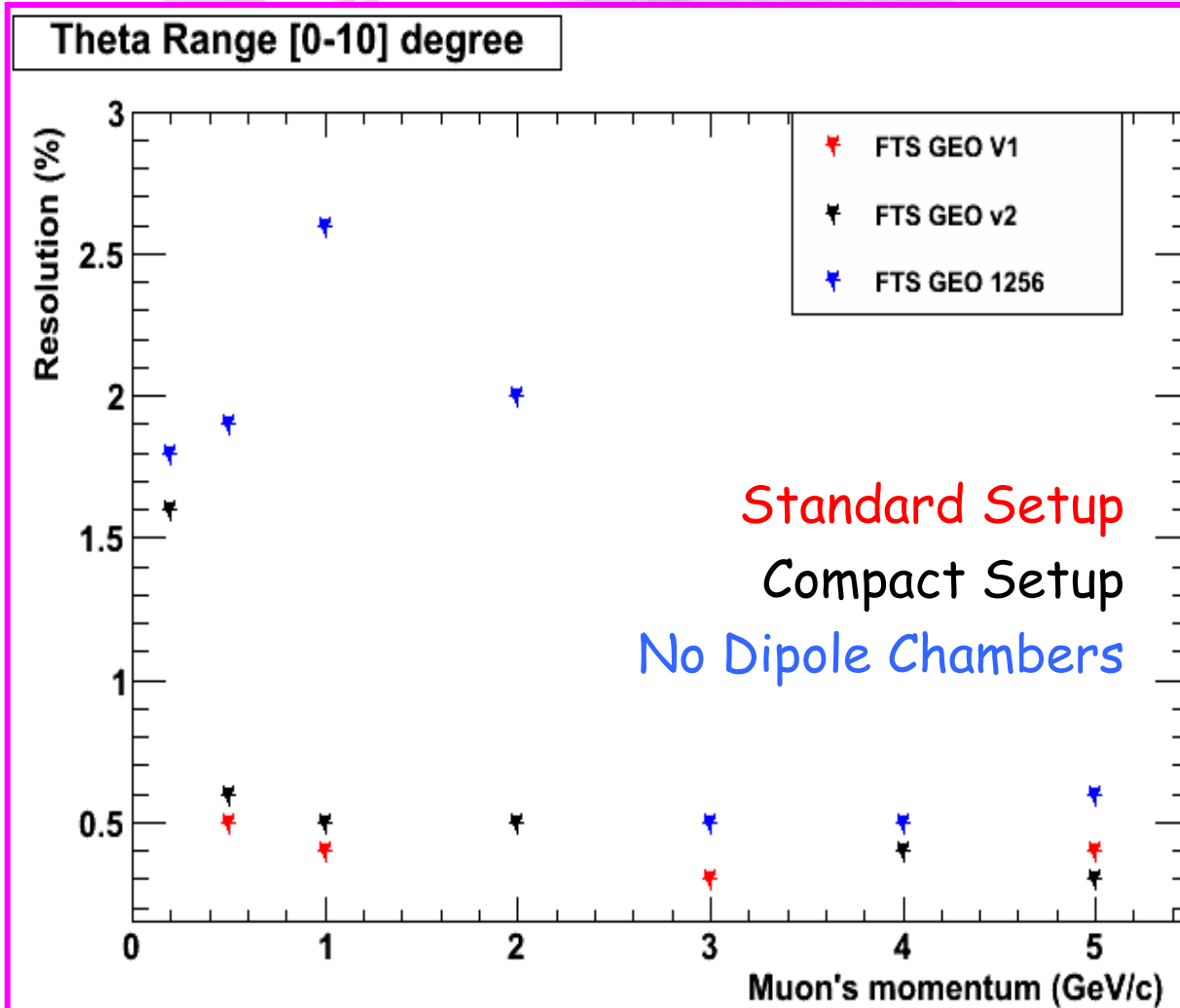
Realistic Forward Tracking

Single track μ^- **MC** p_z = 1.233 GeV/c <-> **FTS** p_z = 1.234 GeV/c

Red = Hits from Geant3 (connected by line segments)
Black = Non-skewed FTS hits (wire positions)
Blue = Line + Parabola Track Model
(from Hough Transforms)

parabola

apex

line

x [cm]

z [cm]

p_{track}

Martin Galuska

houghspaceLine

b [cm]

θ [°]

Kickplane algorithm

Entries 5247
Mean 0.0804
RMS 0.03533

Momentum $\theta_{OUT} - \theta_{IN}$

Manoj Jadhav

houghspaceParabola

$1/p_z$ [MeV^{-1}]

θ [°]

Martin Galuska
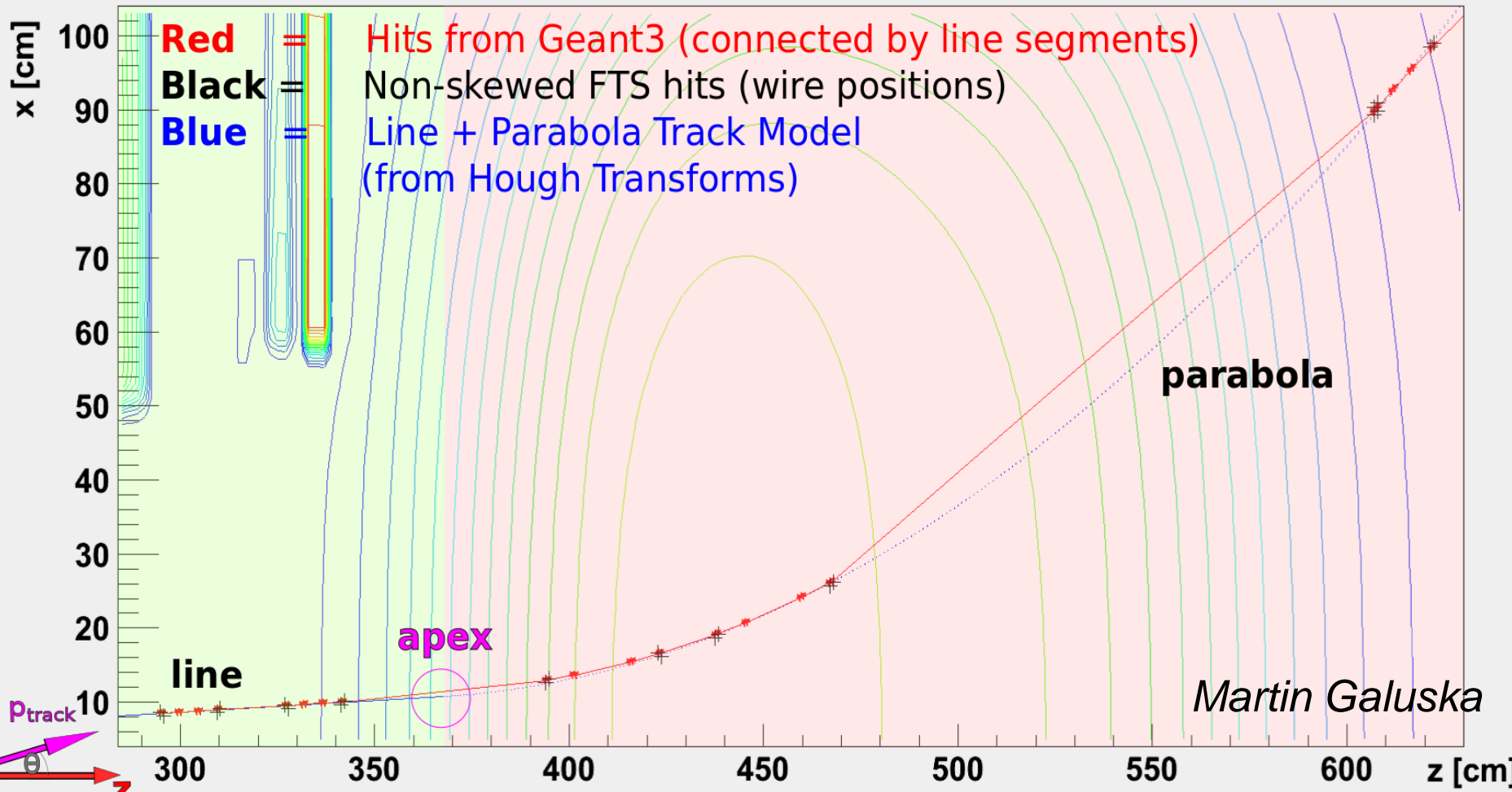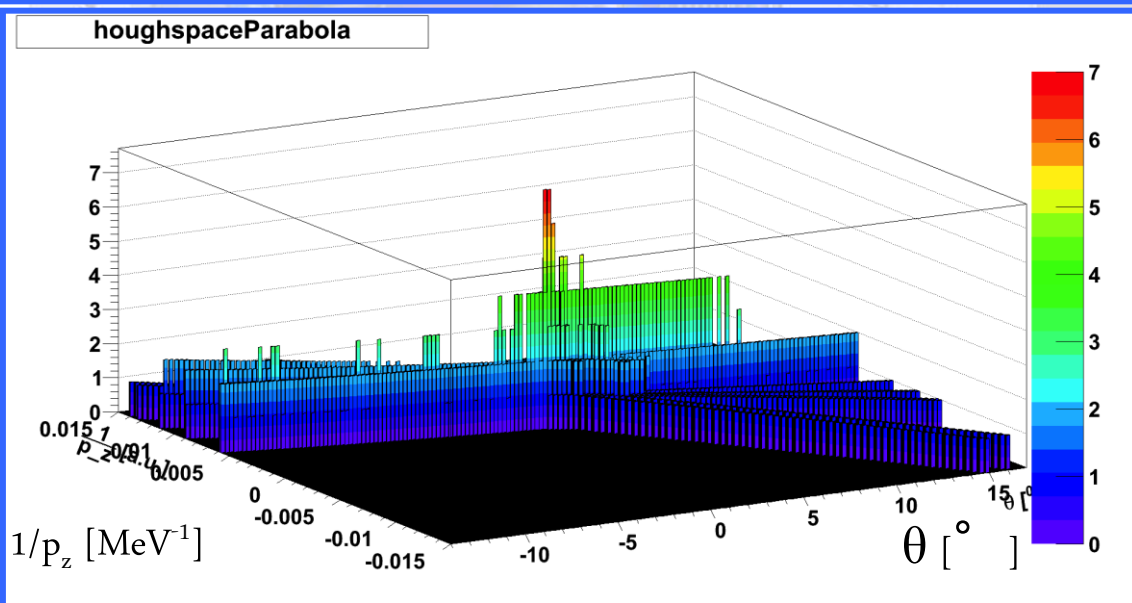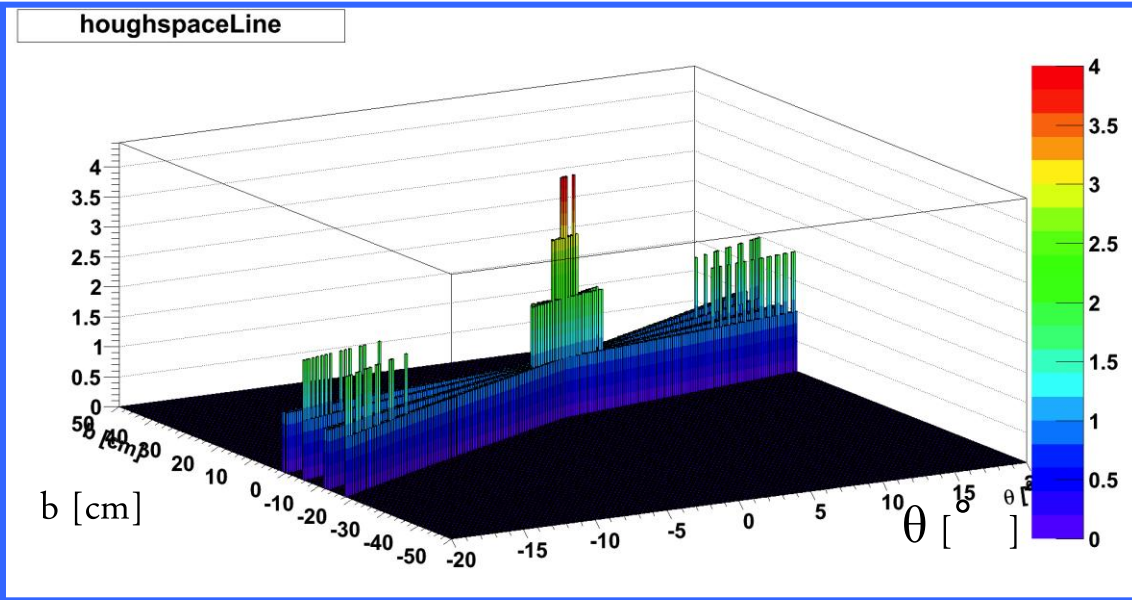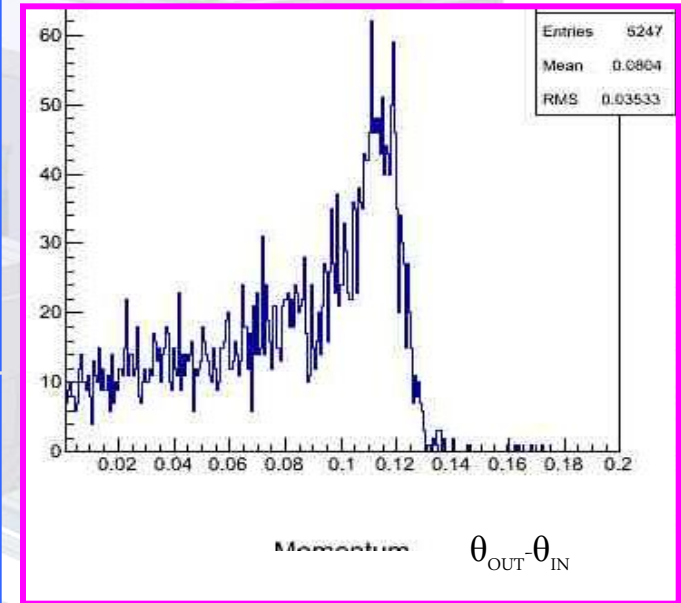
Still a long way…

Particle Identification

Combination of
different algorithms
"Bayes Approach"
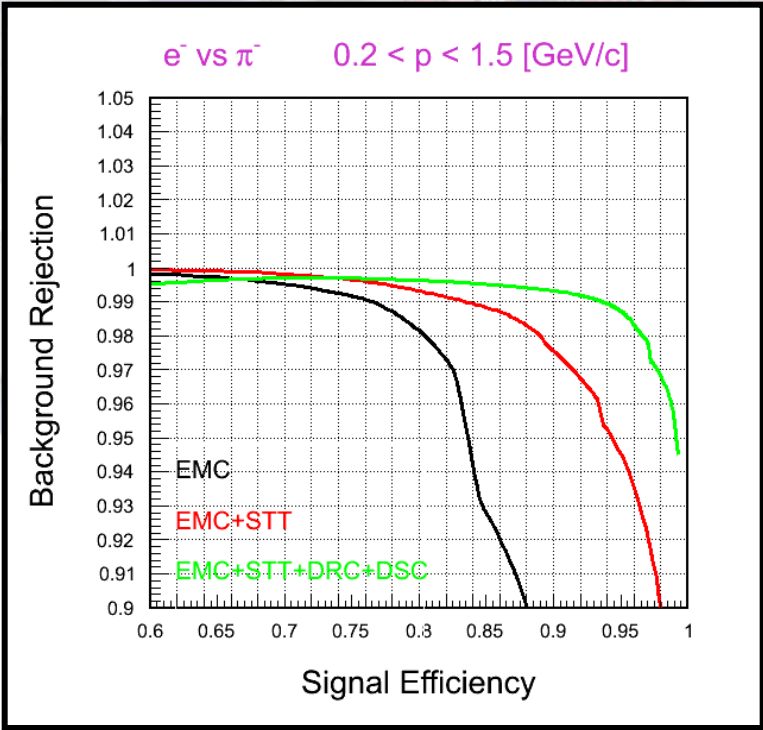
Malgorzata Gumberidze
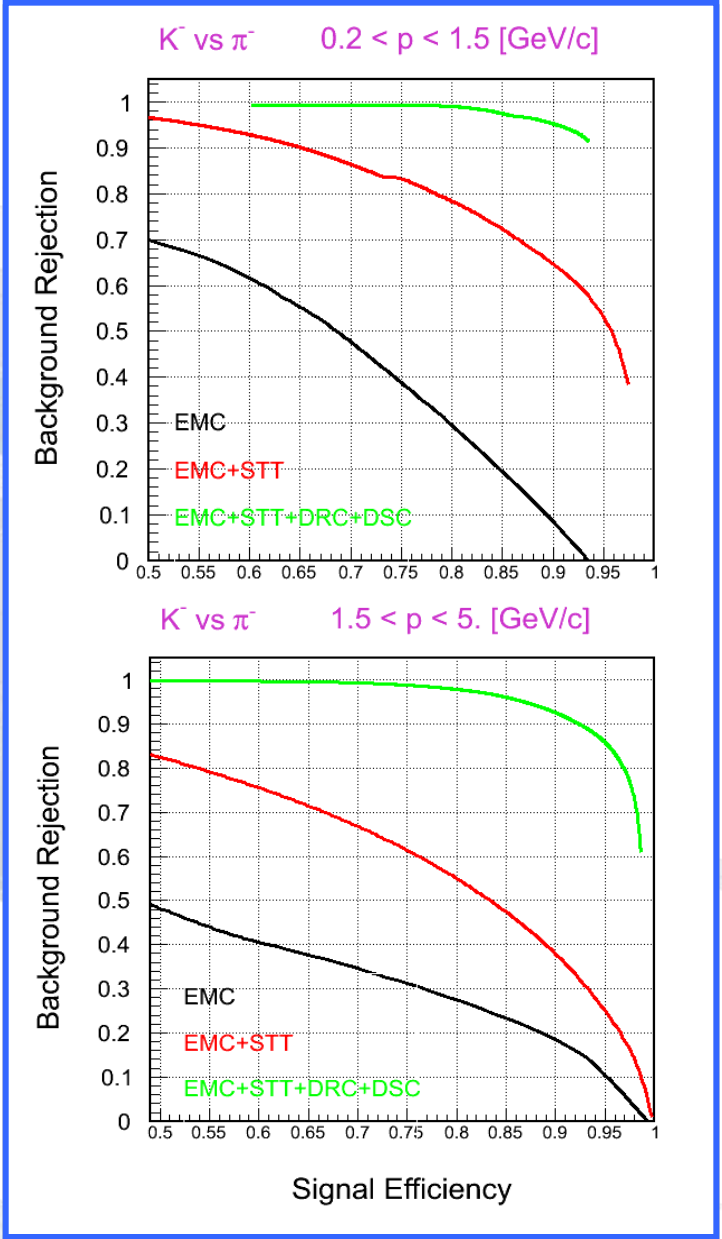
Working Packages

or better...

What is missing

or better...

How can you help
in software developments

and also...

Who is really doing the job

Detectors : Target Spectrometer

MVD	Alignment, PID	🟩
STT	Geometry with passive, electronic simulation, alignment, time based simulation, simulation of noise and missing tubes	🟩
GEM	Time based simulation, pattern recognition, realistic reconstruction	🟩
DIRC	Detector finalization, realistic digitization, realistic reconstruction (online/offline), time based simulation	🟨
DISC	Geometry, digitization, reconstruction, time based simulation	🟥
SCITIL	Realistic digitization, reconstruction, pid, time based simulation	🟨
EMC	Detailed barrel geometry, time based simulation, splitoff recognition, improvement of bump splitting, MC tuning, calibration, error matrices, pre-shower detection	🟩
MDT	Redesign of detailed geometry, realistic digitization, clusterization, MDT tracking, high level PID	🟩
HYP	Detector simulation, time based simulation, uniformation of reconstr. code	🟩

Detectors : Forward Spectrometer

FTS	Time based simulation, realistic pattern recognition	🟩
RICH	Geometry, digitization, reconstruction, pid, time based simulation	🟥
FTOF	Realistic digitization, reconstruction, pid, time based simulation	🟨
MDT	Redesign of detailed geometry, realistic digitization, clusterization, MDT tracking, high level PID	🟨
LUMI	Luminosity fit, alignment, Time based simulation, noise simulation, background suppression	🟩

Manpower: Detectors
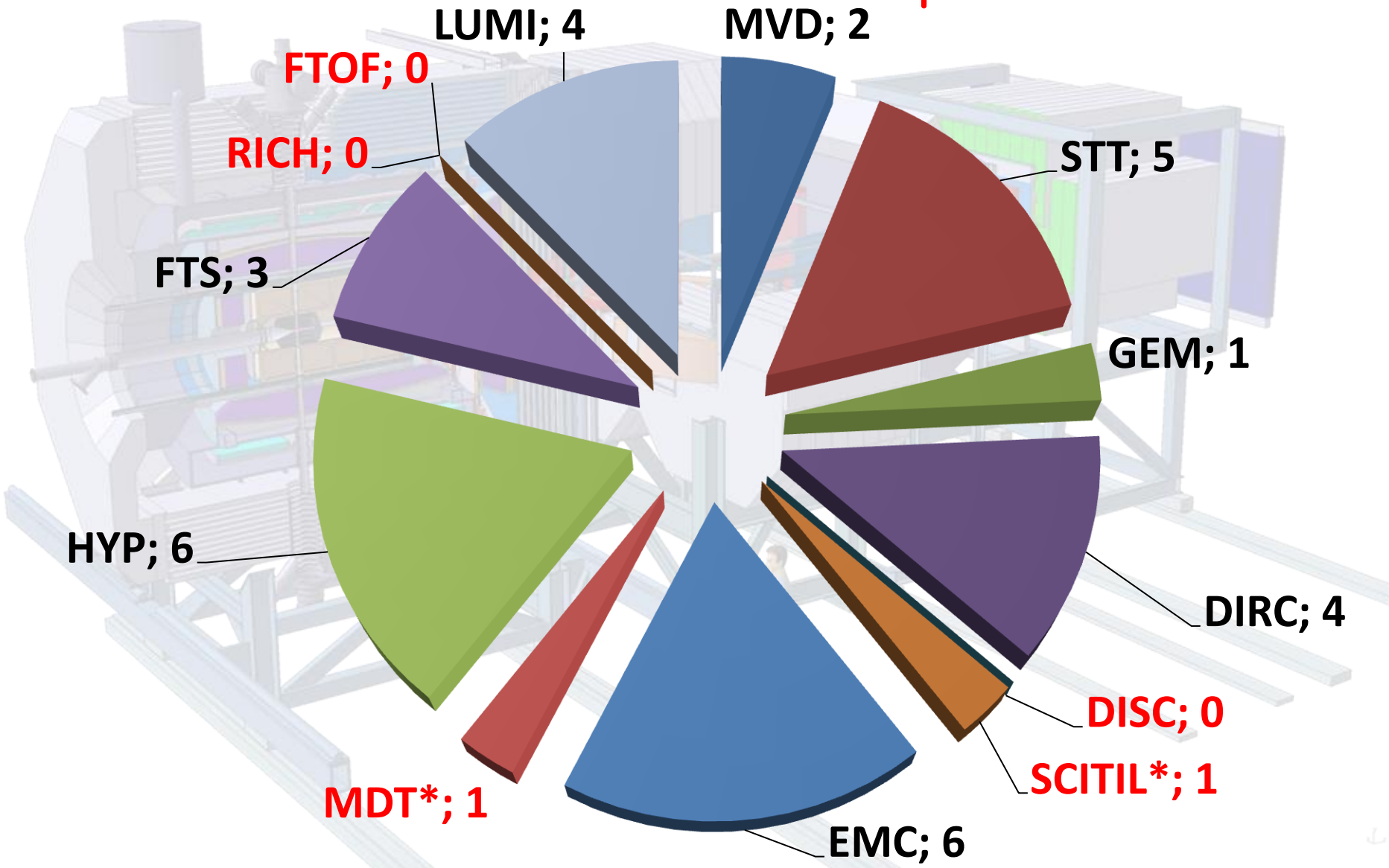
Manpower: Institutes (detectors)

Bonn	EMC	2
Ferrara	FTS	2
Giessen	EMC	1
GSI	GEM (1), DIRC (4), HYP (1)	6
Julich	MVD	2
Krakow	STT+FTS	1
KVI	EMC	1
Mainz	HYP (5), LUMI (4)	9
Pavia	STT	5
Protvino	EMC	1
Warsaw	EMC	1

0 1 2 3 4 5 6 7 8 9

Global Tasks
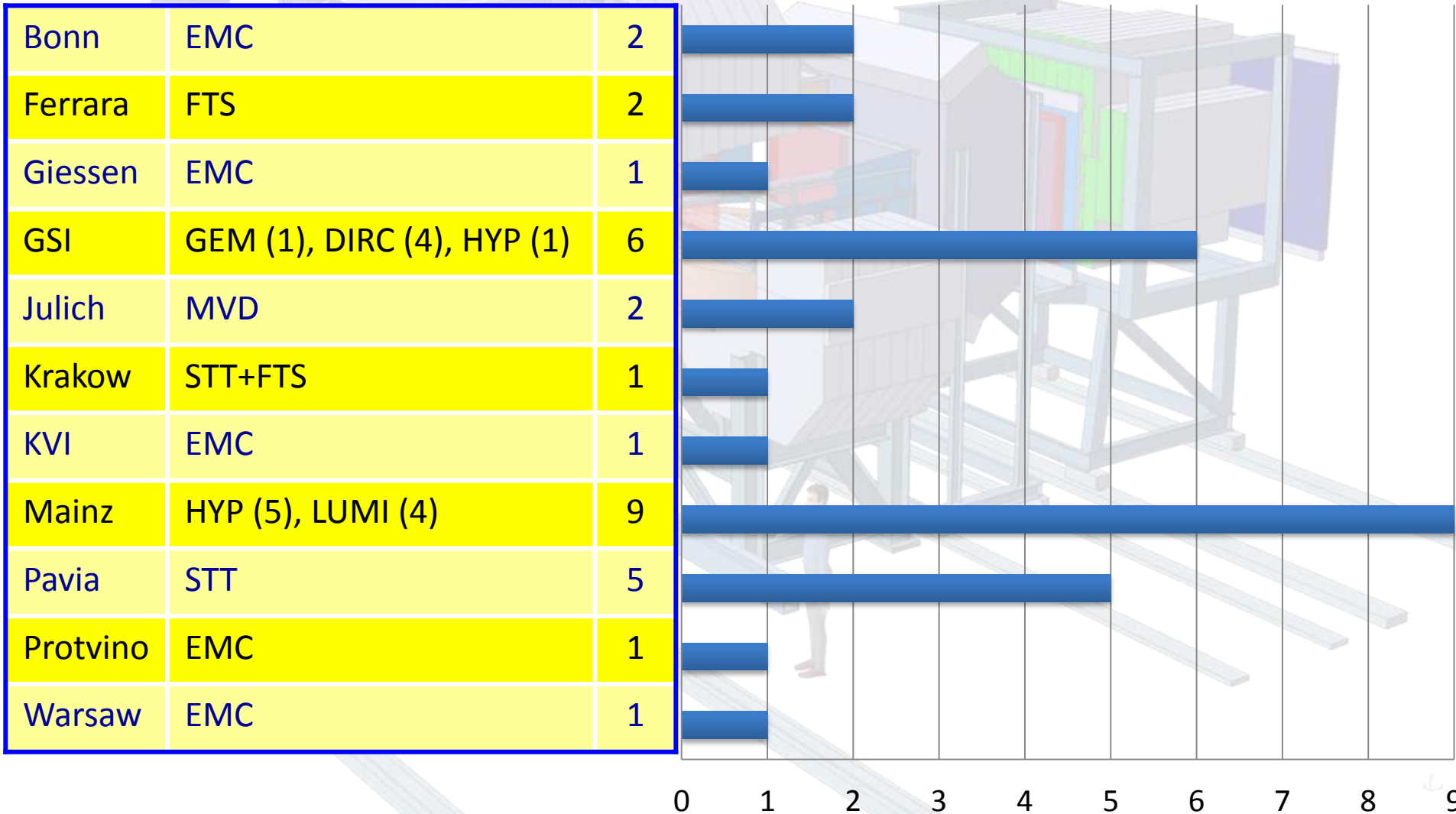
|		
CORE	Global online framework, event source simulation, database connectivity	
TRACKING	Update of the kalman and of the genfit package, deterministic annealing filter, track cleanup, parallelization of the code, MVD+GEM tracking, t0 calculation, forward tracking	
PID	MVD improvements, SciTil pid, improvement of DIRC fast reconstruction, MDT tracking and PID, correlation of FWD detectors, FWD PID, improvements of correlation, neutral pid	
ANALYSIS	Fitter validation, tree fitter, update of fast simulation, studies with neutrals, new MC matching, improvement of PID mechanism	
GRID	New sites, Alien developments	
GENERATORS	Check of new EvtGen, comparison between different background generators (DPM, Fluka, Pythia)	
T.B. SIM.	All the detectors expect MVD, (STT), (EMC) and (LUMI)	
ONLINE	Time based reconstruction, event building	
A.O.B.	Release management, Quality Assessments, Event tag & skimming	

Manpower: Global Tasks

GRID (+2); 3

CORE (+2); 2

CENTRAL TRACKING; 6

ANALYSIS; 2

PID (+1); 3

ONLINE TRACKING; 4

FORWARD TRACKING; 4
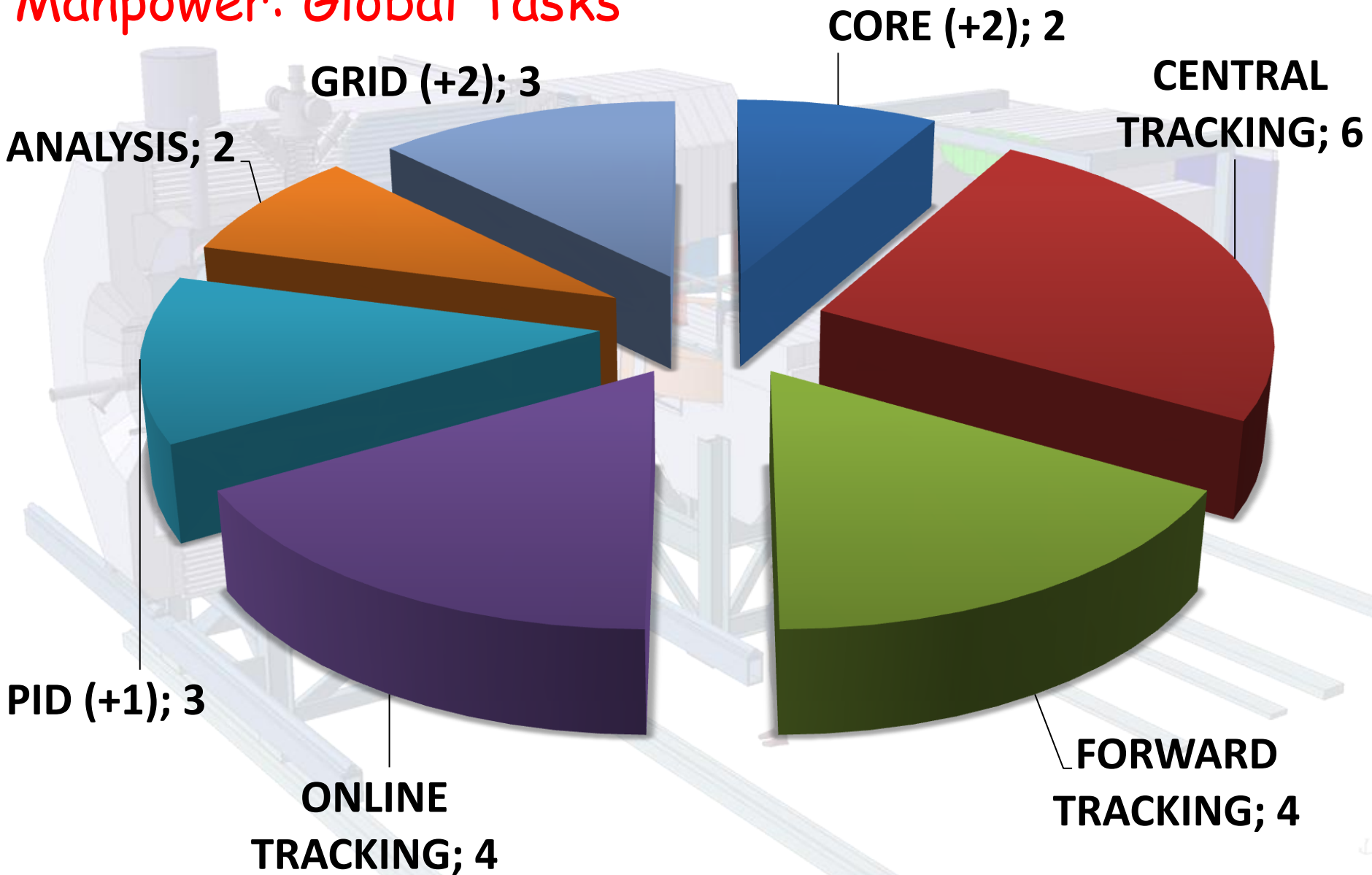
Manpower: Institutes (global tasks)

(Darmstadt)	PID	1
(GSI)	CORE (2), GRID (2)	4
Evanston	ONLINE TRACKING	1
Ferrara	TRACKING	2
Giessen	TRACKING (1), ONLINE TRACKING (2)	3
GSI	CORE (1), ANALYSIS (2), GRID (1)	4
Julich	GRID (1), ONLINE TRACKING (1)	2
KVI	PID	1
Mumbai	TRACKING	1
Orsay	TRACKING+PID	2
Pavia	TRACKING	5
Torino	TRACKING+PID+etc	1
Vienna	GRID	1
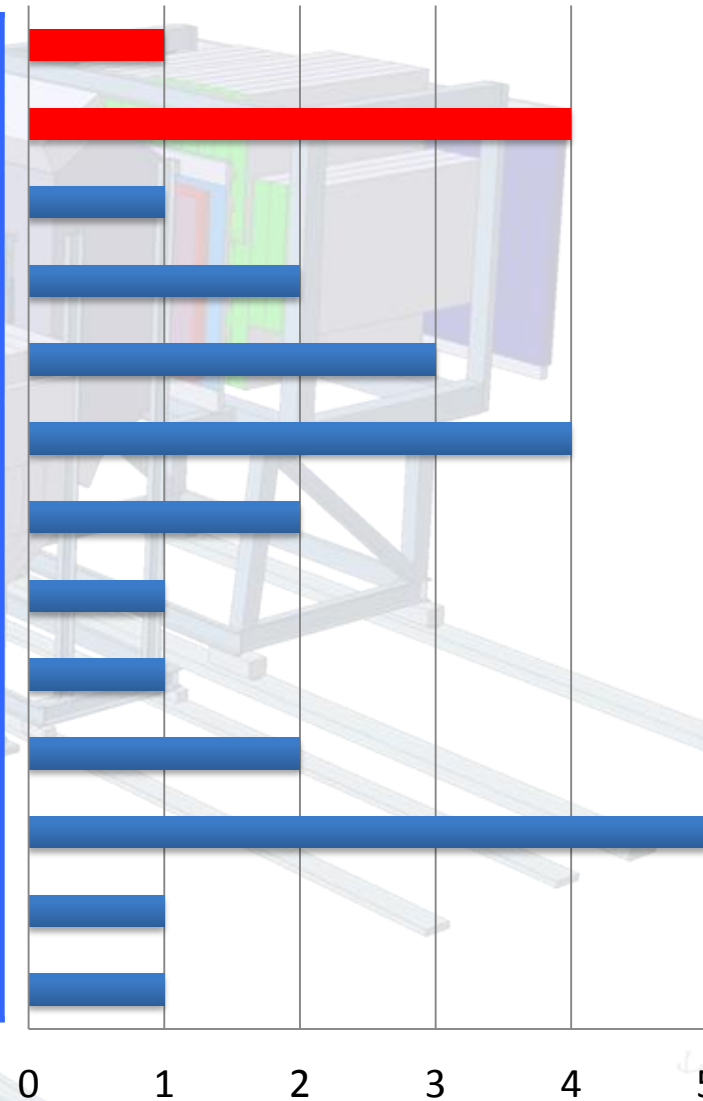
Trying to summarize

Basic structure:
➢ New external packages soon, with Cherenkov fixes and new features (ØMQ)
➢ GRID fully operational again, new sites
➢ Time based simulation ⇒ available in the framework, missing in the reco

Reconstruction :
➢ Full reconstruction in the central tracker ⇒ progresses and new features
➢ Forward tracking ⇒ slow progresses, more people are needed (MHO)
➢ Particle identification ⇒ available in TS, completely missing in FS
➢ Analysis ⇒ (almost) fully operational, new people starting to do analysis
➢ Online ⇒ still too few efforts (MHO) really a lot of work is needed to do

Workpackages and manpower:
➢ Not enough people involved in global tasks (and not fully)
➢ Help is needed, not only for "developments"
➢ Do not expect that other people will do the job for you