Simulation meeting — WHA discussion

http://www-cdf.lbl.gov/∼currat/talks/

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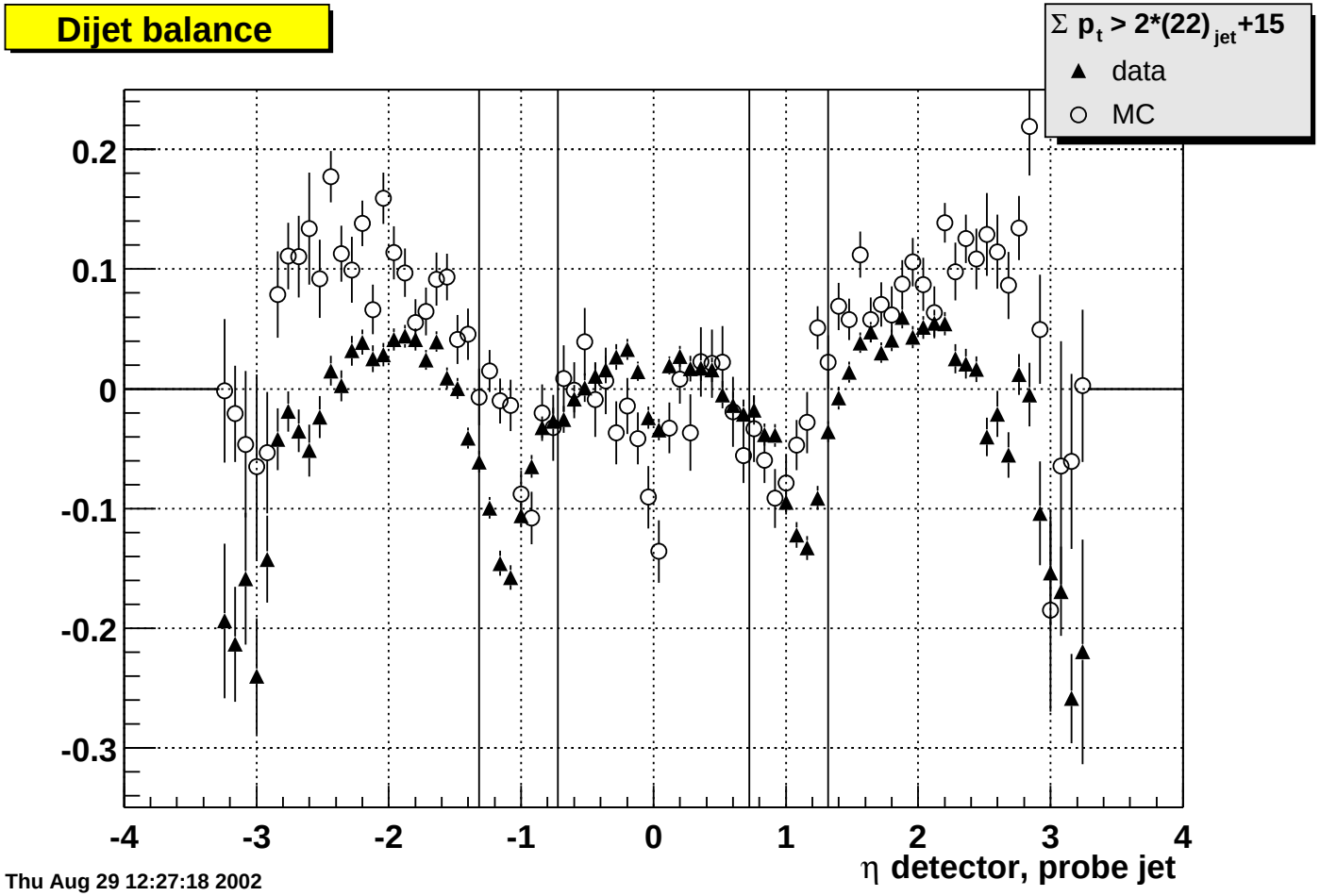
- Dijet balance
- Geometry issues
- `Gflash` predictions

Dijet balance — old MC comparison

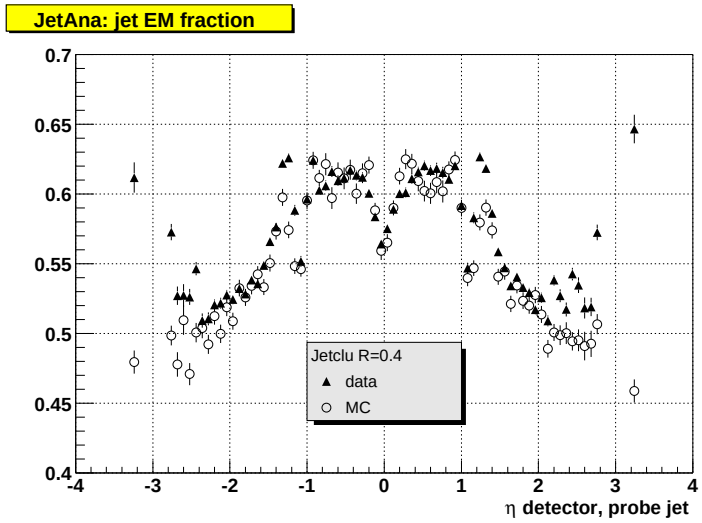
Back to August 2002, `CdfSim v. 4.5.3` and 0.7 cone with Feb'02–June'02 Jet_20 data

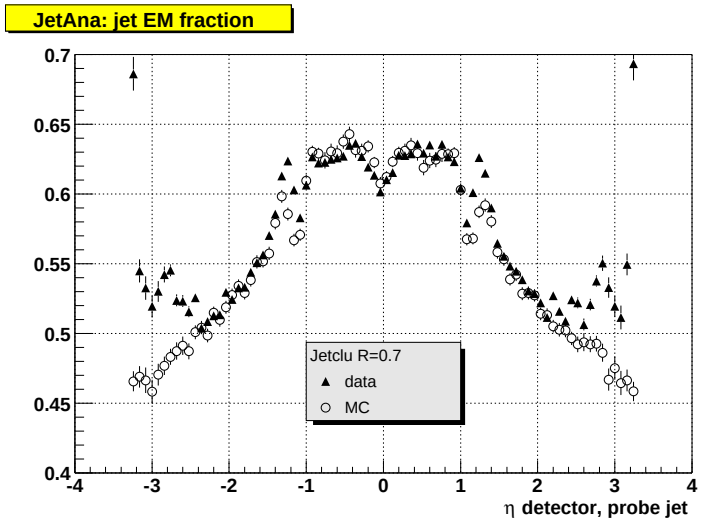


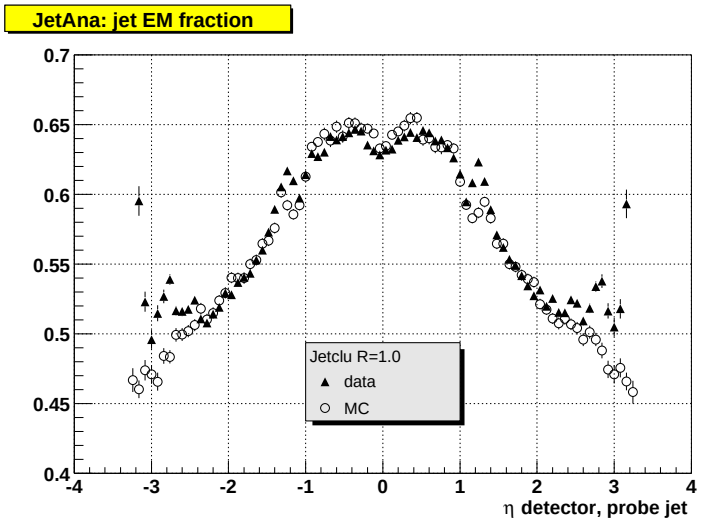
☞ Discrepancy addressed at the time by applying a global scale factor 0.92 for $|\eta| > 1$ in MC

Jet EM fraction — no jet corrections

- Using `CdfSim v. 4.9.1 STntuples`. Cone sizes 0.4/0.7/1.0
- `JetClu` algo, `Jet_20` data, `jtop2d` MC sample

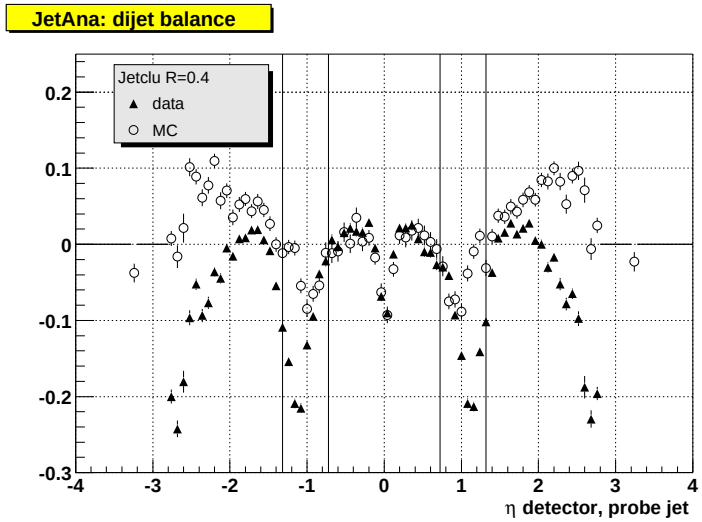


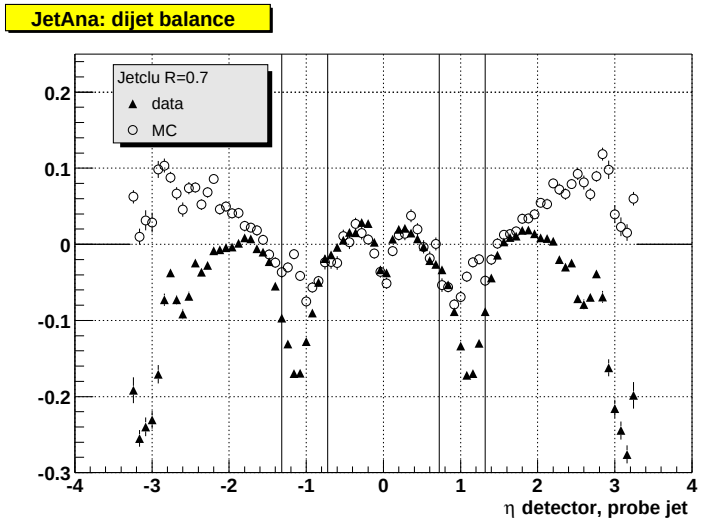


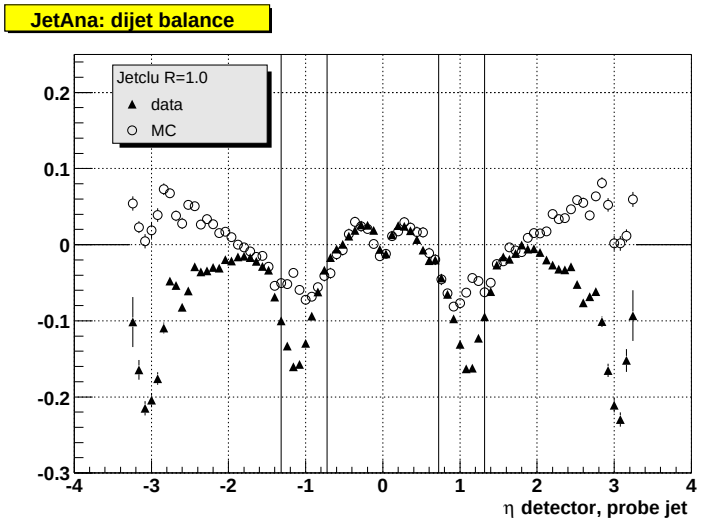


Dijet balance — no jet corrections

Now with `CdfSim v. 4.9.1` and 0.4/0.7/1.0 cones (`JetClu`, `Jet_20` data)



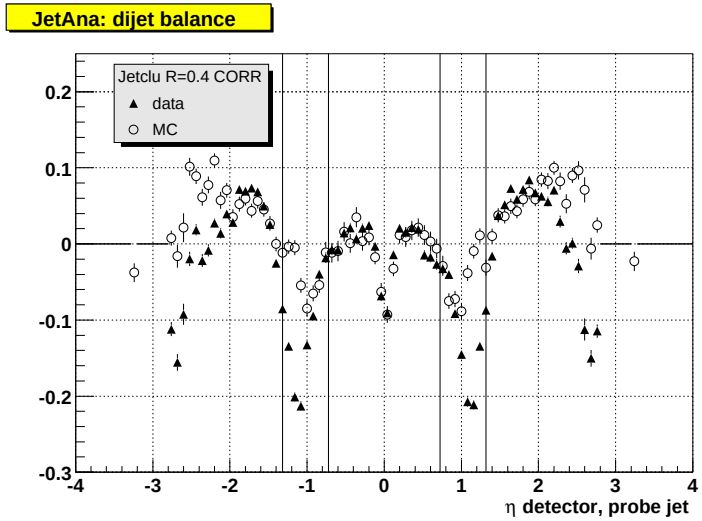


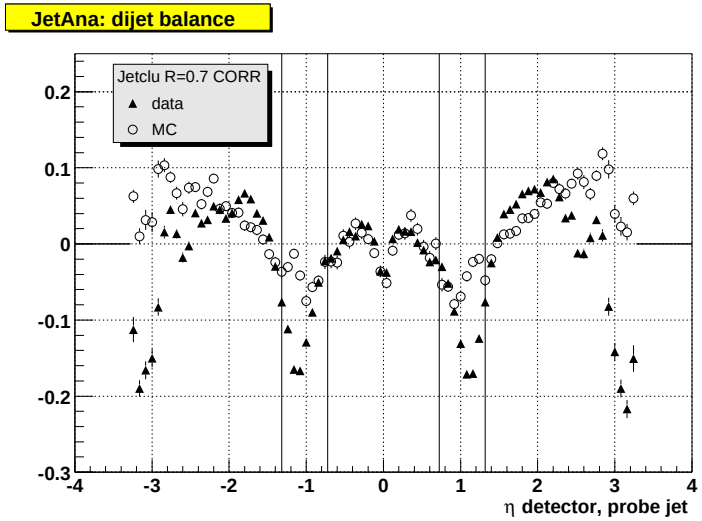


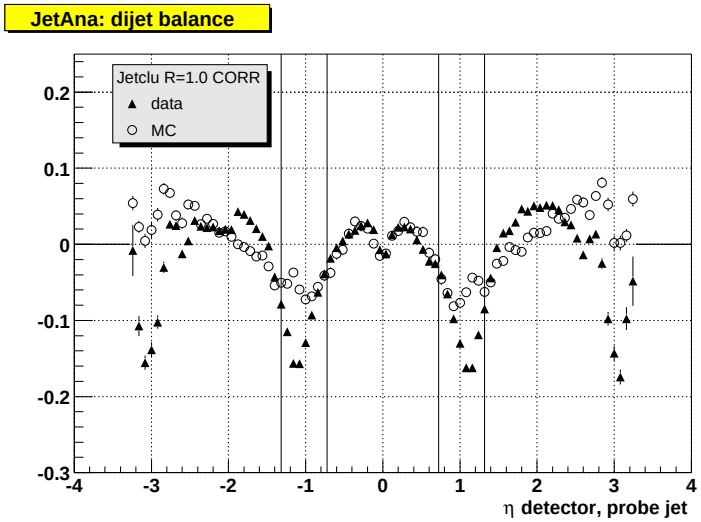
☞ Same problematic behavior for $|\eta| > 1$

Dijet balance — with time correction

Now with `CdfSim v. 4.9.1` and 0.4/0.7/1.0 cones (`JetClu`, `Jet_20` data)



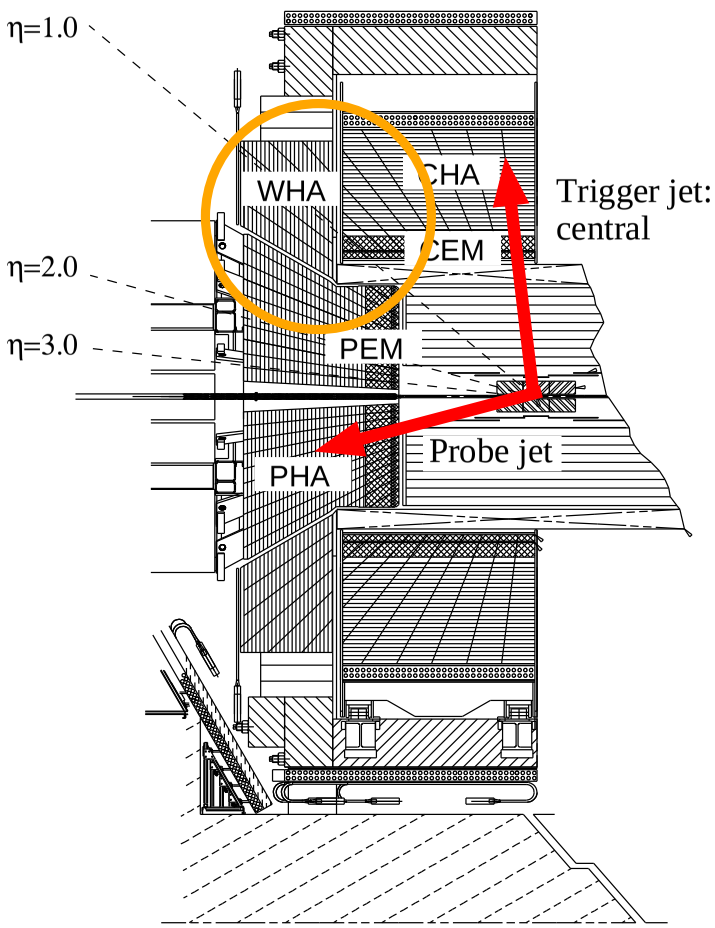


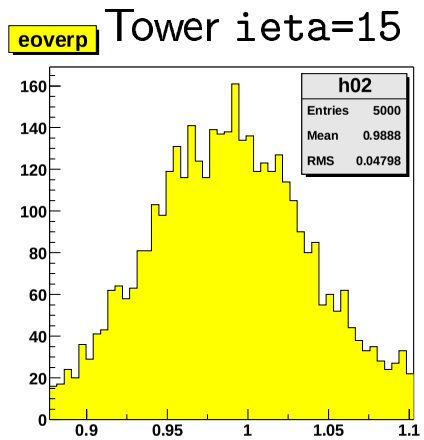


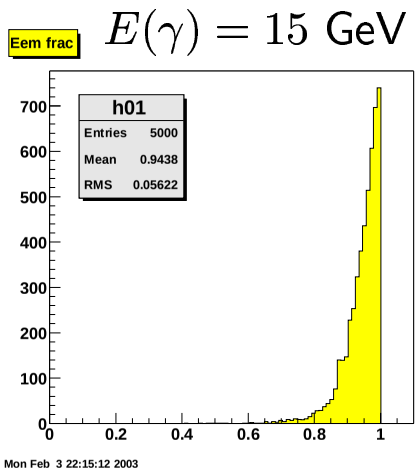
☞ Now, after time correction in the plugs the problem becomes twofold: WHA region vs high η region have now to be addressed separately. WHA first.

Data/MC comparison – WHA issue

- Resuscitated `Gflash` toolbox to investigate about E-scale in WHA (no tuning has ever been done...)
- Shooting single particles in individual towers, scan the $30°$-crack



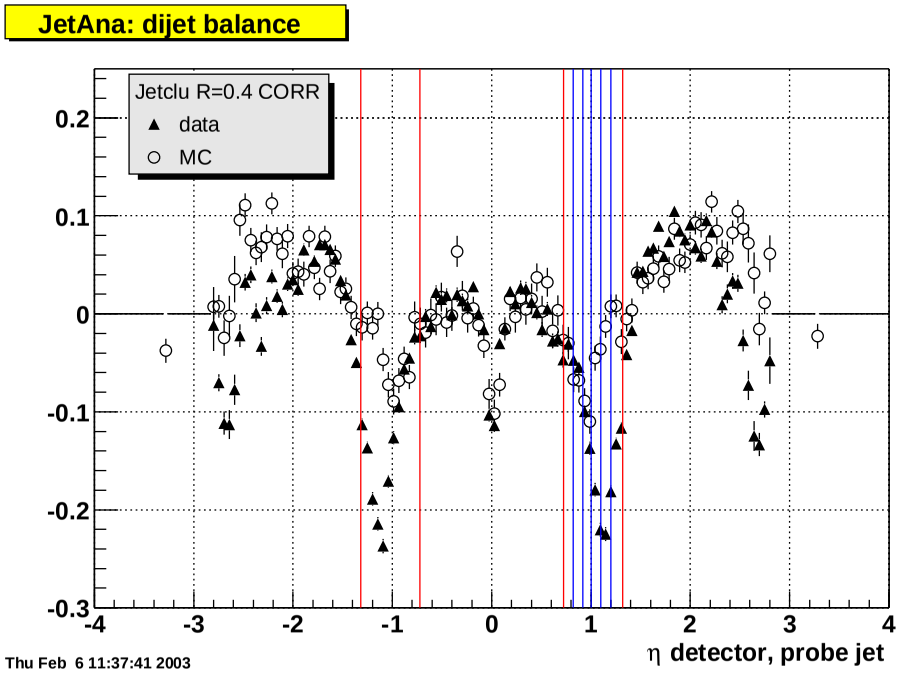


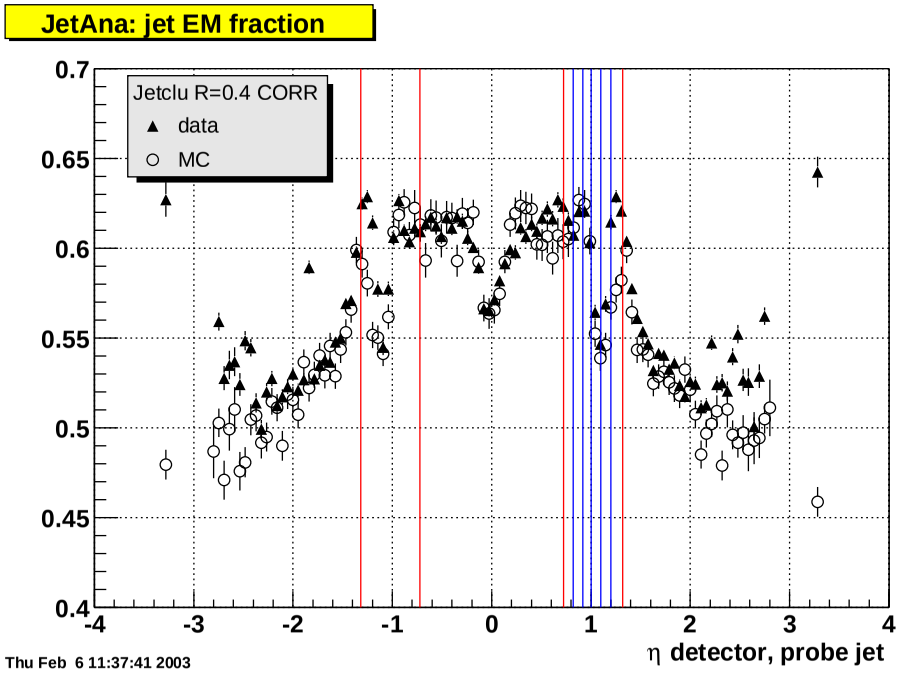


☞ Comparison with Run I data (cf CDF notes #835,#1513) indicates that the problem is in the simulation

Data/MC comparison – WHA issue

Rebinned. Blue lines delimit towers `ieta=19,...,14`





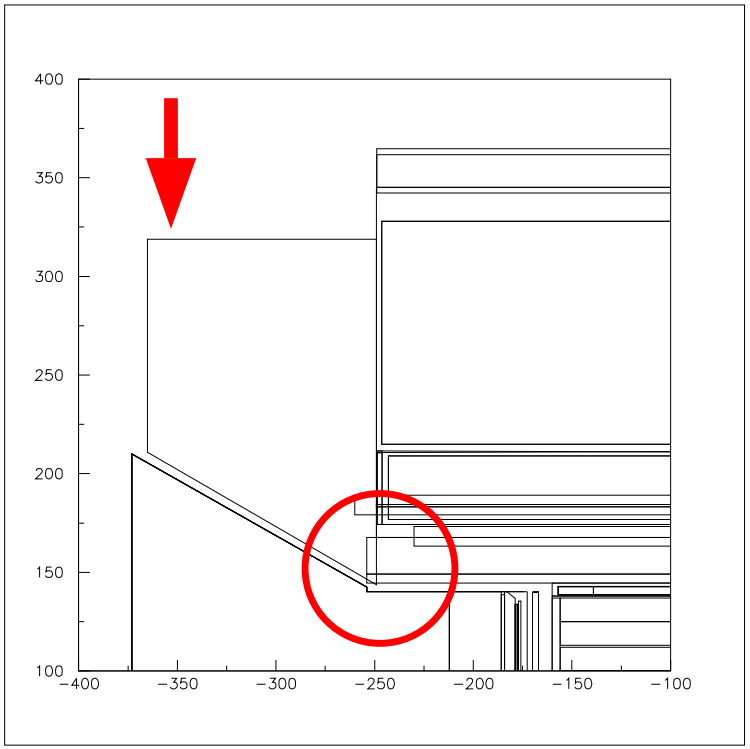
☞ Discrepancy in the WHA amounts up to 15%

WHA geometry cross-check

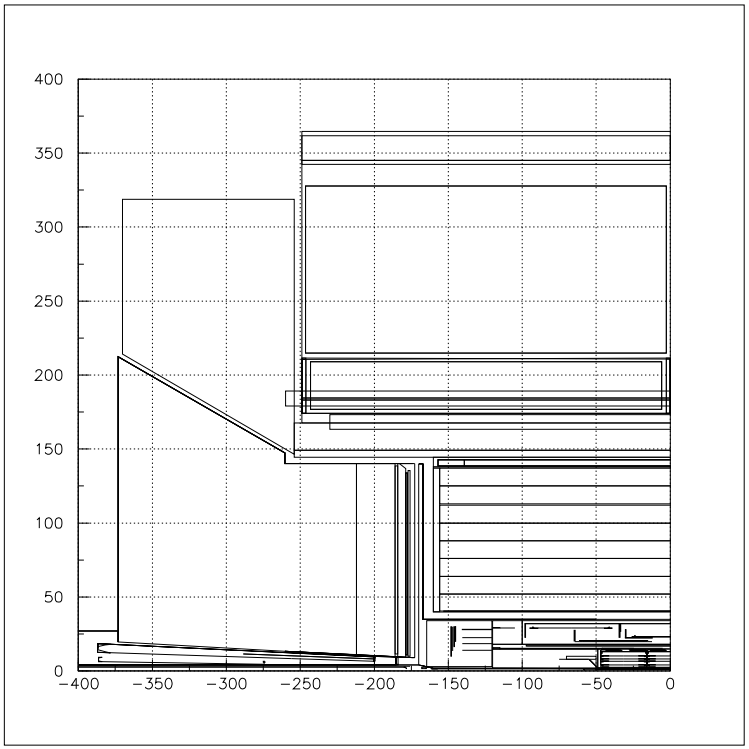
Problems with WHA geometry implementation in GEANT

- WHA was ill-positioned, coil overlapping into WHA
- WHA+PHA geometry slightly modified to agree with 1993 blueprint.

Before



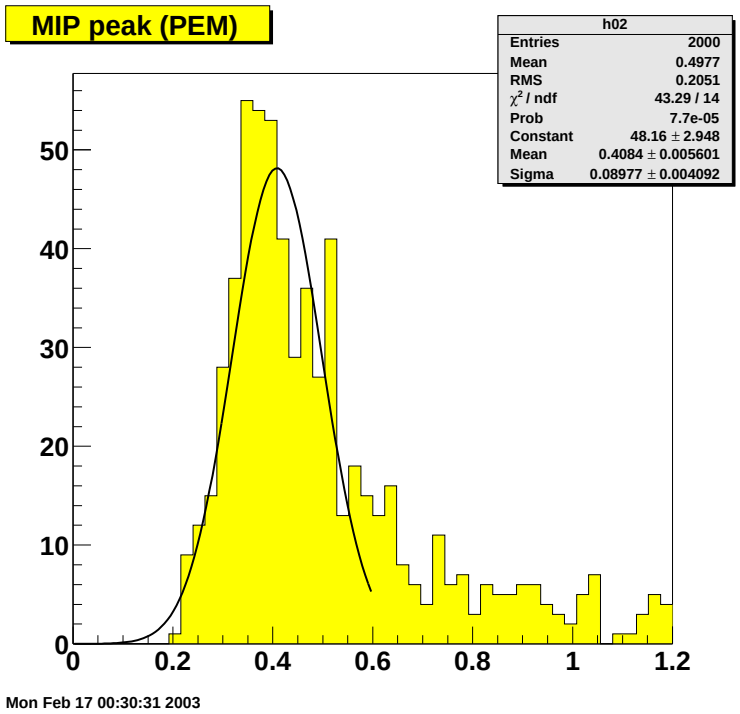
After



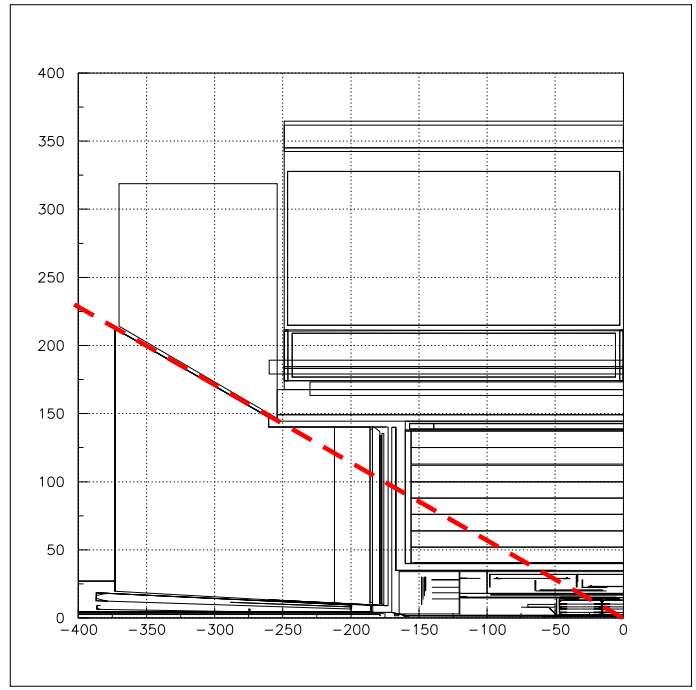
☞ This has been corrected now (contact me)

WHA-crack response to single π 1/2

- Shooting 57 GeV $\pi^{\pm}$ straight in the crack ($\eta = 1.326$, B field turned off)
- MIP peak in the PEM:



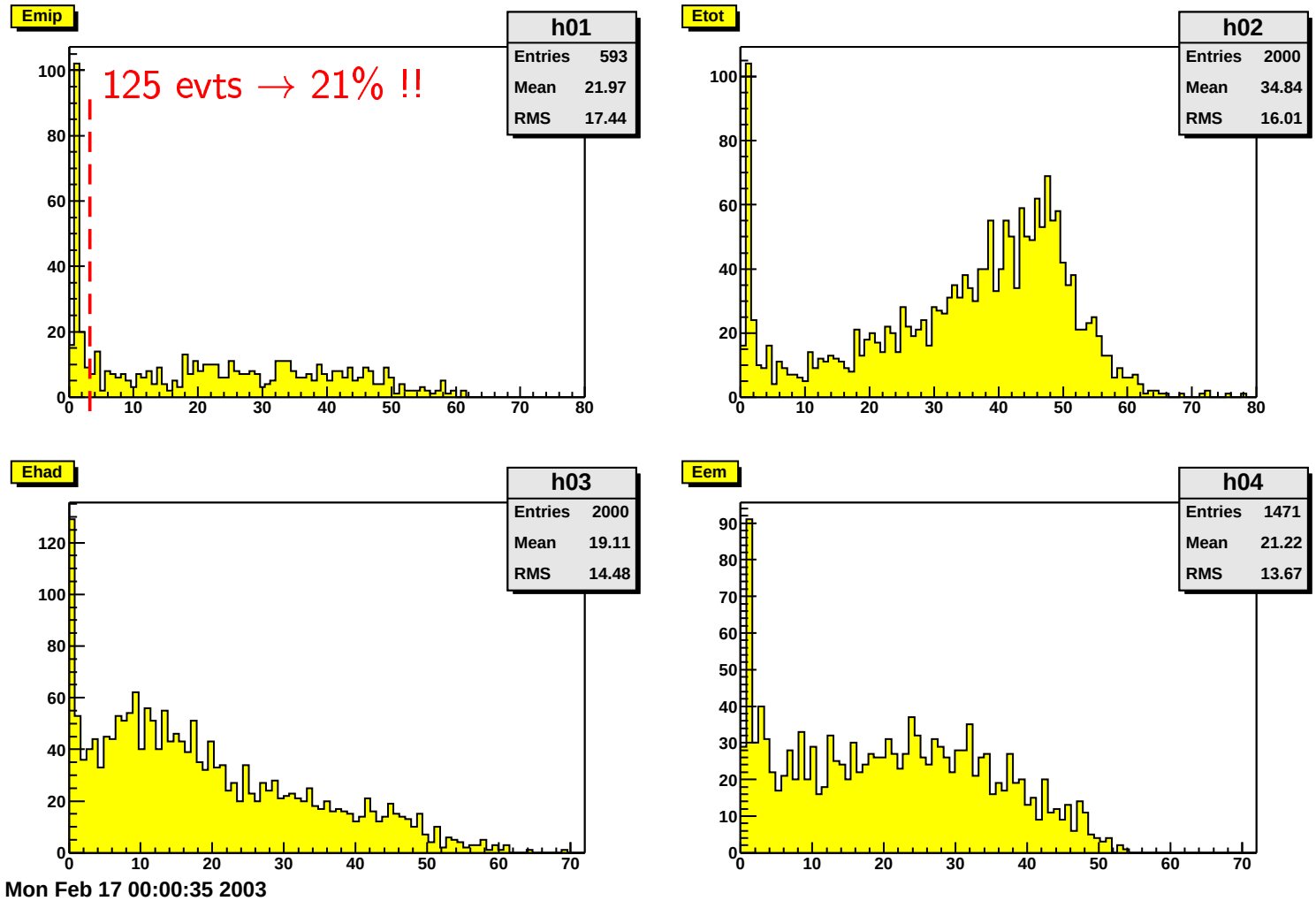
☞ MIP peak in PEM looks to be at the right place, according to CDF note #5886



- At $\eta = 1.326$, trajectory crosses $\sim 1.56\lambda_I$ in PHA
- $e^{-1.56} \simeq 21\%$ of particles expected to reach & pass through the crack, not interacting at all

WHA-crack response to single π 2/2

The $30°$-crack "response" looks actually correct. Shooting 57 GeV $\pi^{\pm}$ in the crack $(\eta = 1.326, B = 0)$ gives



WHA-tower response to single π 1/3

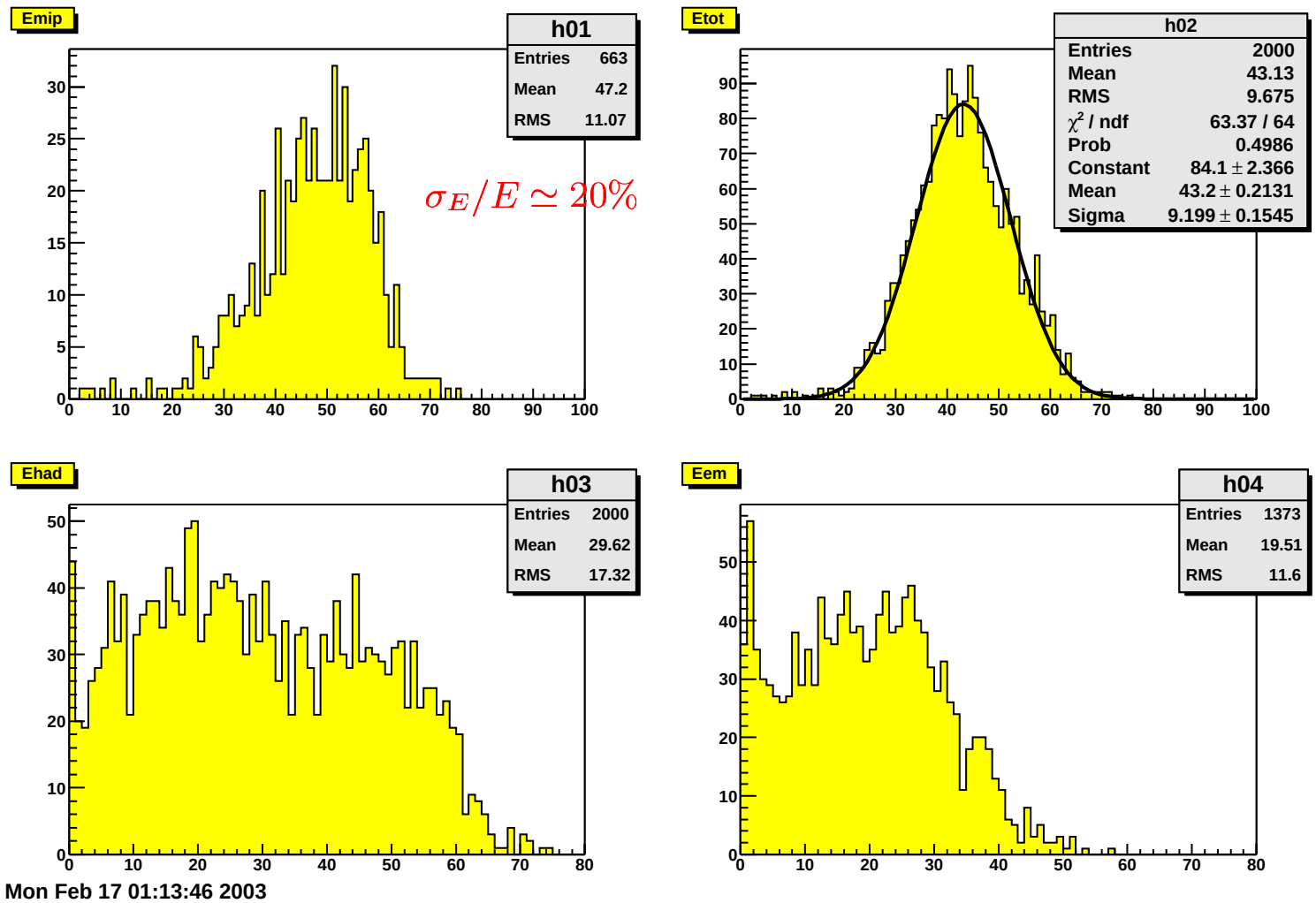
Shooting now 57 GeV π in the center of each WHA tower (B field turned off).
Energies in [GeV]

	ieta	mip [GeV]	EM_mip peak	σ_{EM_mip}	Full peak	E/p
Plug	12	0.41	58.5	5.6	55.0	0.967
	13	0.40	59.1	5.5	54.9	0.965
WHA	14	0.43	61.0	9.3	56.1	0.985
	15	0.28	54.1	7.1	52.4	0.924
	16	0.23	54.7	7.6	50.4	0.885
	17	0.35	47.9	9.9	43.2	0.766
	18	0.35	52.1	5.8	49.2	0.868
	19	0.35	53.1	6.3	50.5	0.890
Central	20	0.34	54.9	5.4	51.6	0.909
	21	0.34	54.4	5.9	51.4	0.906
	22	0.34	53.9	6.1	51.3	0.903

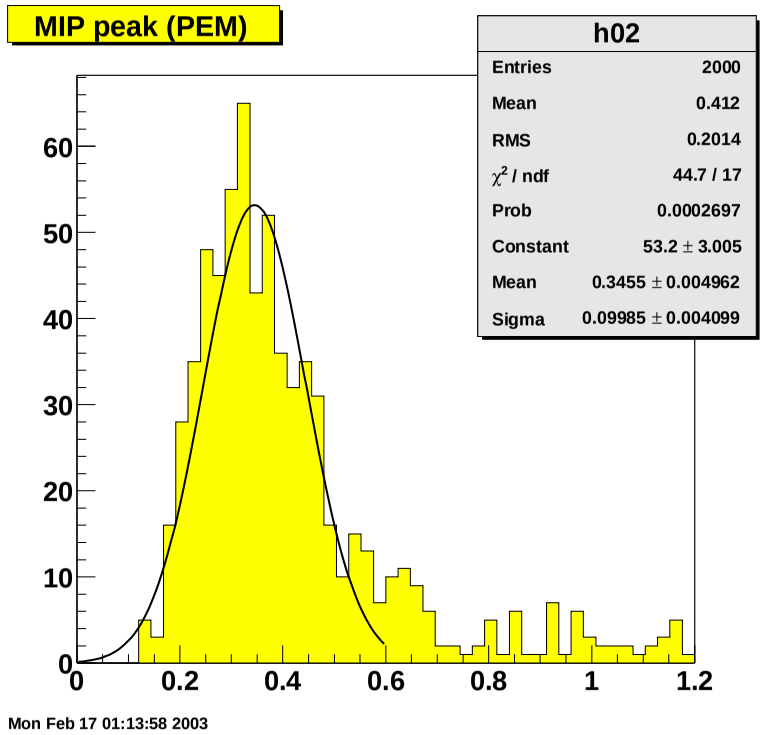
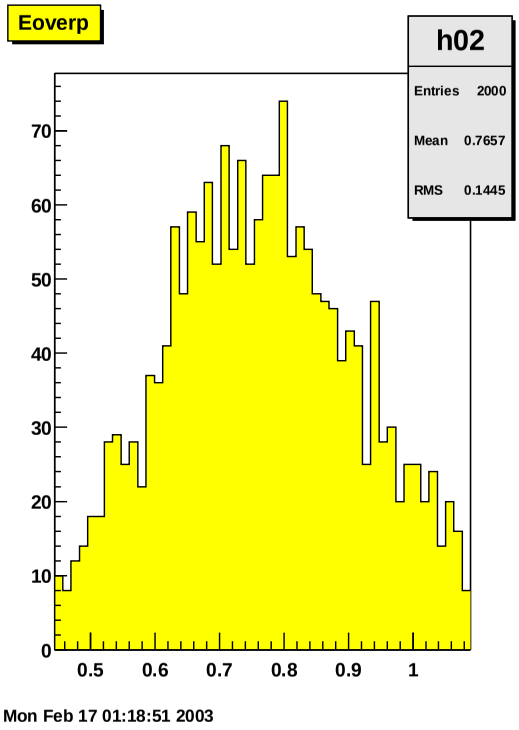
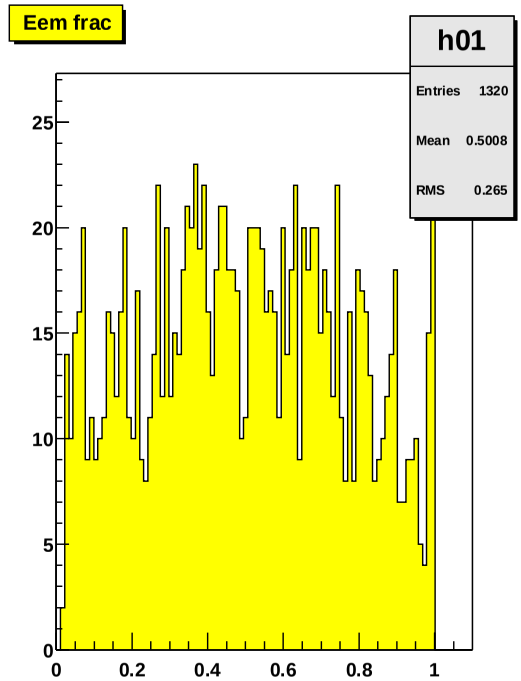
☞ Looks like a tower-by-tower tuning is necessary in the WHA

WHA-tower response to single π 2/3

Shooting 57 GeV π straight in tower `ieta=17` (B field turned off) gives



☞ Undecently low peak and bad resolution... !!

WHA response to single π 3/3

Shooting 57 GeV π straight in tower `ieta=17` (B field turned off) gives