

DC2 IRF Status

- Meeting agenda, references at:
<http://confluence.slac.stanford.edu/display/DC2/060127>
- Event Classes - Julie
 - Refine Bill's cuts to two exclusive event classes: A and B!
 - Limit $\cos(\theta) < -0.4$ (66 degrees)
- Effective area - Jean
 - Binning: $\Delta\cos(\theta)=0.05$ (20 bins) and $\Delta\log_{10}(E)=0.2$ bins (5/decade, 20 bins)
 - Finds no discontinuities
 - Request special data at $\theta=0$ and for $E < 100$ MeV
- Dispersion – Riccardo
 - Preliminary study front vs. back, event classes 1,2,3
 - Issue of asymmetric response (tail to low energy) – tentative decision to ignore
- PSF – Toby
 - Study of event classes A and B, front and back
 - Binning: $\Delta\cos(\theta)=0.1$ (8 bins), $\Delta\log_{10}(E)=0.5$ (2/decade, 8 bins)
 - Good fits to the standard 2-parameter function (at least for class A)
 - Request more data at low energies

The calibration data

Photon response from “allgamma”

- Version v7r3p4, with reprocess to update CTB variables
- (4000-2)*50 K generated events into 6 m²:
 - uniformly in log(E) from 16 MeV to 160 GeV (4 decades)
 - uniform in cos(θ) from -1 to 0 (upper LAT hemisphere)

Background

- Version v7r3p5, also CTB updated, and filtered with CTBGAM>0
- 18675 seconds of live time, distributed uniformly over 3 days of the DC2 orbit

Cuts (Julie)

Reference: DC2Cuts.C at

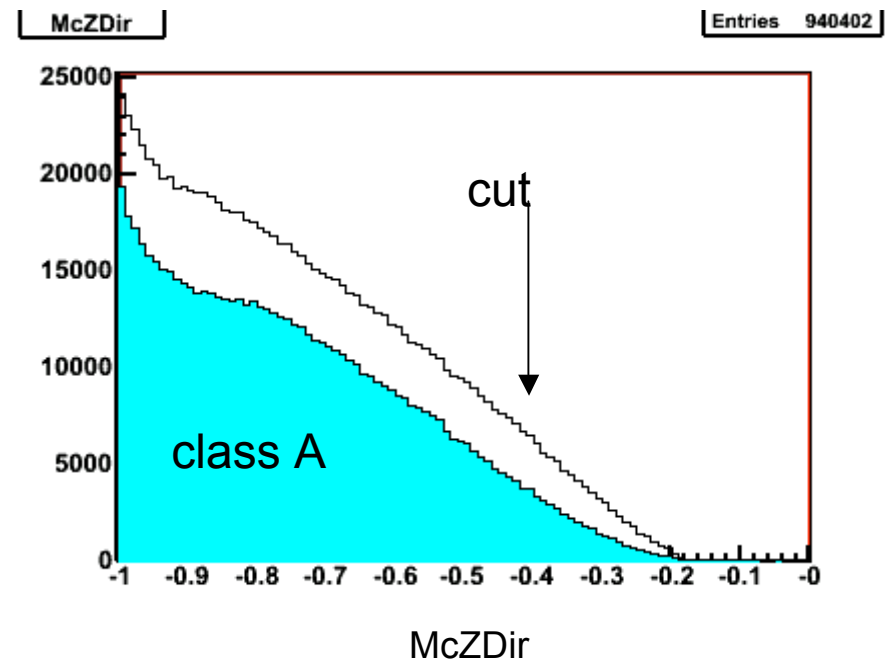
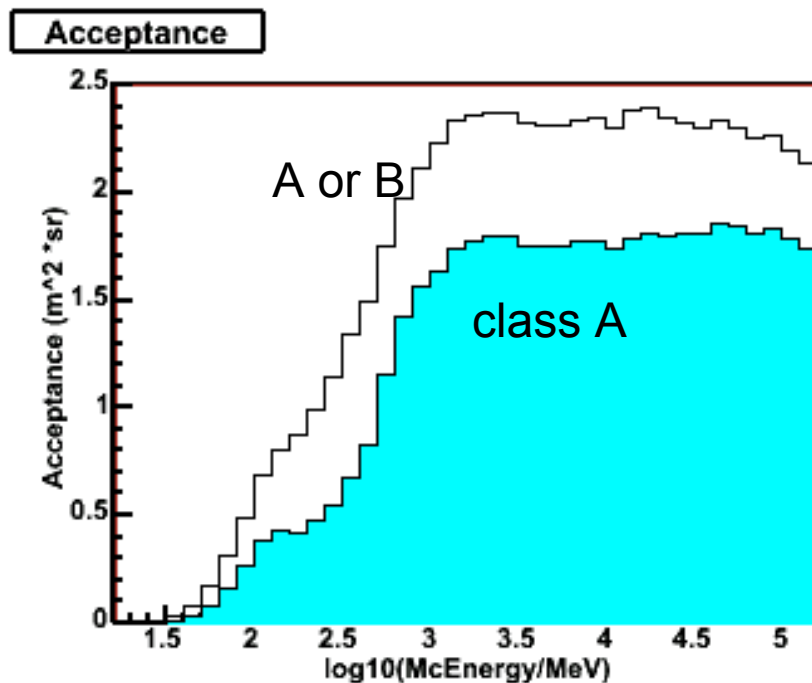
<http://confluence.slac.stanford.edu/display/DC2/Trigger+and+Filter+settings+and+Event+classes>

New cuts for:

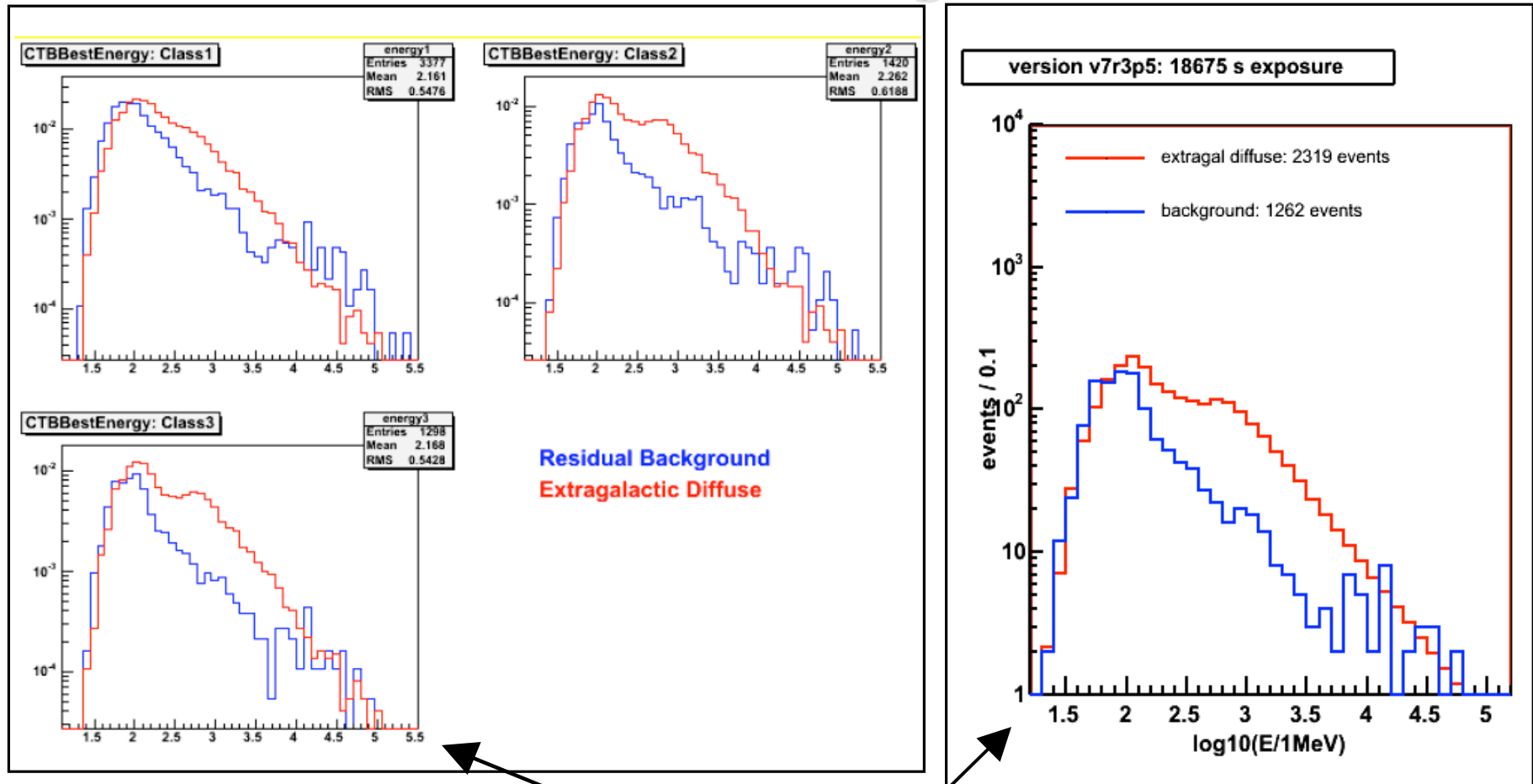
- high energy electrons
- suspect topology: track 2 start not consistent with track 1
- heavy ions sneak up our skirt

Two classes: CTB cuts are,

- A: CTBCORE>0.35 and CTBBestEnergyProb>0.35 and CTBGAM>0.50
- B: not(A) and CTBCORE>0.1 and CTBBestEnergyProb>0.1 and CTBGAM>0.35



How is the background?



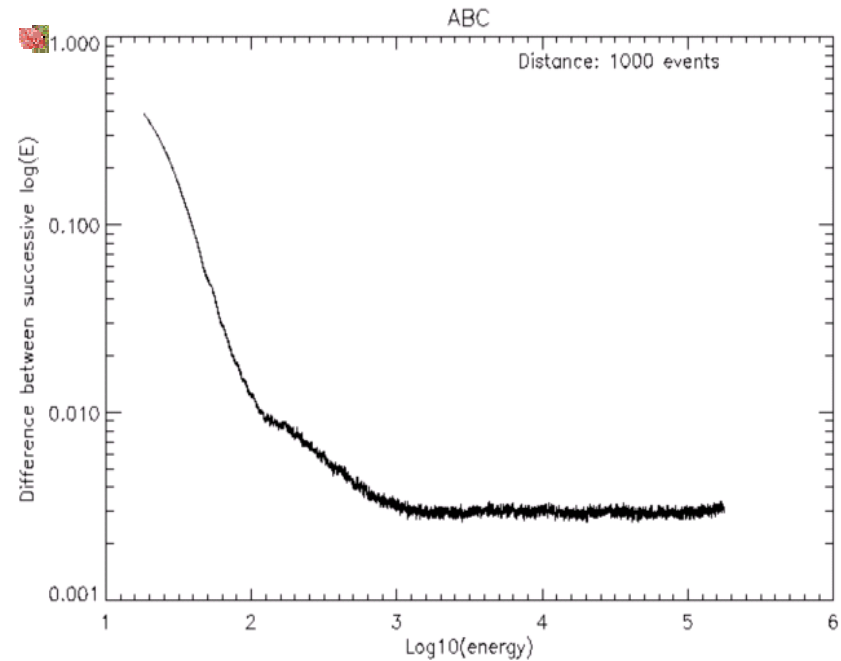
Julie: using special extragalactic run

class A

Toby: use spectrum with acceptance

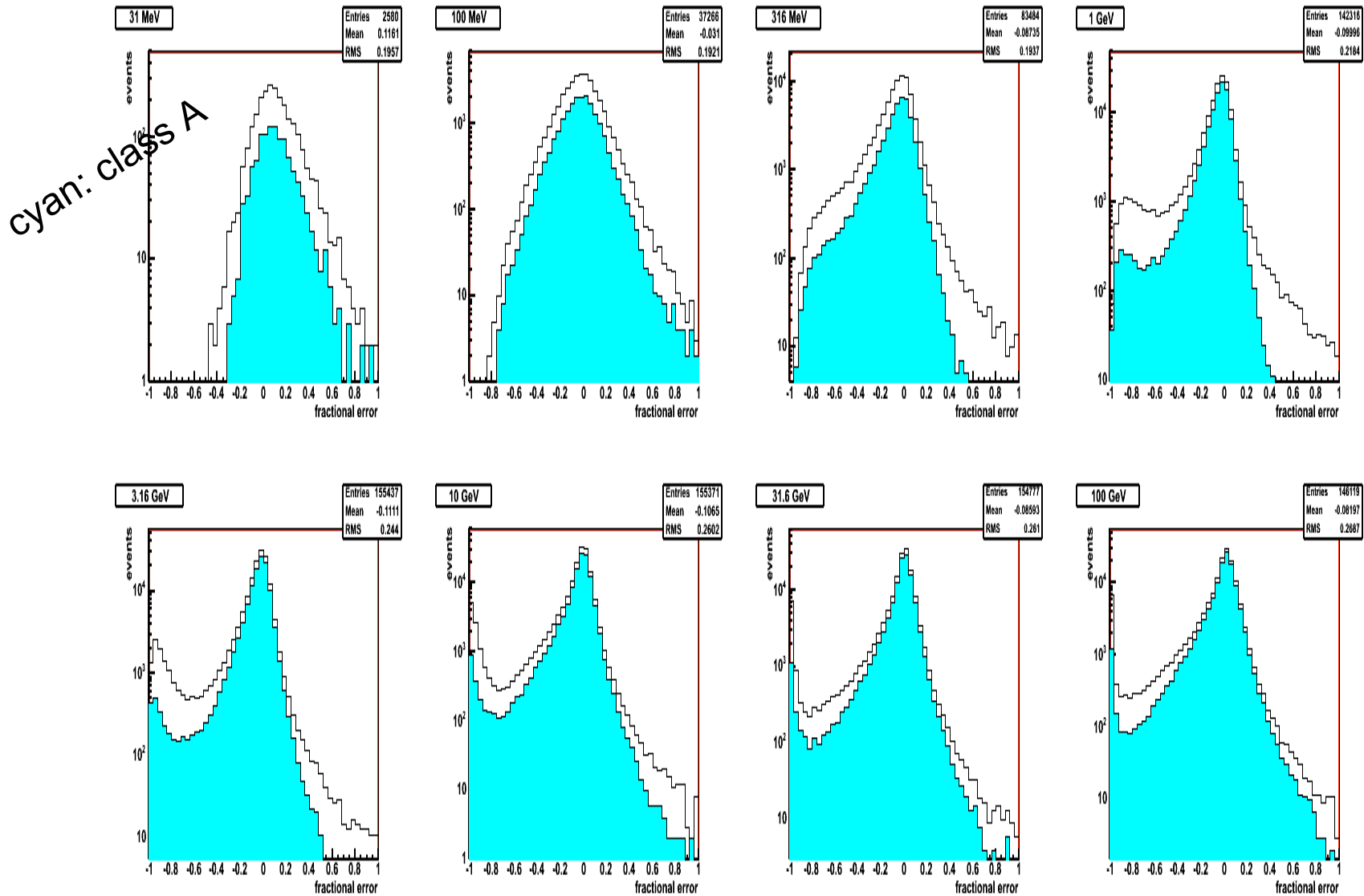
Effective Area (Jean)

- Presented a unique way to measure the effective area: plot the distance in $\log_{10}E$ between one event and its n th follower, after ordering the events by increasing E . This is inversely proportional to the effective area.
- Concern that $\theta=0$ is a singular point, which requires special data to study.
- Proposes a special run with a hard, E^{-3} spectrum to emphasize low energies
- Proposed output format, including a OGIP* document for file format.



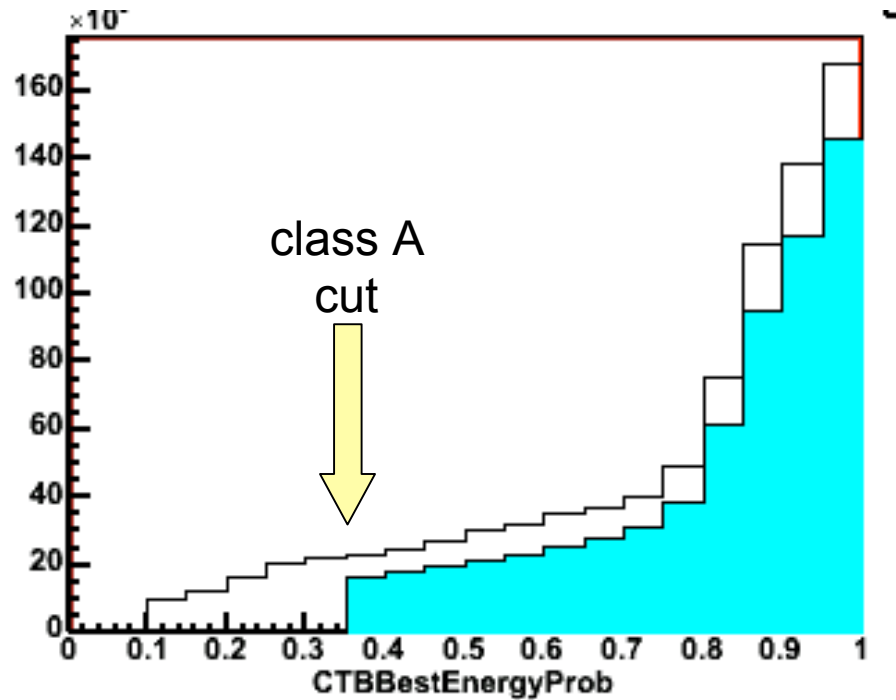
*http://heasarc.gsfc.nasa.gov/docs/heasarc/ofwg/docs/summary/ogip_92_007_summary.html

Dispersion: tale of a tail

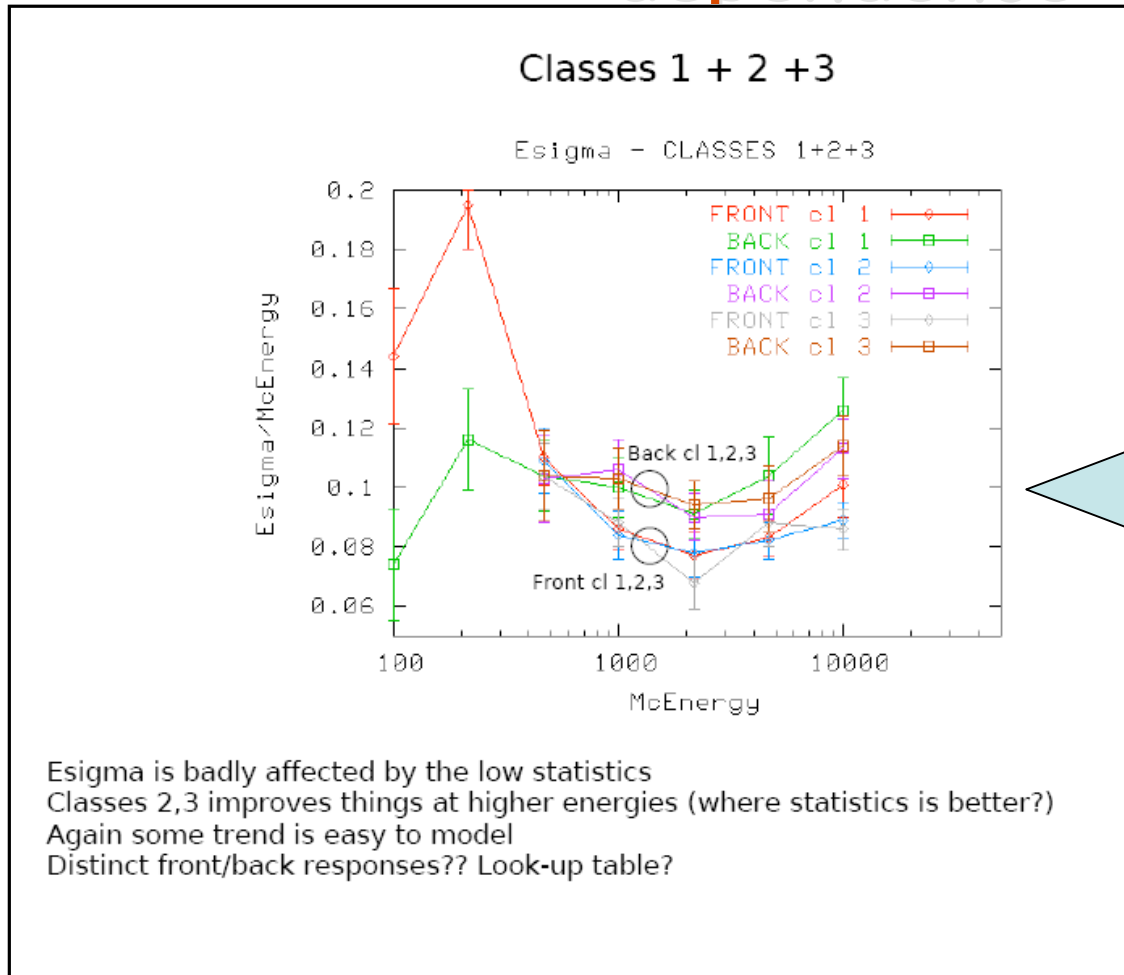


Dispersion, cont

- Note that the CTBBestEnergyProb cut can be made more severe without a large effect: an issue for future study.

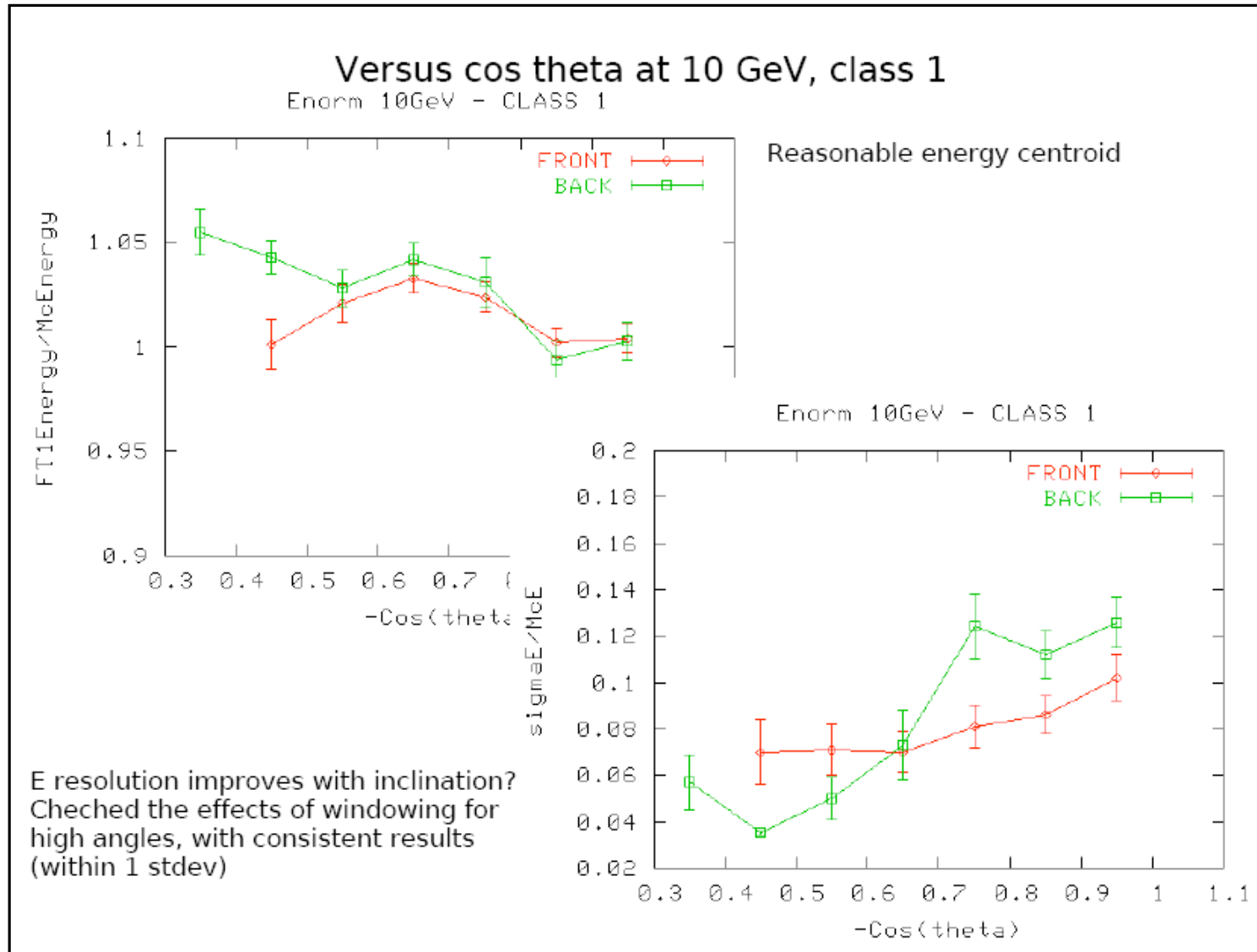


Ricardo's gaussian fits: energy dependence



10% is what we
have been using
for the science
tools checkouts

Riccardo: angular dependence



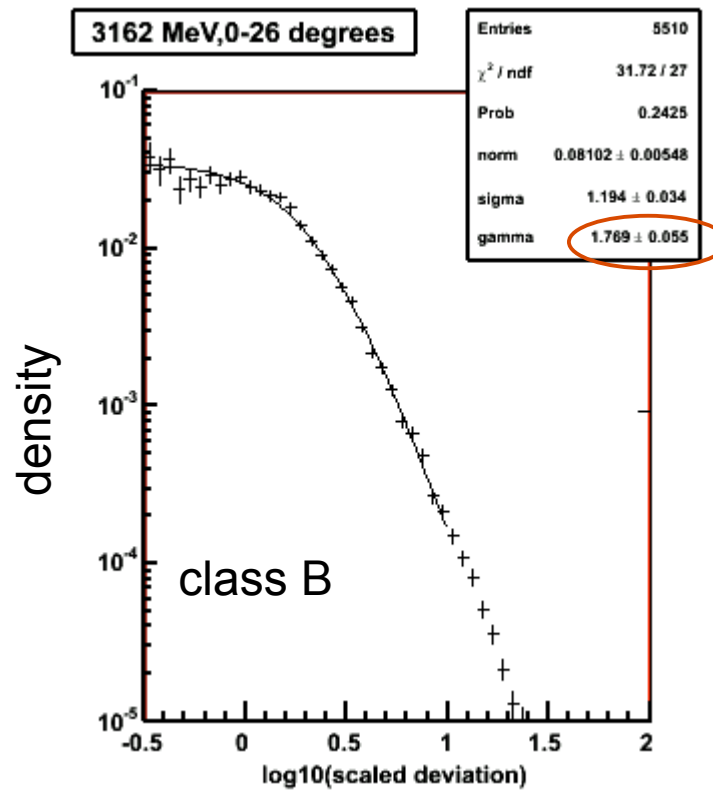
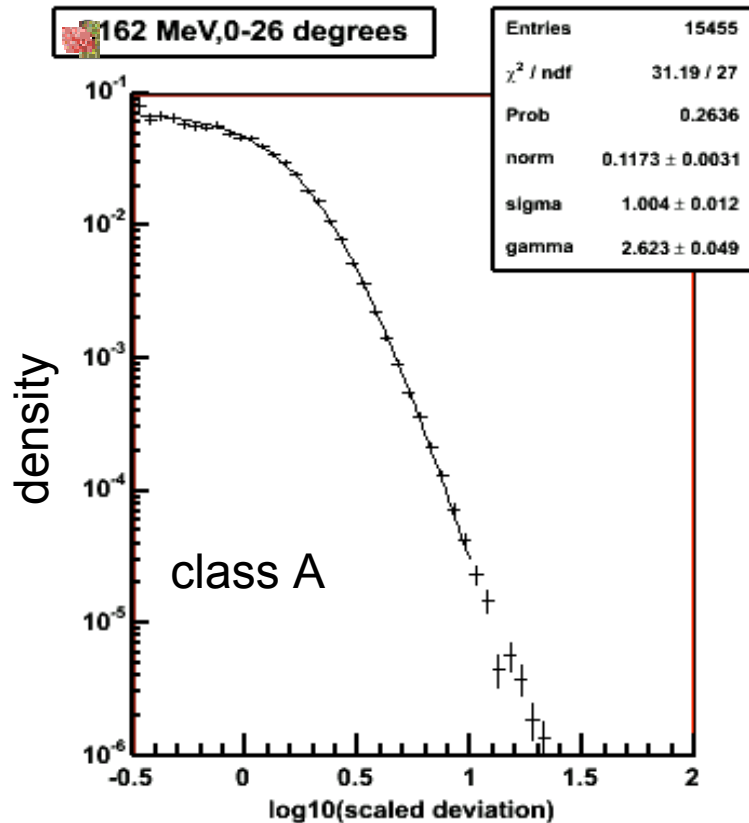
PSF (Toby)

- The function:
$$\frac{1}{N} \frac{dN}{d\delta}(\delta; \sigma, \gamma) = 2 \frac{\delta}{\sigma} \left(1 - \frac{1}{\gamma}\right) \left(1 + \frac{1}{2\gamma} \left(\frac{\delta}{\sigma}\right)^2\right)^\gamma$$
- 8 bins in energy (2/decade), 8 in $\cos(\theta)$ (0.1)
- Two classes so far differ in CTBCORE cut. also (front/back)
A: GoodEvent3;
C: GoodEvent1 && ! GoodEvent3;
- Apply scaling function of energy to angular deviations to make the fit values for σ approximately 1. (The “Atwood function”)
- Objective: to find reasonable parametric representation in E and $\cos\theta$ of σ and γ

Fits to the function

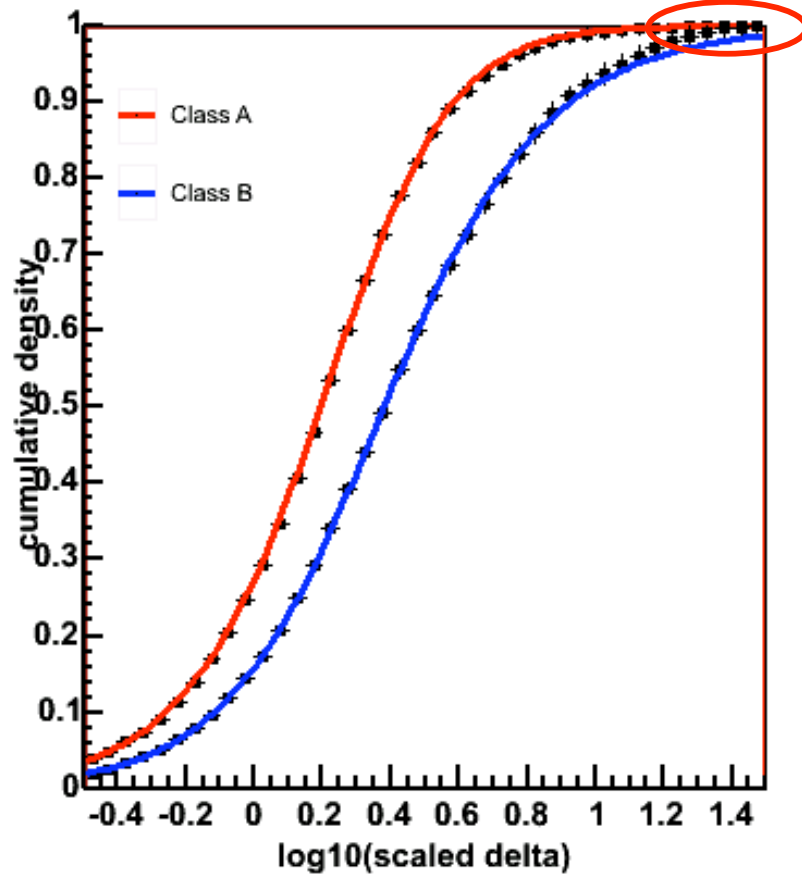
- 8 bins in energy (2/decade), 8 in $\cos(\theta)$ (0.1)
- Two classes so far differ in CTBCORE cut. also (front/back)
A: GoodEvent3;
C: GoodEvent1 && ! GoodEvent3;
- Apply scaling function of energy to make fit values for σ approximately 1.
- Stop fit at 10 (scaled) sigma, will apply different exponent

Example PSF fits at the "sweet spot"



Relate to the integral distributions

1000 MeV, 0-26 degrees



Function predicts too-large tail above 95%: is this a problem?

Front section: Angular dependence at 3 GeV, energy dependence for ~normal

