Jet corrections meeting

www-cdf.lbl.gov/∼currat/talks/

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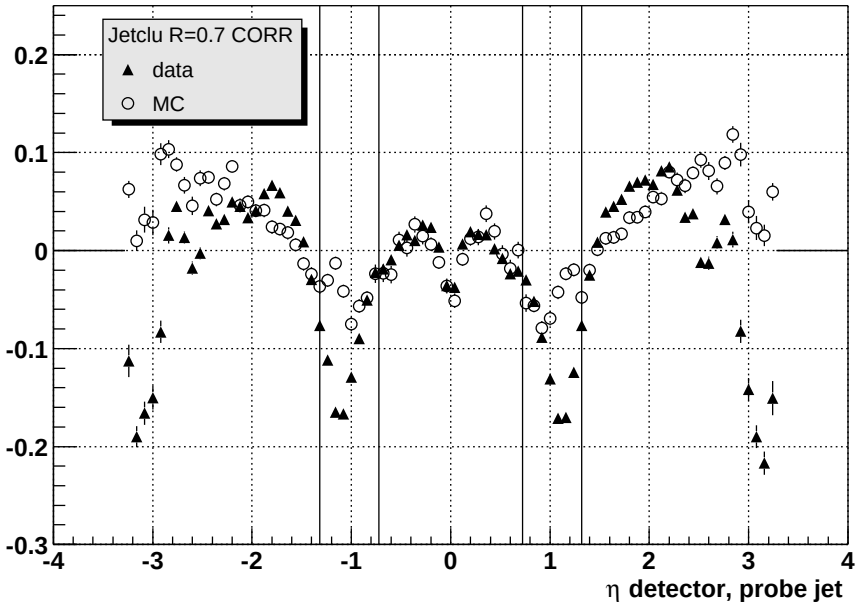
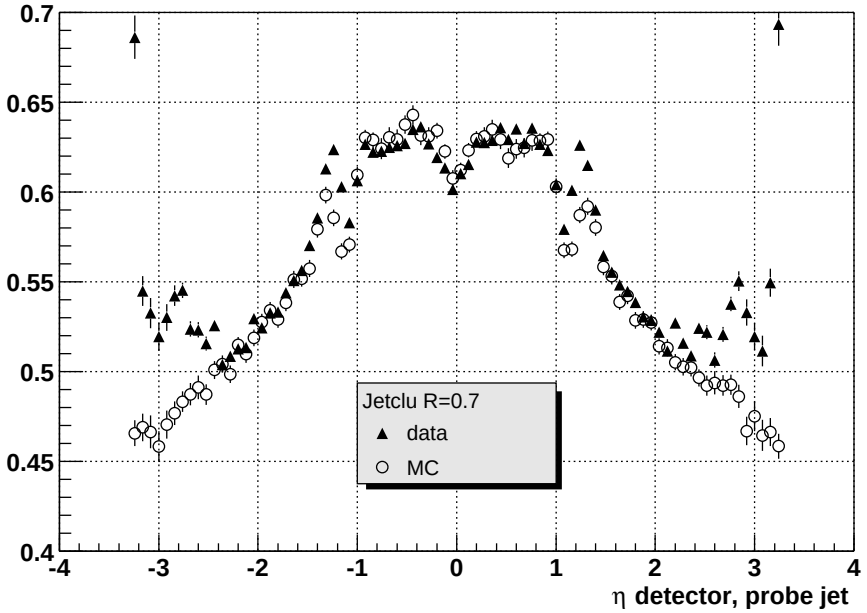
- Disagreement between data/MC for jets above $|\eta| > 2$
- First look at v. 4.10.4 data with dijet balance

Reminder (4.9.1)

JetAna: dijet balance



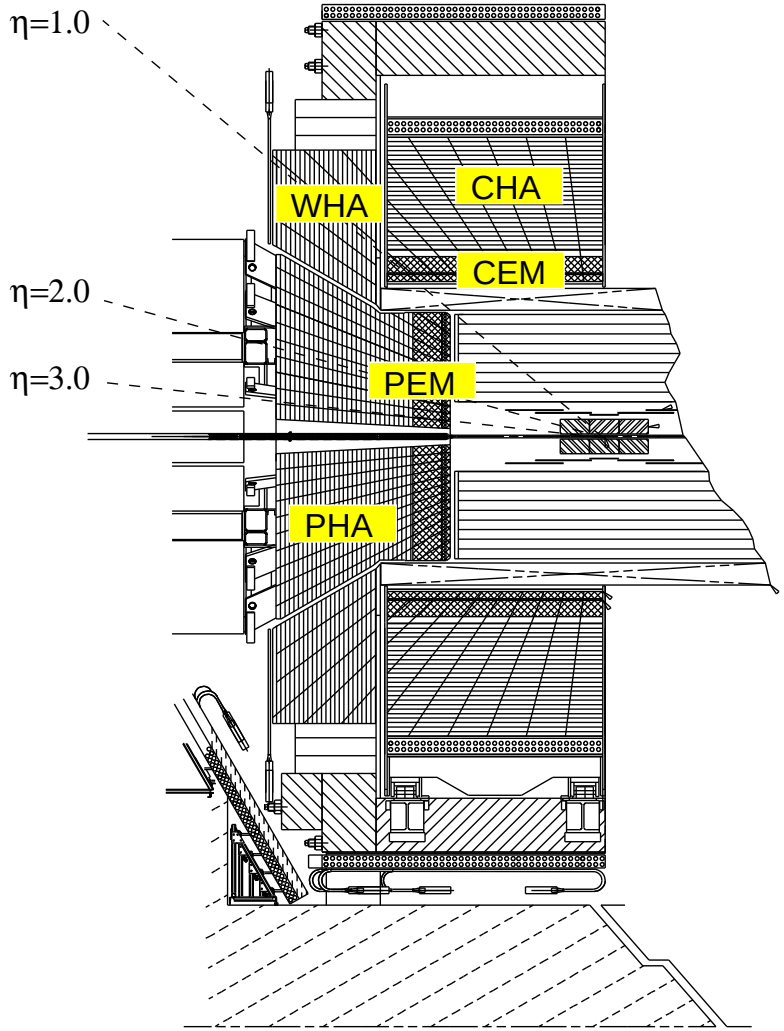
JetAna: jet EM fraction

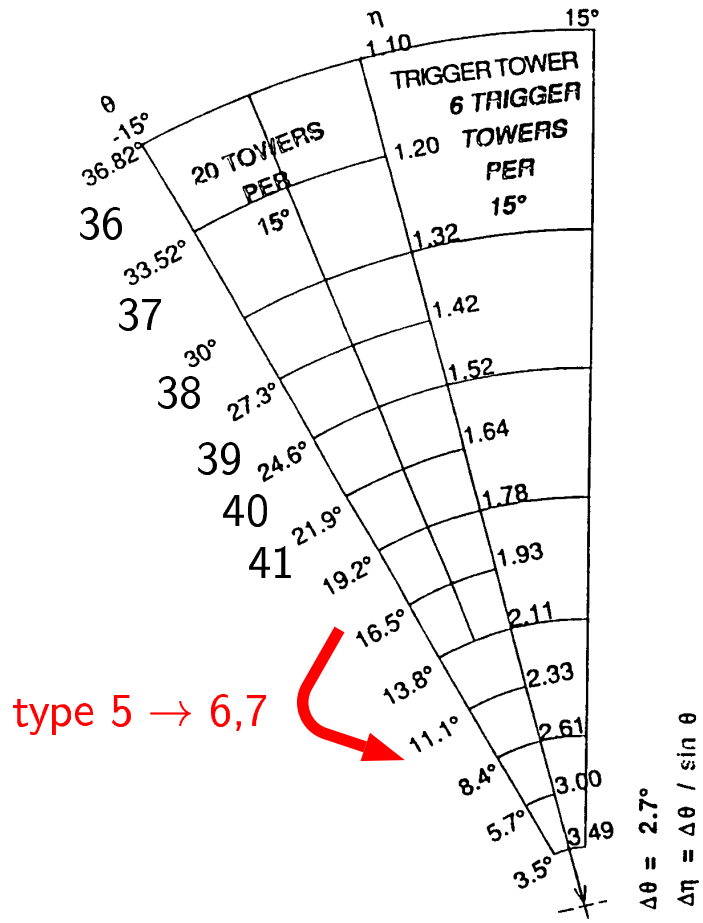


- Disagreement for jets above $|\eta| > 2.0$
- WHA?!

Plug segmentation

Segmentation of EM and HAD towers is the same

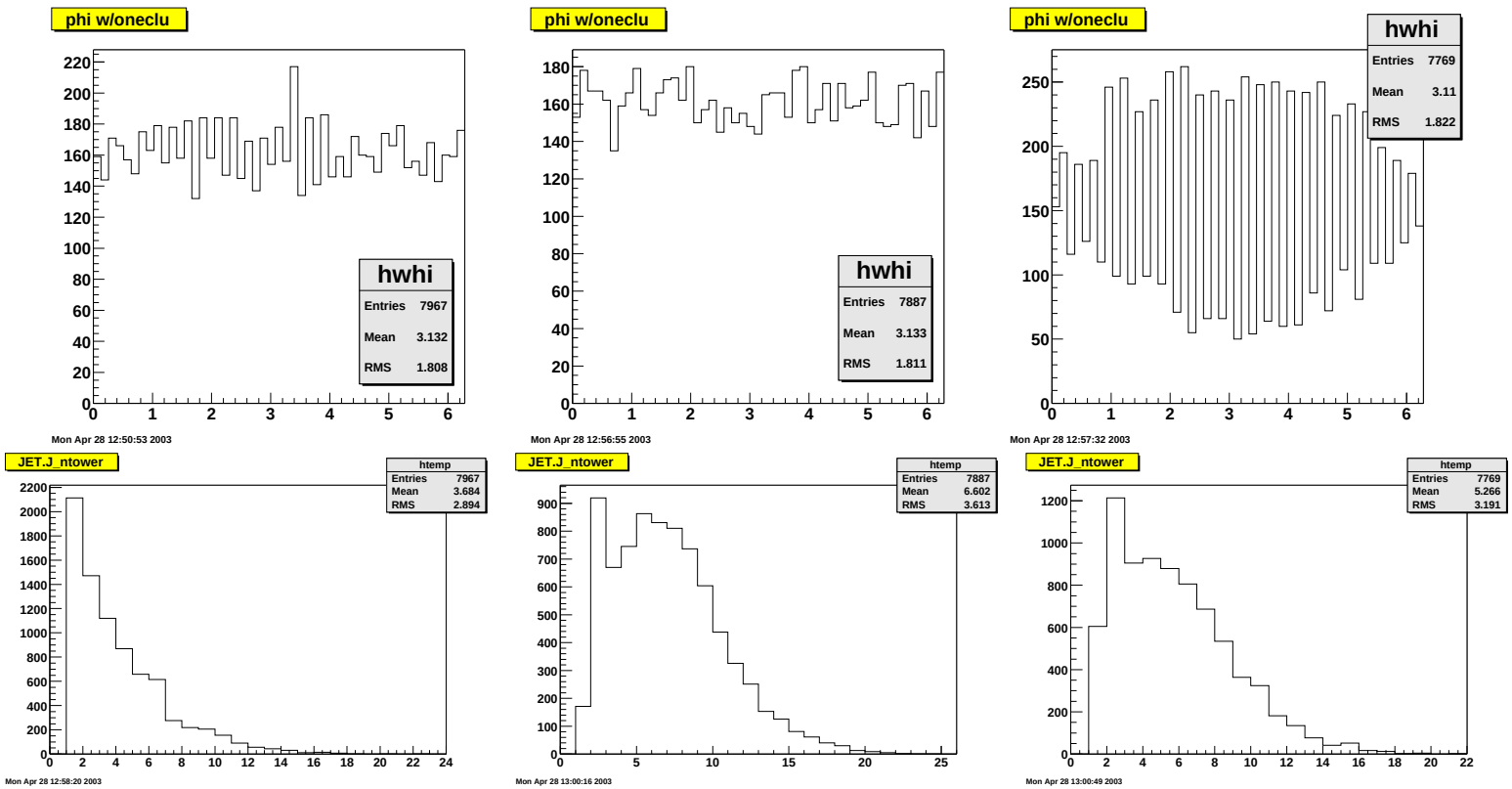




type 5 → 6,7

Jet ϕ-uniformity

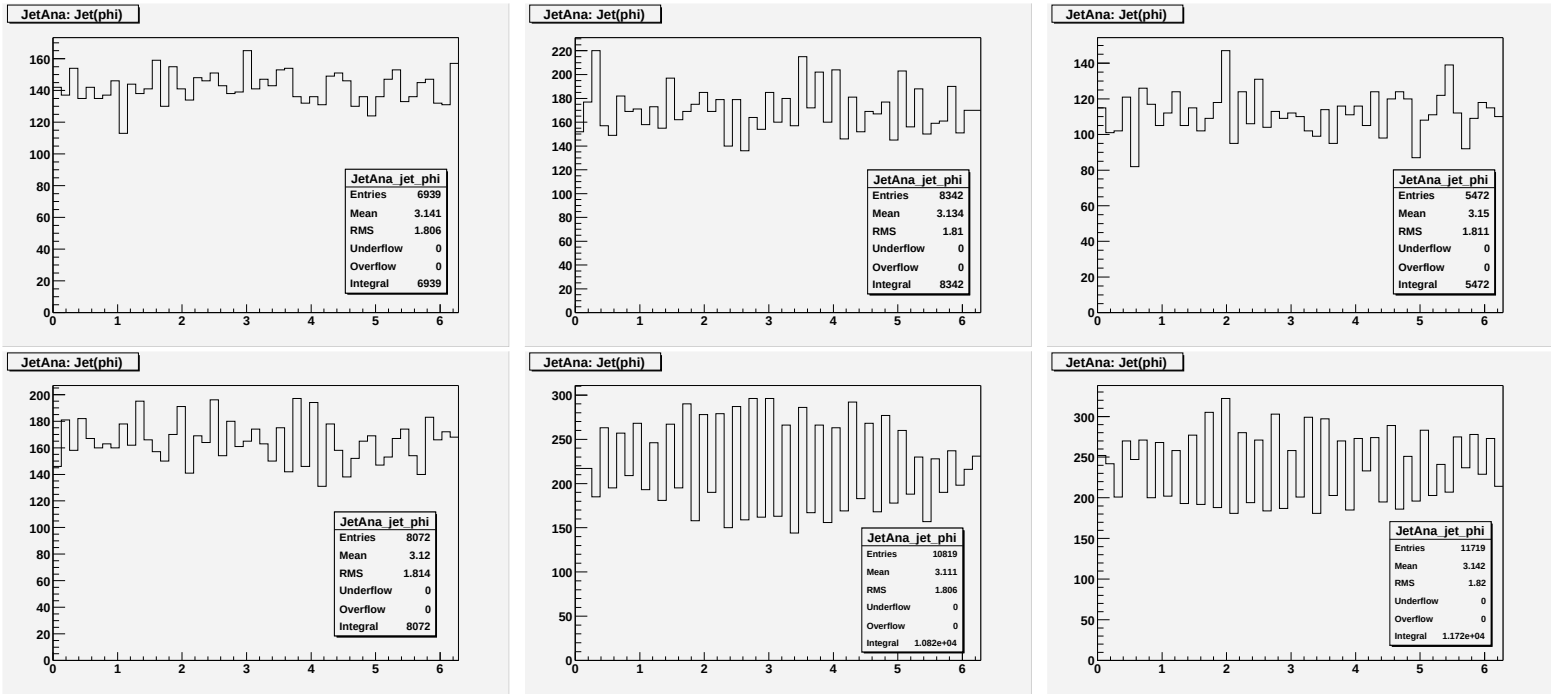
`Fake_Event` jet output from single pions (E=30 GeV), per annulus [`ieta` index used]. Towers of type 6/7 show spiky ϕ-profile



T21 seg=24 T43 seg=48 T44 seg=24

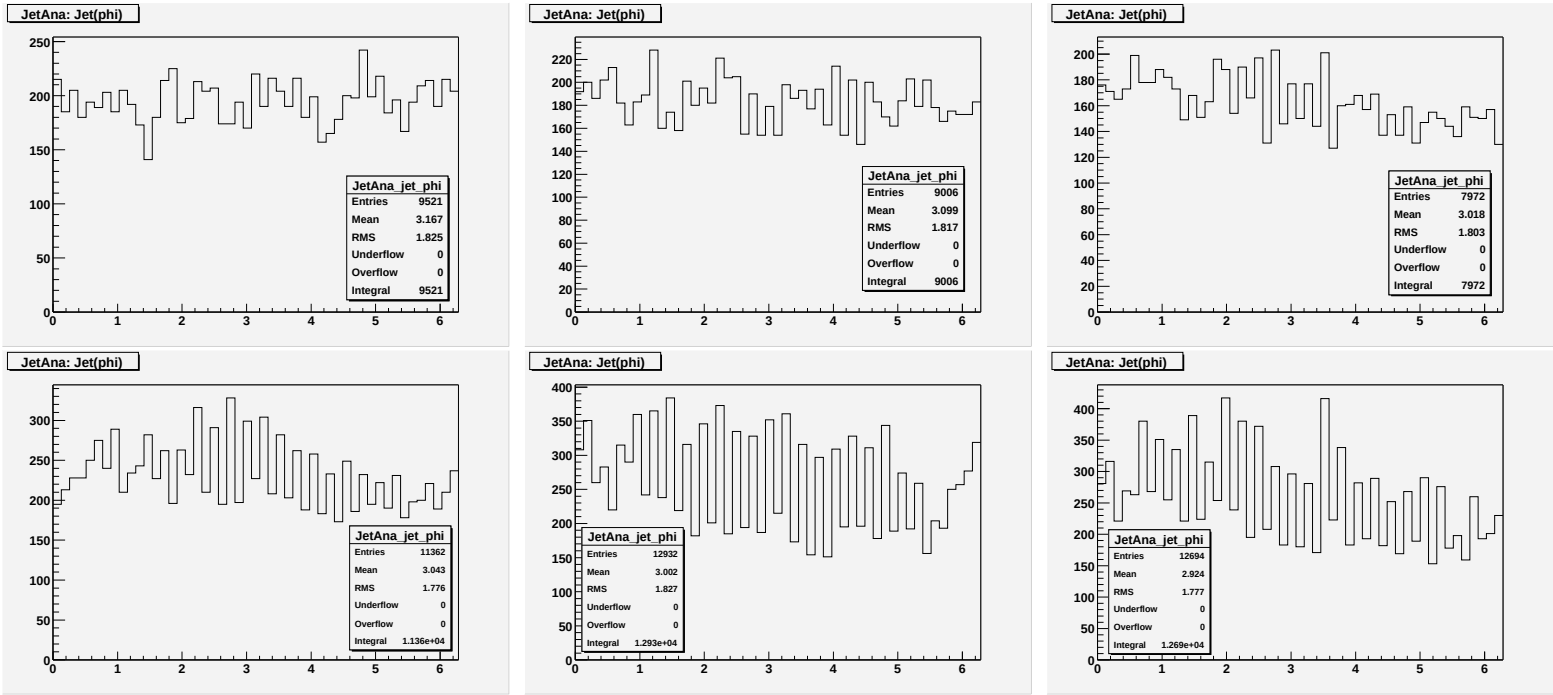
Jet ϕ-uniformity

MC sample `jtop2d` (v. 4.9.1), per annulus [resp. T21,36,42,43,44,45]. `JetClu` R=0.4



Jet ϕ-uniformity 1/2

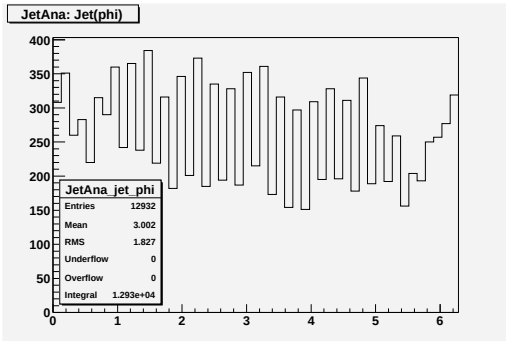
Jet_20 data (v. 4.9.1), per annulus [resp. T21,36,42,43,44,45] JetClu R=0.4

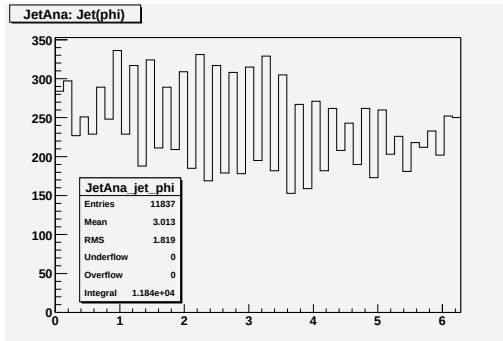


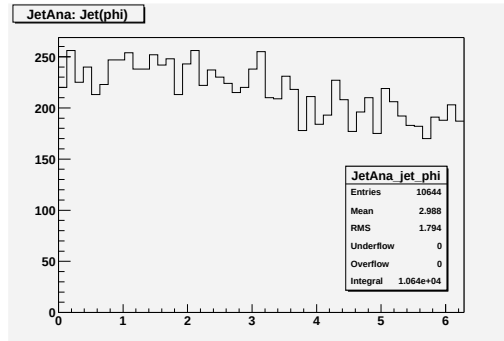
☞ same spikiness effect in data

Jet ϕ-uniformity 2/2

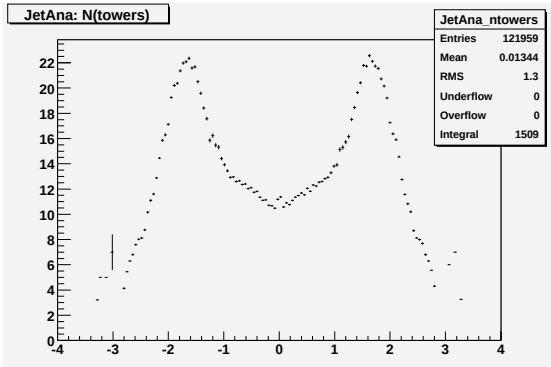
Jet_20 data, per annulus [T44 resp R=0.4,0.7,1.0]

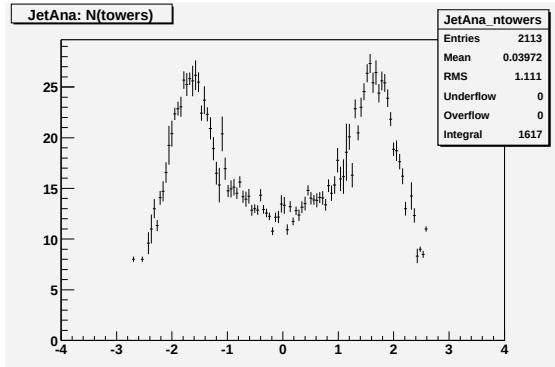






Number of towers per jet (R=0.4) as f(η)



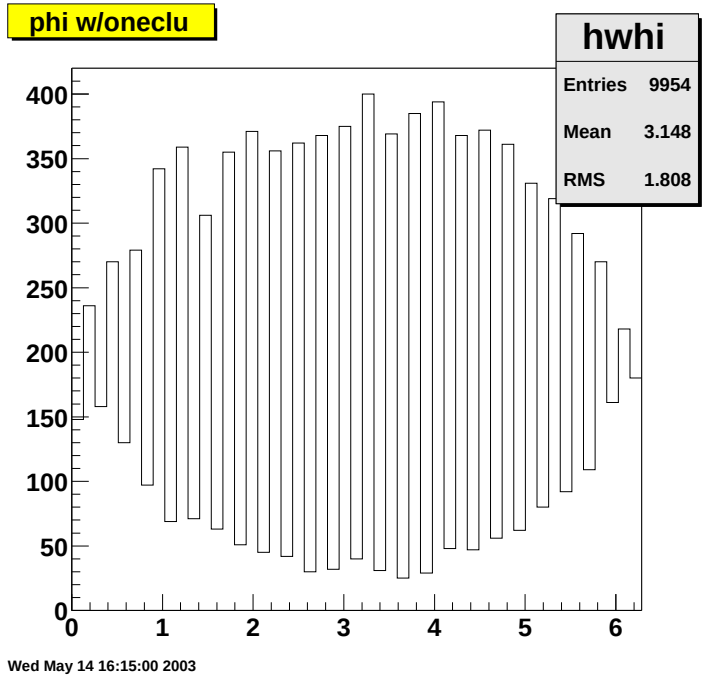


$20 < p_T < 50$ $\qquad$ $50 < p_T < 70$

☞ $\langle 12 \rangle$ towers/jet at $\eta = 0.5$ and $\eta = 2.2$

Charge sharing

Charge sharing between 2 PMTs for the central towers. T21 with no charge sharing illustrated.



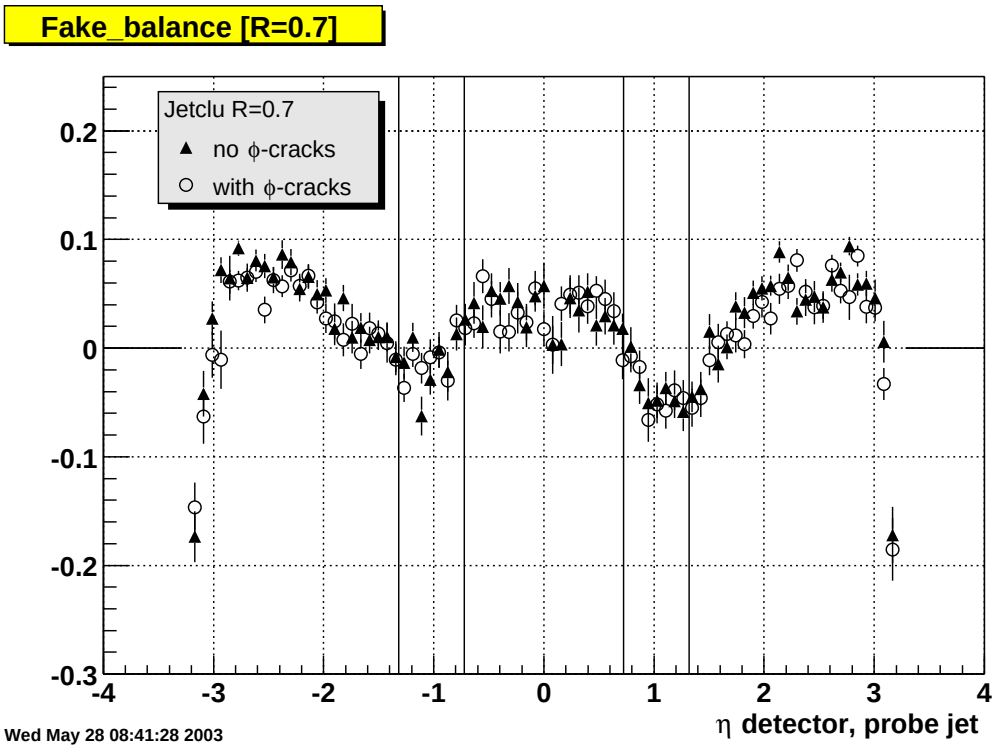
☞ Same spikiness effect as in T44

- Not a bug but a feature due to the charge sharing in the central
- ... nothing to do with the jet algorithm

Dead regions in the plug 1/2

- Some passive material was missing so far: silicon cables at COT end plate, up to $\sim 1X_0$ ➪ included in 4.11.0pre2 (Beate, Manfred), to be assessed
- No ϕ-cracks implemented so far in the simulation. But there are some (from Willis)...
  - PHA: small ones every $30°$, about 6mm wide
  - PHA: for $|\eta| < 1.42$ (towers 11 and 12) 3/4" dead region every $30°$
  - PEM: no real cracks

  Implement these cracks in `GflashCalResponse.cc` assuming response $= 0$. Using "fake jets" to see amplitude of the effect.



☞ of the order of ∼1% at most ➪ not really significant

Dead regions in the plug 2/2

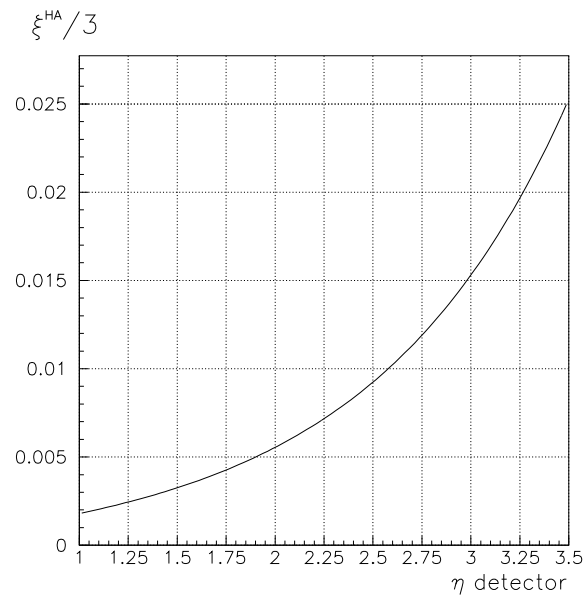
Back of the envelope calculation: no reason to expect a big effect in the plug. Assuming $E_{EM}/E_{TOT} \sim 2/3$

$$\xi \simeq \frac{\sum \Delta d_{crack}}{2\pi \langle R(\eta) \rangle} \quad \text{giving } E_{jet}^{cracks} = \left(1 - \frac{2}{3}\xi^{EM} - \frac{1}{3}\xi^{HA}\right) E_{jet}$$

with $\langle R(\eta) \rangle$ the radius at the shower max, $z_{max} \sim 3\lambda_I \sim 250$ cm $\times \cos\theta \sim 250$ cm taken to be constant in the plug

$$\langle R \rangle / z_{max} = \tan\theta \Rightarrow \langle R \rangle = \frac{2e^{-\eta}}{1 - e^{-2\eta}} z_{max}$$

since there's no PEM cracks $\xi^{EM} = 0$ and with $\Delta d_{crack}^{HA} = 0.6$ cm, ξ^{HA} amounts

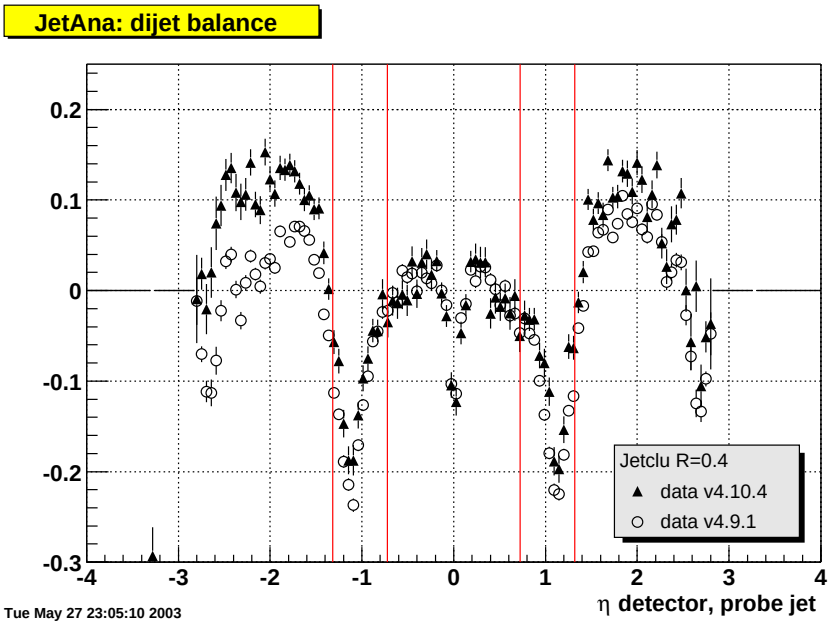


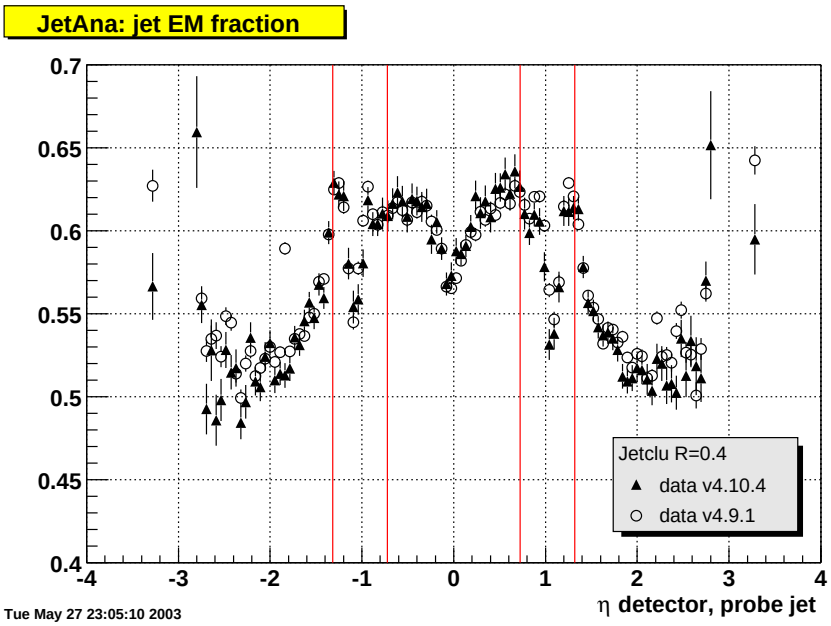
☞ a 1.5% effect @ $\eta = 3$, last tower. Same calculation in the central gives a η-independent $> 3\%$ effect (see geometry description in note #1361: $\Delta d_{crack}^{EM} \sim 2.2$ cm, $\Delta d_{crack}^{HA} \sim 4.2$ cm every $15°$)

Data STntuples *in v. 4.10.4*

- Waiting for the new MC STntuples (Toronto)
- Preliminary comparison between data STntuples in 4.9.1 (with plug time correction at jet level) and 4.10.4

☞ Dijet balance and jet EM fraction





☞ WHA response ∼5% higher / wider plateau for $|\eta| > 2$