Some plans for DC2 and the Physics Workshop

Outline

- Physics Studies for the Physics Workshop
- Simulation/Geant4
  - Pixel Simulation example
- Analysis with DC2 and Physics Workshop simulation
  - Analysis tools
- Physics Validation
- Plan for Rome

SUSY case for DC2

Assume SUGRA model.

Theoretical model:

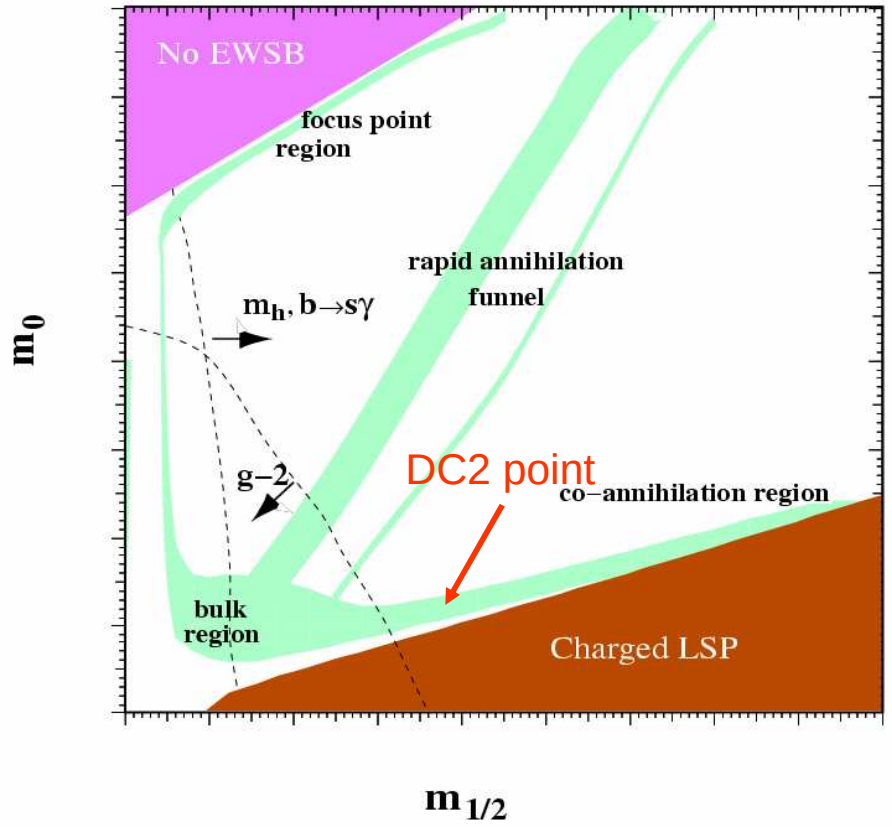
- no new particles m<100GeV
- b $\rightarrow s\gamma$
- g_μ-2
- WMAP meas. of Ω_{CDM}

Just a few "benchmark" points studied:

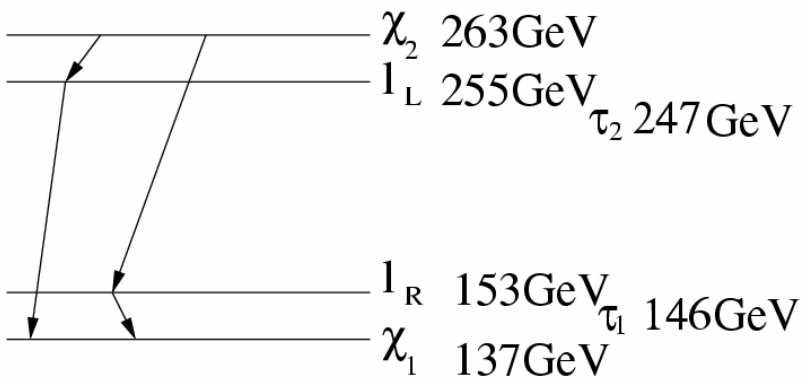
• LHCC 5 points (1996) ATLAS Physics TDR.

• 1 point studied with Full Geant simulation DC1

• new point proposed



Physics case for DC2



Slow Leptons expected in this case

Fast simulation to give a first preliminary indication

Full Simulation needed. Tracking performances are critical

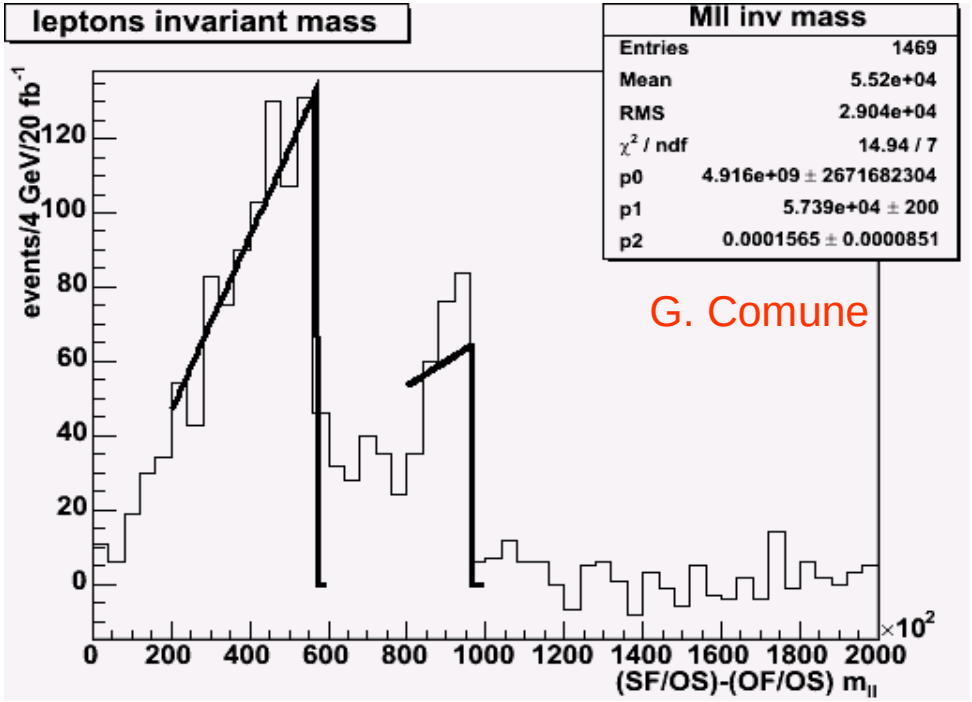
Repeat an exercise similar to DC1, more events, background simulation
Need to understand Herwig Underlying Event

Some Fast Simulation Results

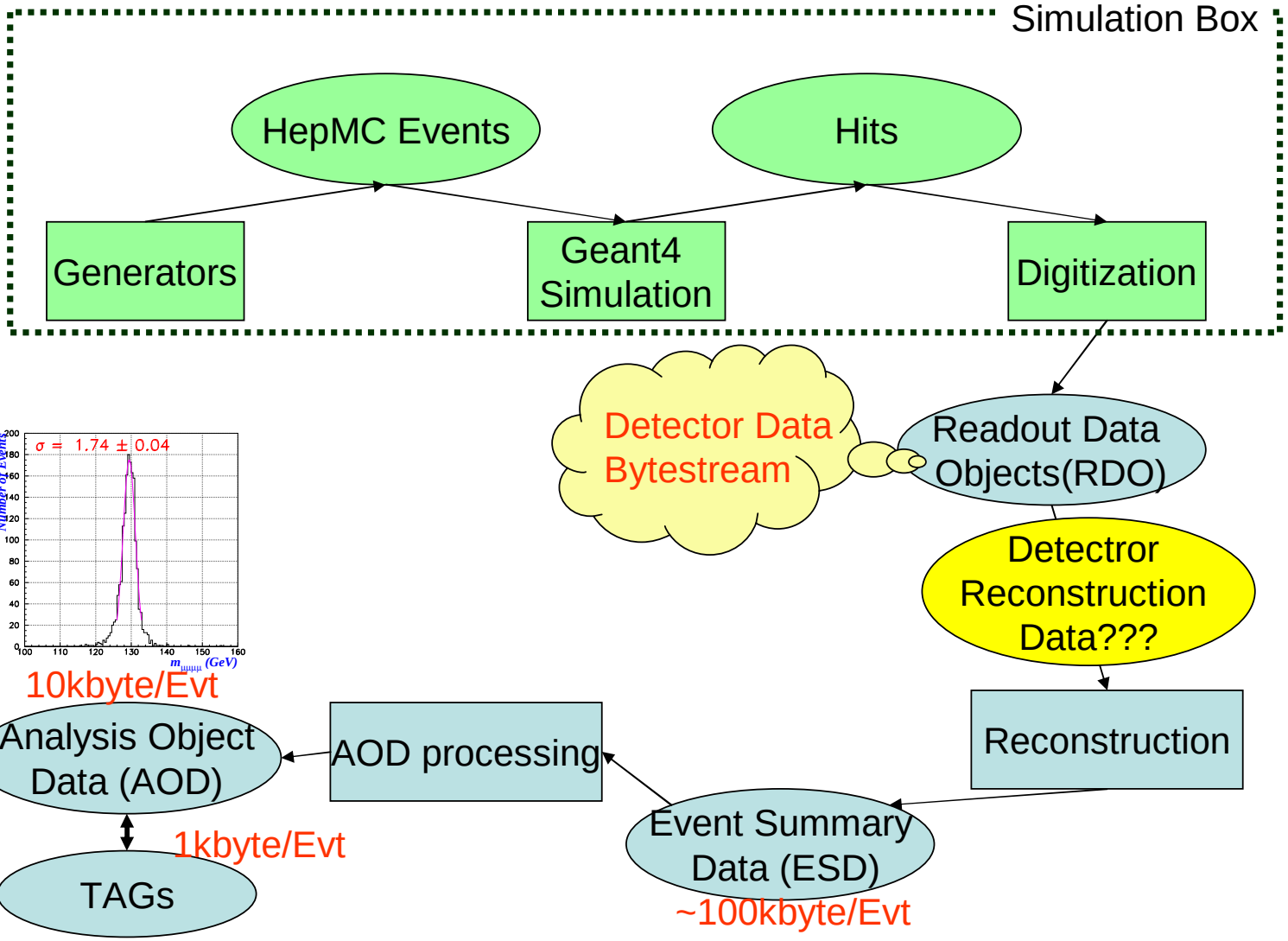
Flavor subtracted dilepton Invariant mass

200K events produced

<u>Full simulation studies</u>
Started (show some results next week at Cern)



A Cartoon View of the ATLAS sw



AtlasG4

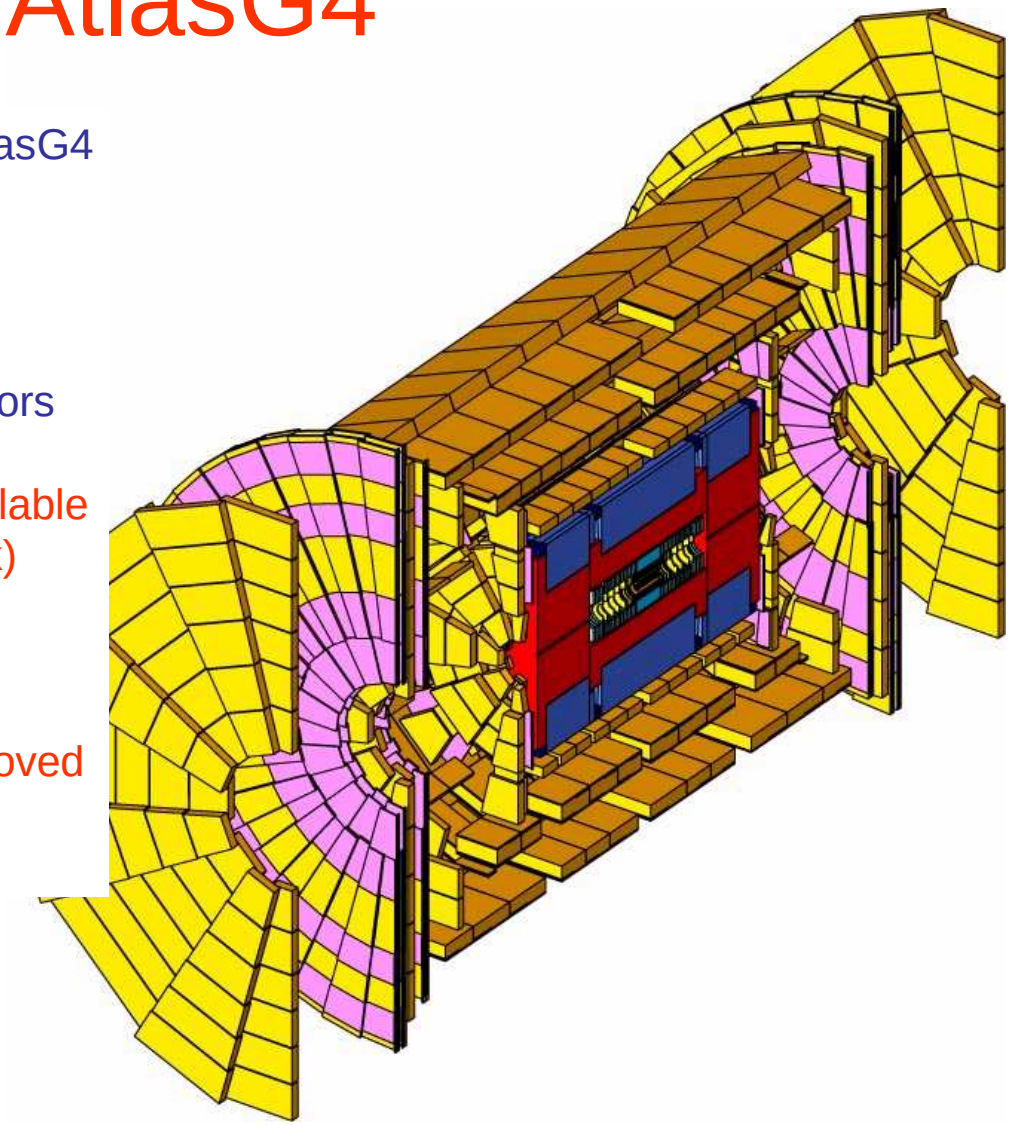
All Detectors now described in AtlasG4
Used for DC2

Almost 10M events simulated

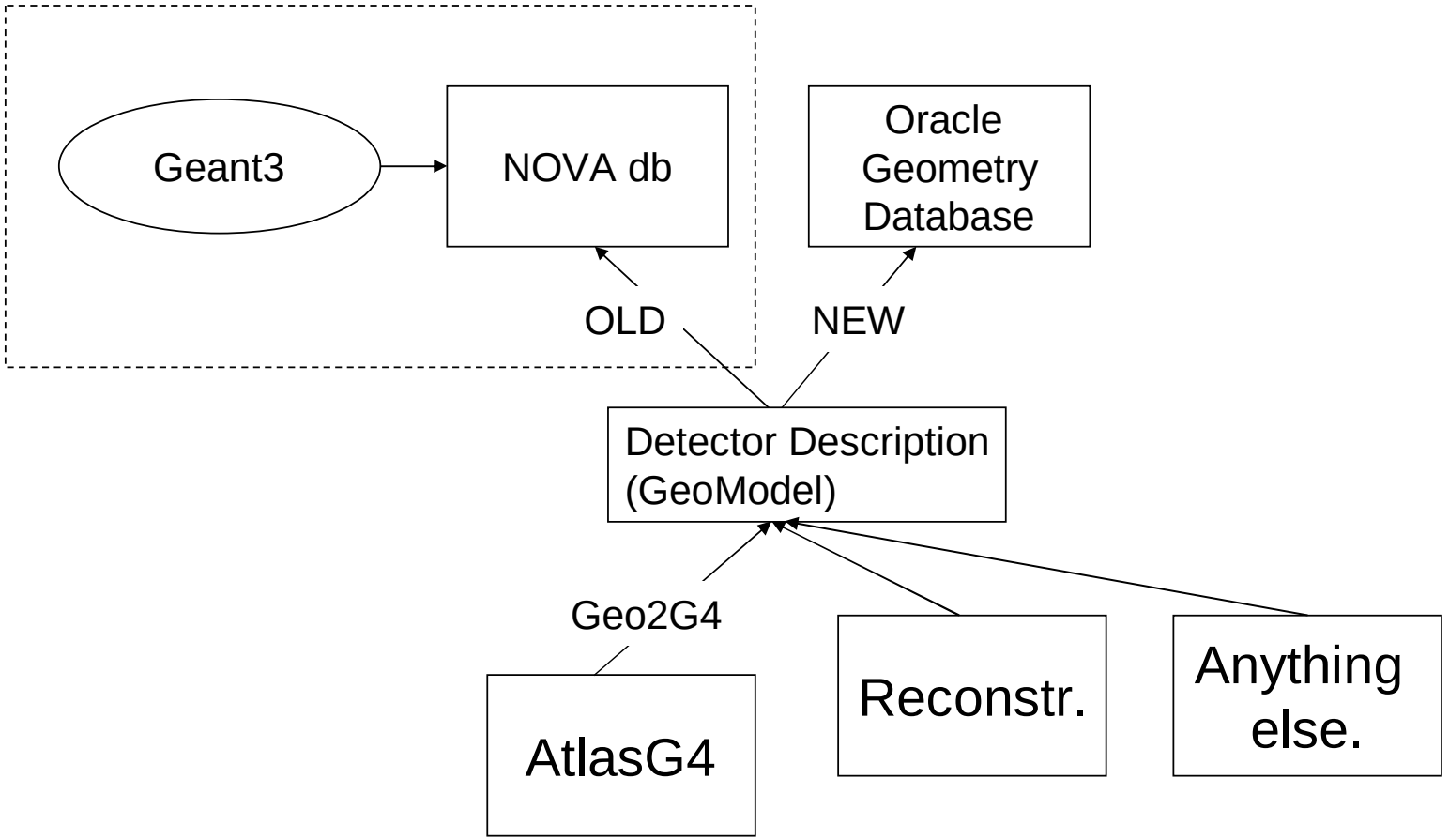
Digitization available for all Detectors

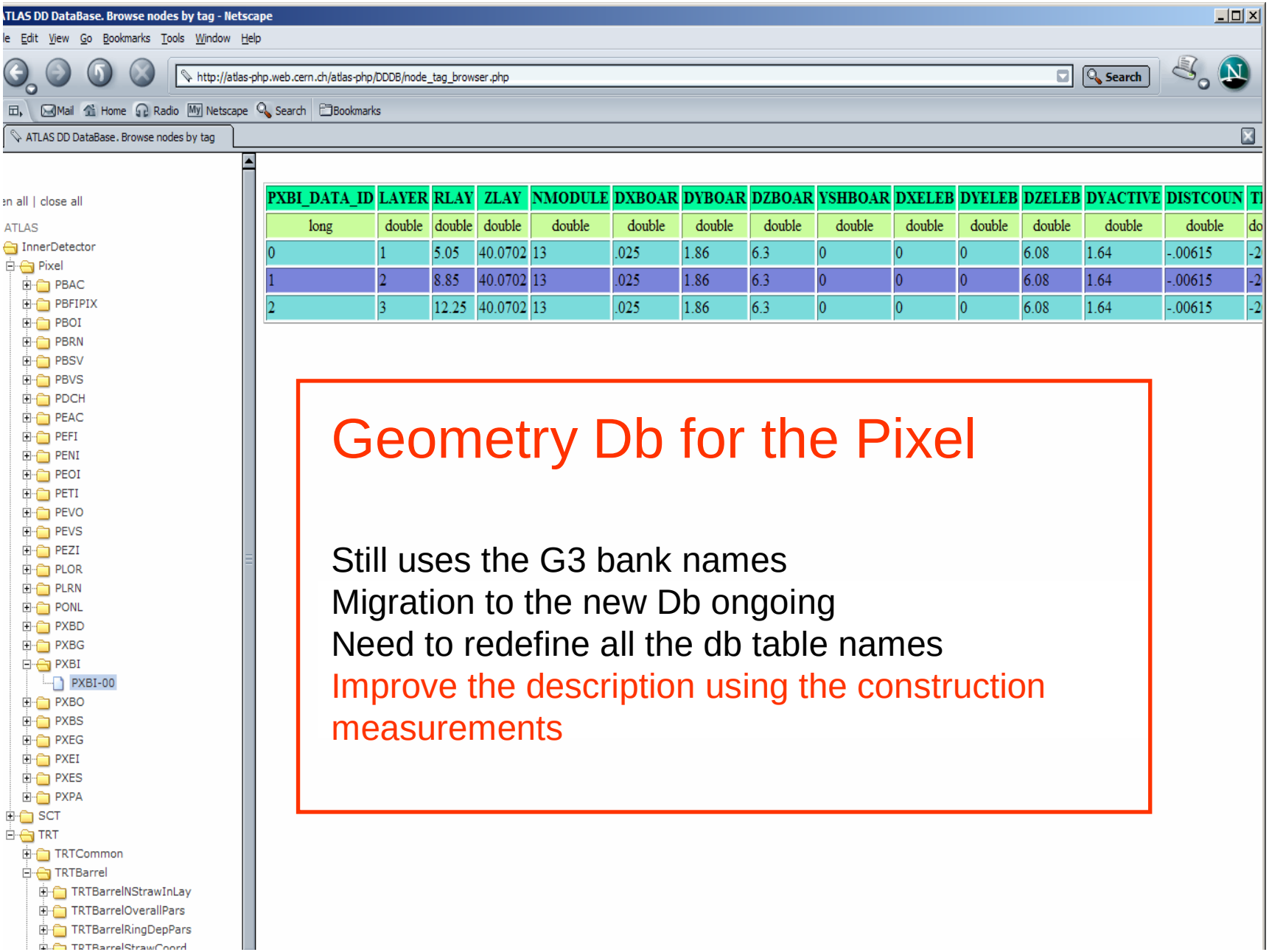
"Initial" Geometry to be made available
For Atlas release 9.0.0 (next week)

- Pixel Layer/Disk 1 removed
- No TRT outer wheel
- No TileCal gap scintillators
- Some muon Chambers removed



ATLAS Det. Description



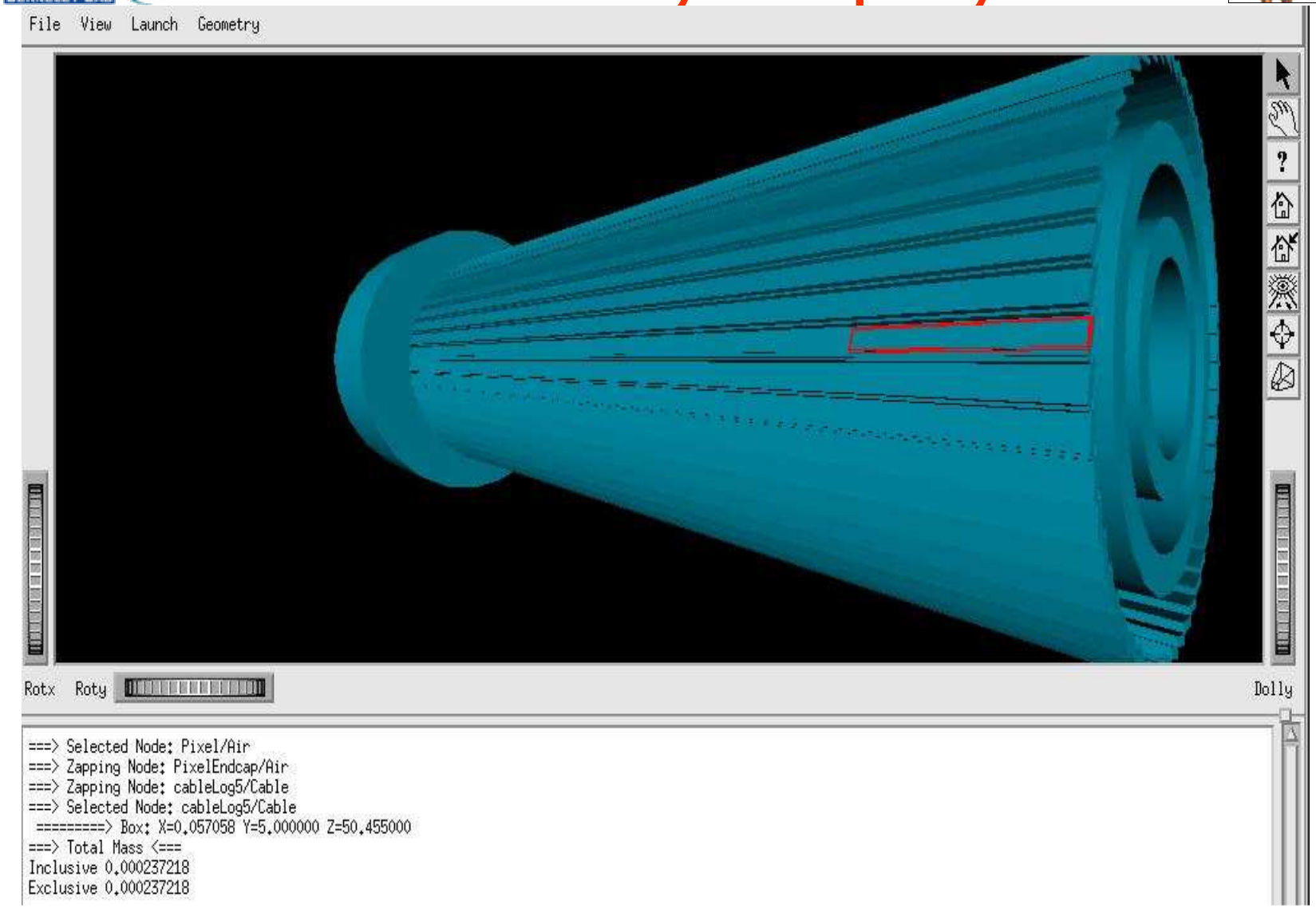


PXBI_DATA_ID	LAYER	RLAY	ZLAY	NMODULE	DXBOAR	DYBOAR	DZBOAR	YSHBOAR	DXELEB	DYELEB	DZELEB	DYACTIVE	DISTCOUN	TI
long	double	double	double	double	double	double	double	double	double	double	double	double	double	do
0	1	5.05	40.0702	13	.025	1.86	6.3	0	0	0	6.08	1.64	-.00615	-2
1	2	8.85	40.0702	13	.025	1.86	6.3	0	0	0	6.08	1.64	-.00615	-2
2	3	12.25	40.0702	13	.025	1.86	6.3	0	0	0	6.08	1.64	-.00615	-2

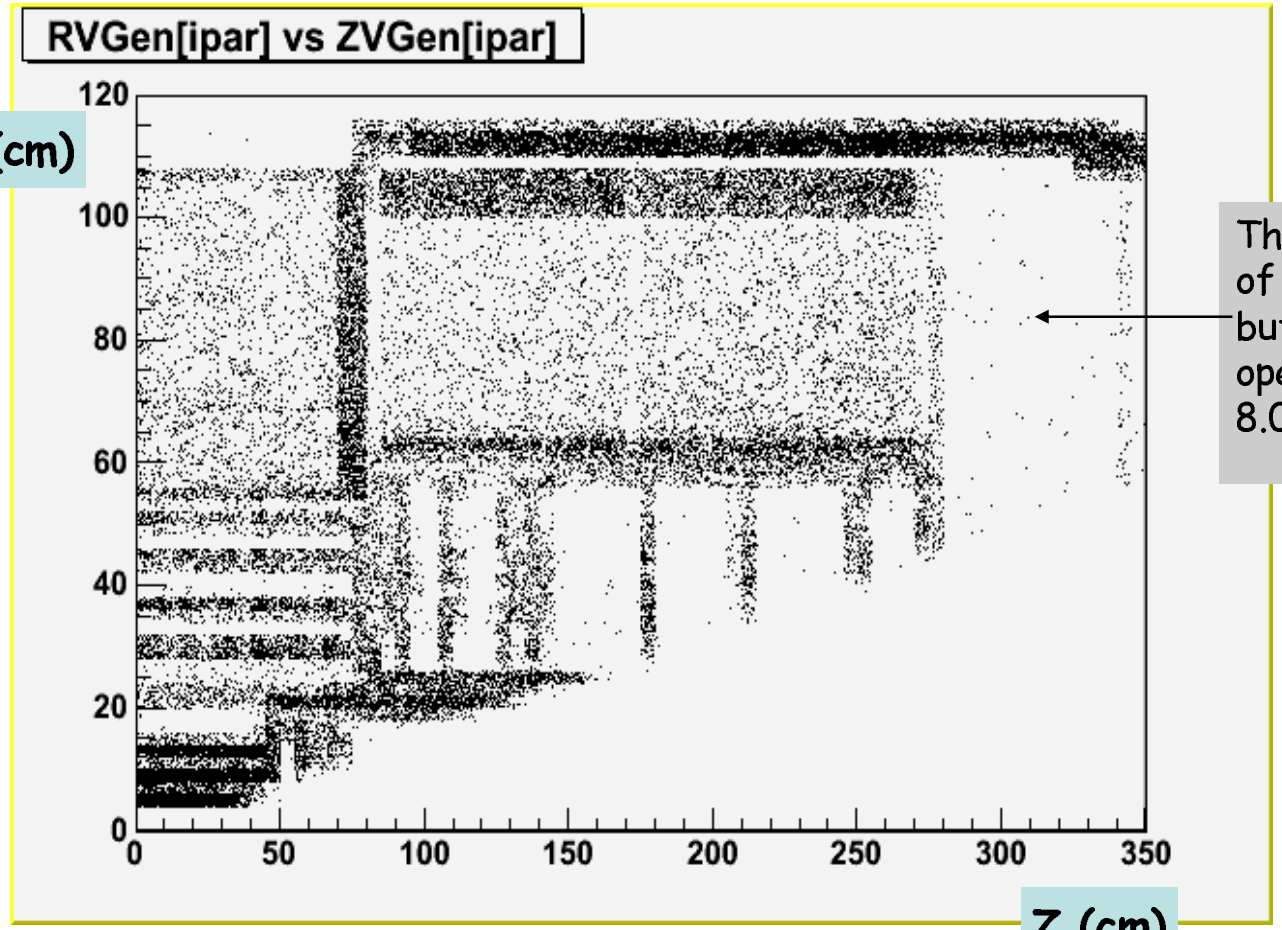
Geometry Db for the Pixel

Still uses the G3 bank names
Migration to the new Db ongoing
Need to redefine all the db table names
Improve the description using the construction measurements

Geometry Display



Tracker radiography : i.e R vs Z at which secondaries are produced



This is not staging of TRT C-wheels, but Davide's wrong operation (fixed in 8.0.5)

Using the information on the electron conversion from G4

DC2 production and analysis

- Goal is to simulate 10^7 events
  - Almost finished with the AtlasG4 part
- Problem with the distribution of the files to the end-user
  - How to find and fetch a file being produced??
  - Being solved
- Still quite a lot of processing needed before being able to see some plots…
  - Events need to be Digitized, then Reconstructed. At this point AODs (or ntuples) are available
- Tutorial on “Analysis Tools” next week. Example of top mass reconstruction using Analysis Object Data. In addition to Wim’s tutorials for beginners

An Example Analysis on AODs

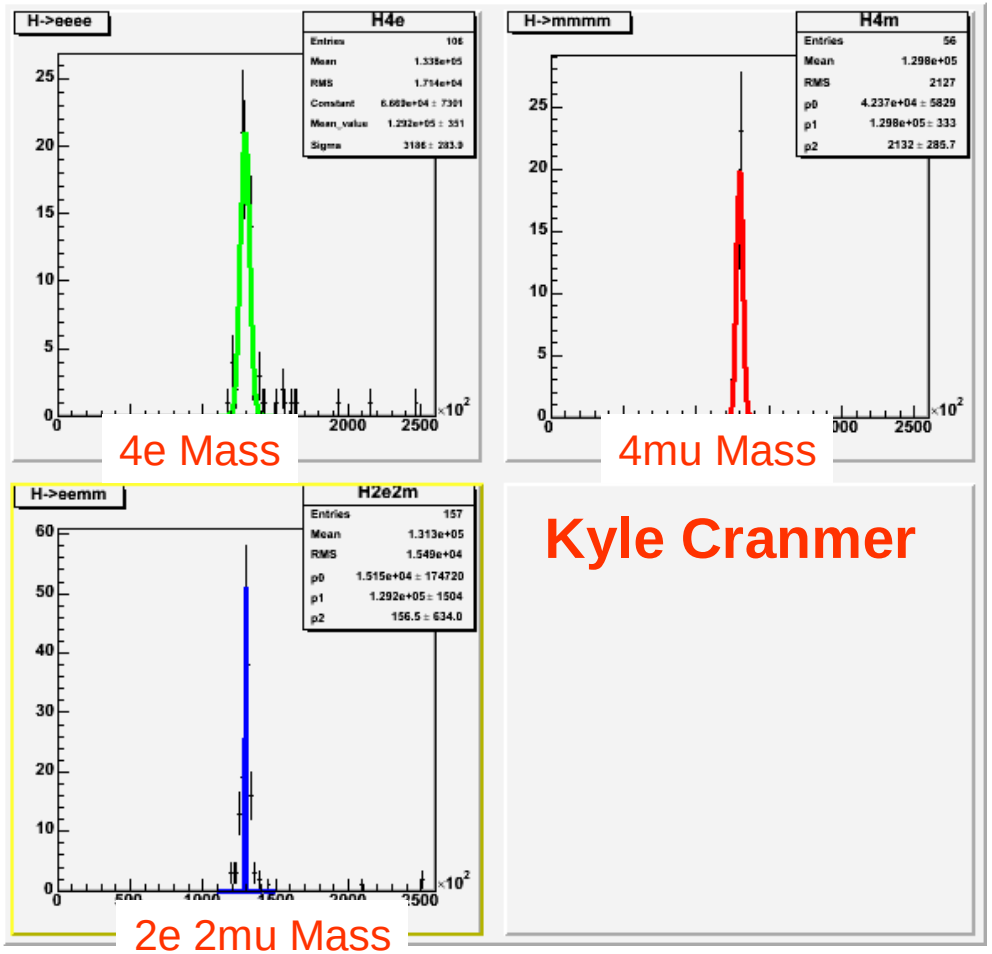
H(130)→4leptons.

2,000 events to show how things work

We are still in the process of having a more “stable” software for the Rome workshop

Next Major software release will have all needed functionality (~1month away)

SUSY AOD analysis under development



Physics Validation

- The ATLAS Software is in a continuous evolution, two different requirements:
  - The Software Developers are constructing the model that we will be using in 2007
  - Physics/Detector Performance Groups want to use the ATLAS software to study simulated data samples
  - DC2 is about to start!

- New Physics Validation group set up by the Physics Coordination:
  - Repeat the experience we had for DC1 and the Athens workshop, thanks to Fabiola
  - Collect feedback from the Physicists/Users in the different groups and report to the Software Developers community
  - Use the ATLAS software for Physics/Detector performance studies. Spot bugs, request new features, improve the performances.
  - Improve the communication between different Physics Groups

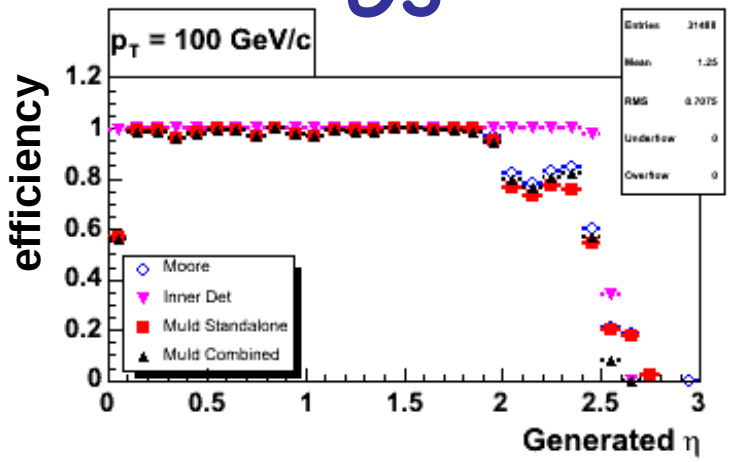
A Few Organization Details

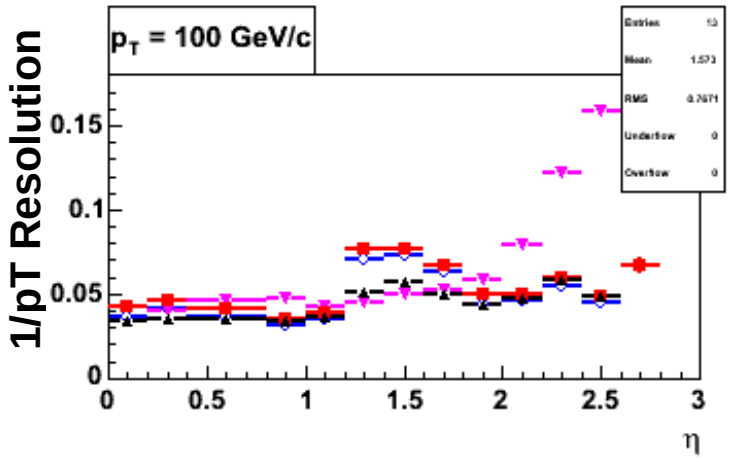
- The group started at the beginning of 2004:
  - Validation group meets (phone/VRVS only) every two weeks on Wed at 4pm. Next Meeting on Sep 15th
    Validation overview during sw weeks.
  - Mailing list (atlas-phys-validation) to exchange information about validation and “features” of the Software (>120 people)
  - The main ingredient will be the new Simulation, Reconstruction and user feedback on Analysis Tools
  - Validation web page:

    http://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/SOFT_VALID/soft_valid.html
  - Liaison between the Physics and Computing

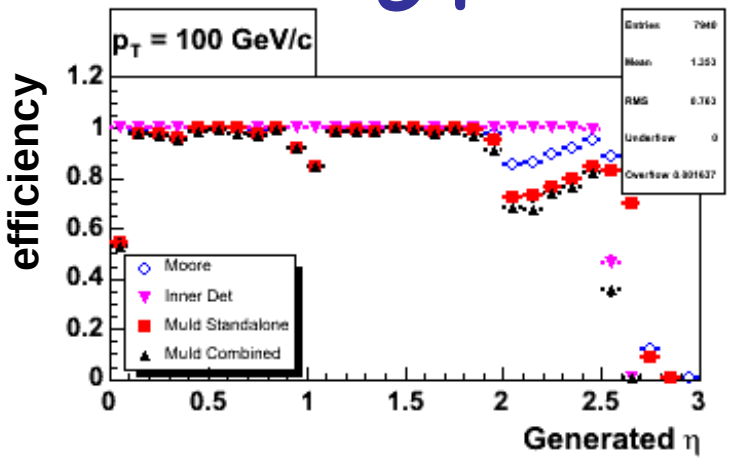
An Example: |η| Dependence for muon reconstruction (p_T=100 GeV/c)

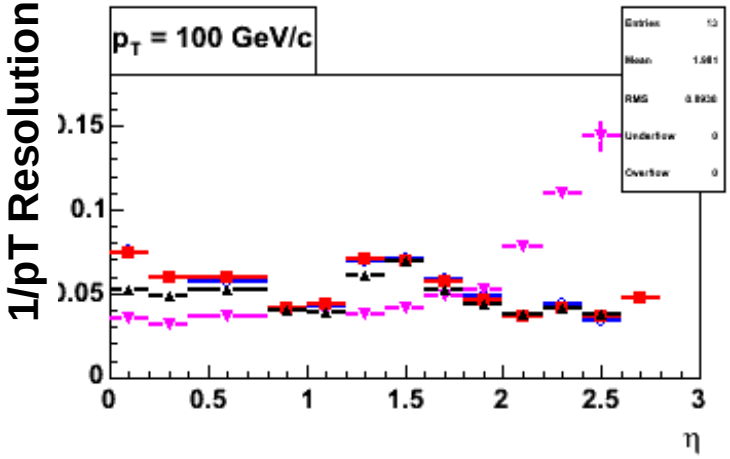
G3





G4





Plan for Rome

- Most of the tools needed are available
  - Need to have a more consistent Underlying Event model
  - Simulation/Reconstruction are in a reasonable shape
  - Polishing needed on the time scale of November
  - Missing things: Calibration and Alignment, LVL2
- We have a Physics case to study
  - Susy coannihilation point.
  - We will have background events too
- Implication on the local resources
  - Our share of pdsf is just enough…
  - We are getting 1Tbyte of disk