

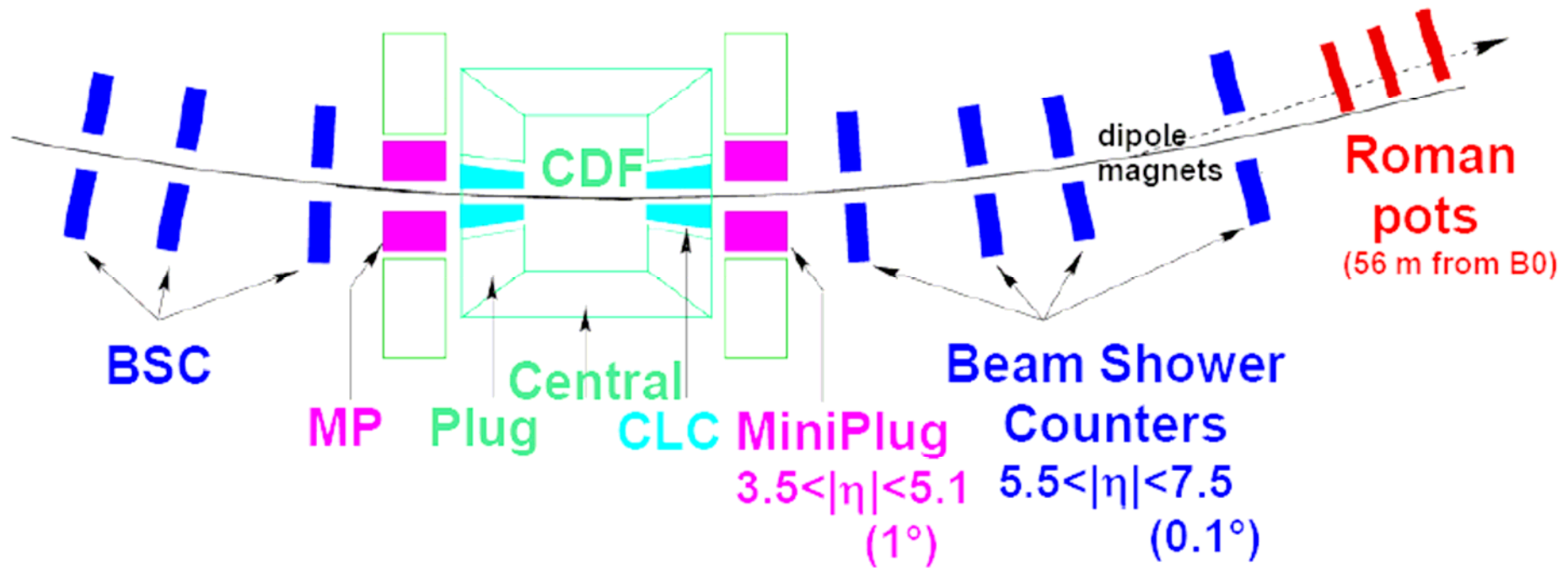
Forward Physics at the LHC
Manchester, UK, 8-12 Dec 2007

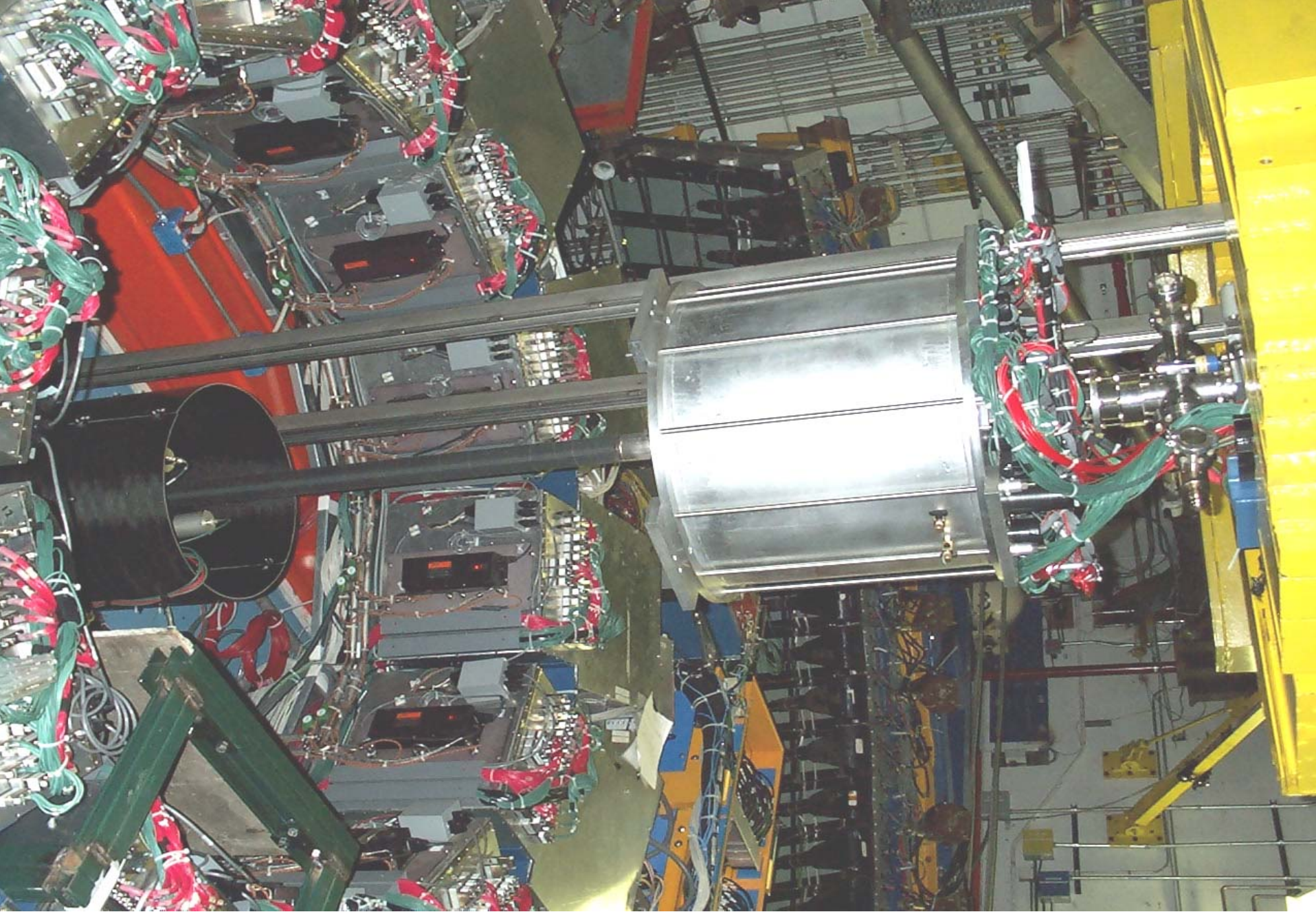
Alignment and Calibrations

Konstantin Goulios
The Rockefeller University

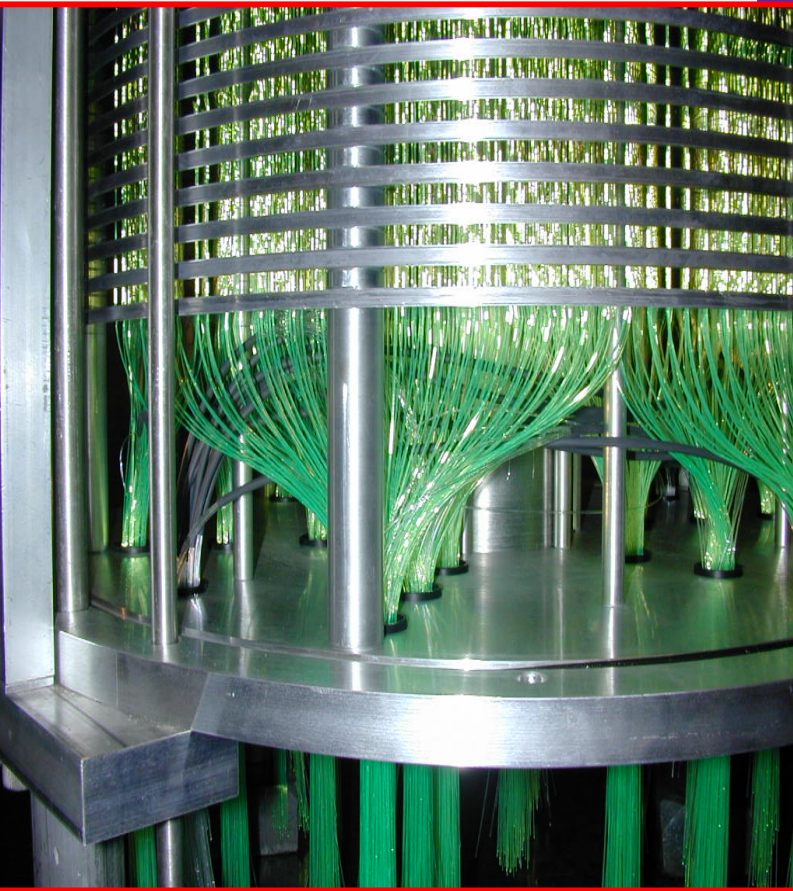


The Forward Detectors of CDF



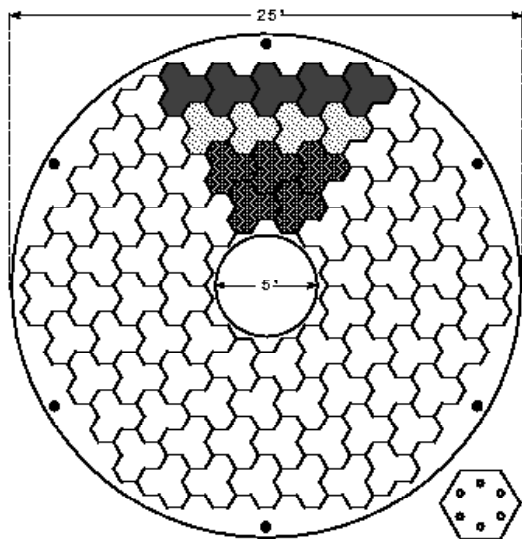


MiniPlug Construction



About 1500 wavelength shifting fibers of 1 mm dia. are 'strung' through holes drilled in $36 \times \frac{1}{4}$ " lead plates sandwiched between reflective Al sheets and guided into bunches to be viewed individually by multi-channel photomultipliers.

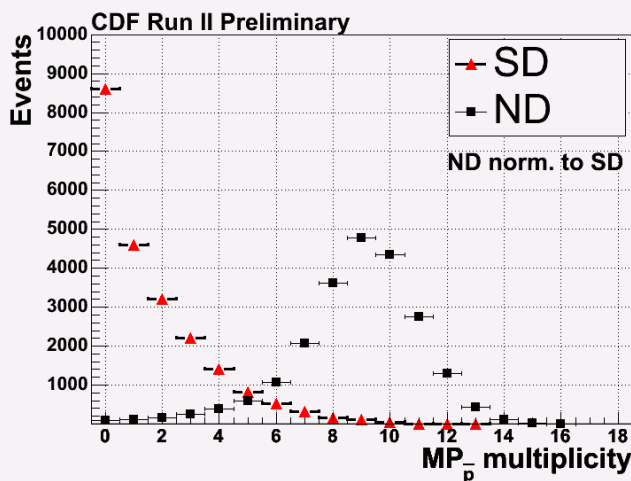
Measurements w/the MiniPlugs



← MP TOWER
STRUCTURE

MULTIPLICITY
@ POSITION

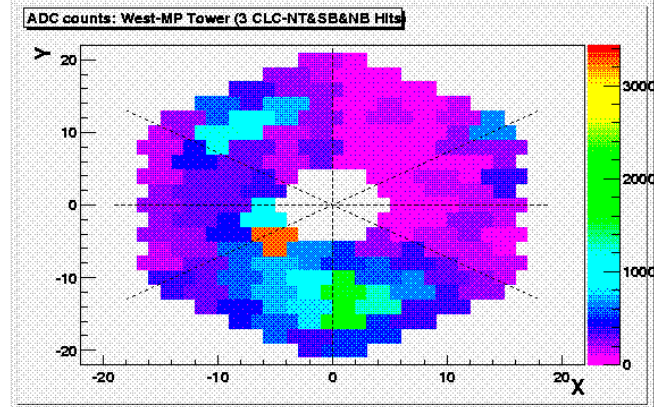
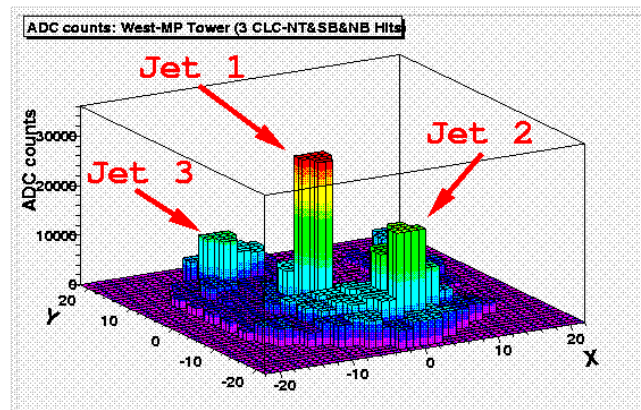
ENERGY



Multiplicity of SD and ND events

$$\xi_{CAL} = \frac{\sum_i E_T^i e^{-\eta_i}}{\sqrt{s}}$$

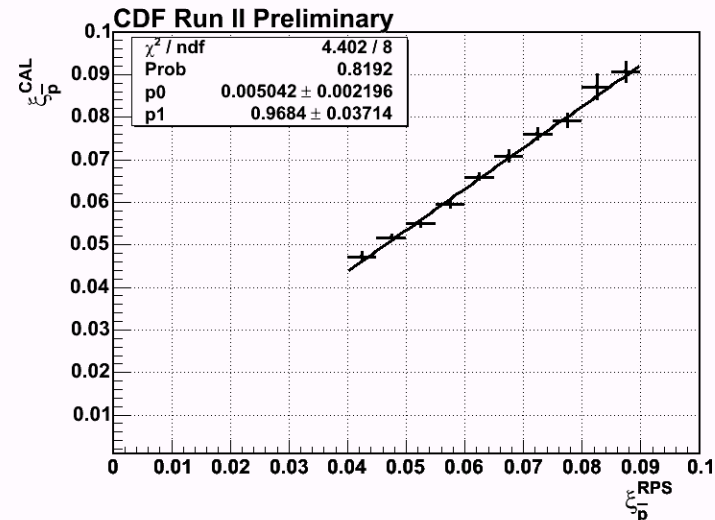
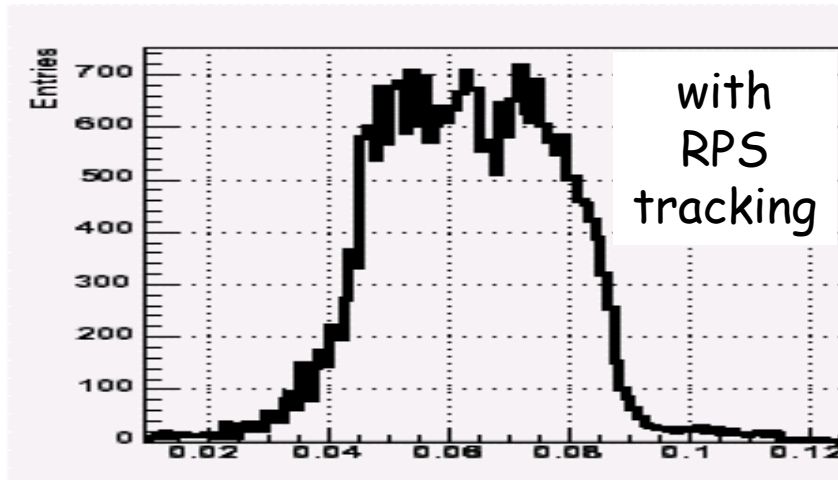
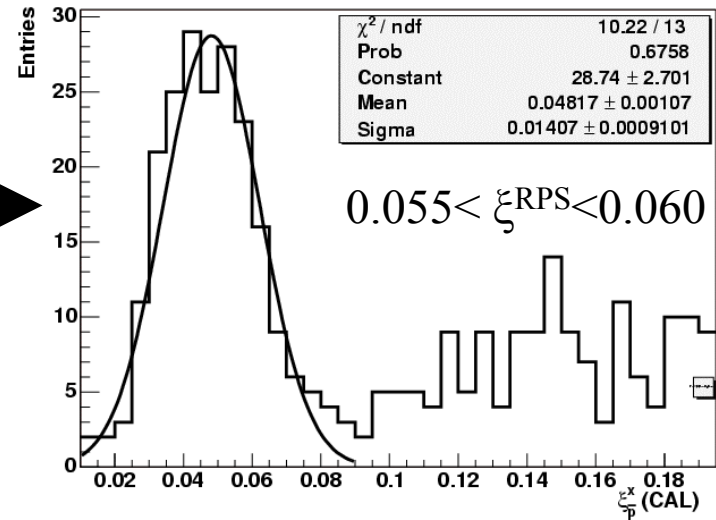
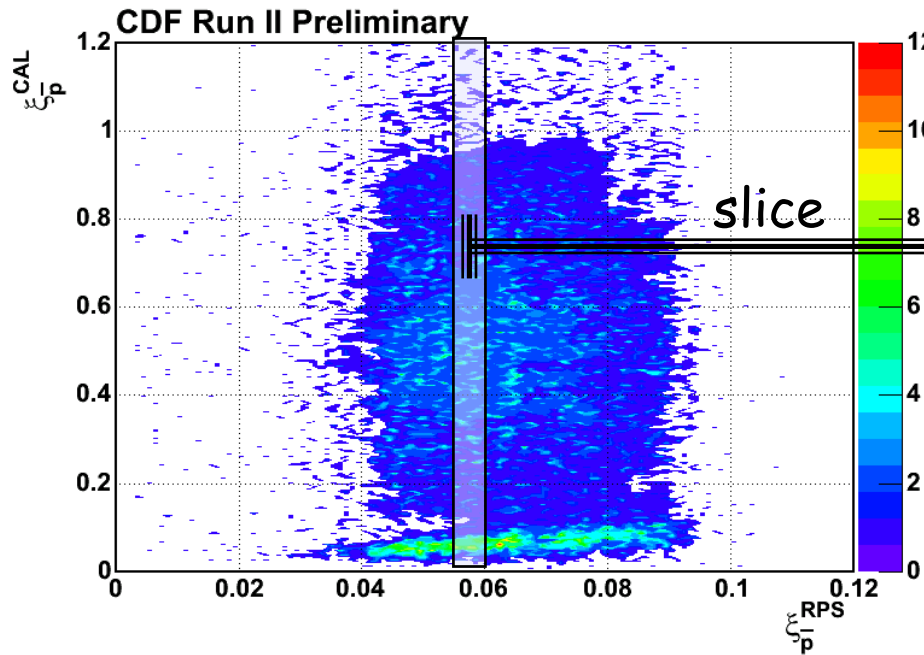
- NIM A 430 (1999)
- NIM A 496 (2003)
- NIM A 518 (2004)



ADC counts in MiniPlug towers in a $p\bar{p}$ event at 1960 GeV.

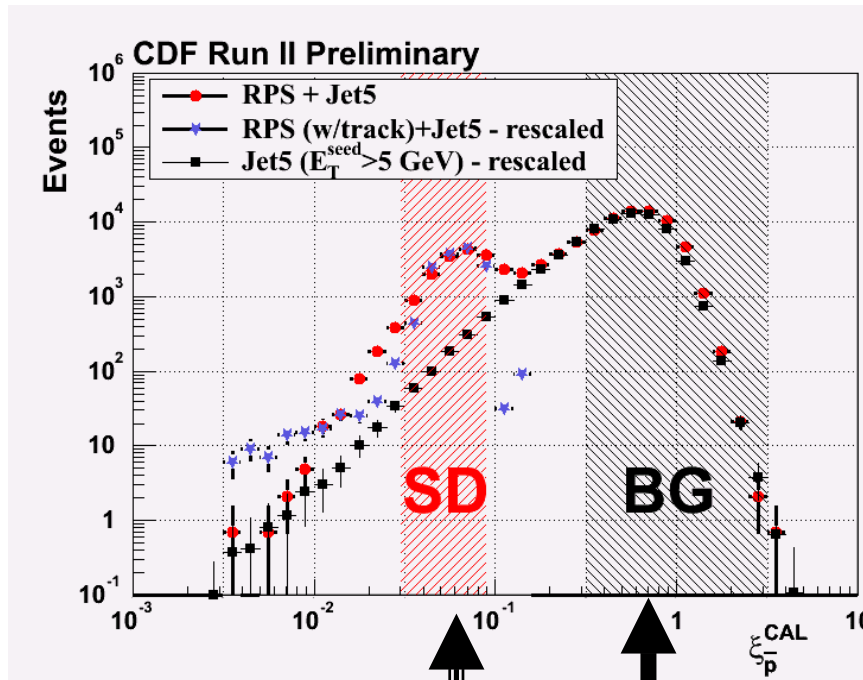
- “jet” indicates an energy cluster and may be just a hadron.
- 1000 counts ~ 1 GeV

RPS Tracking Calibration

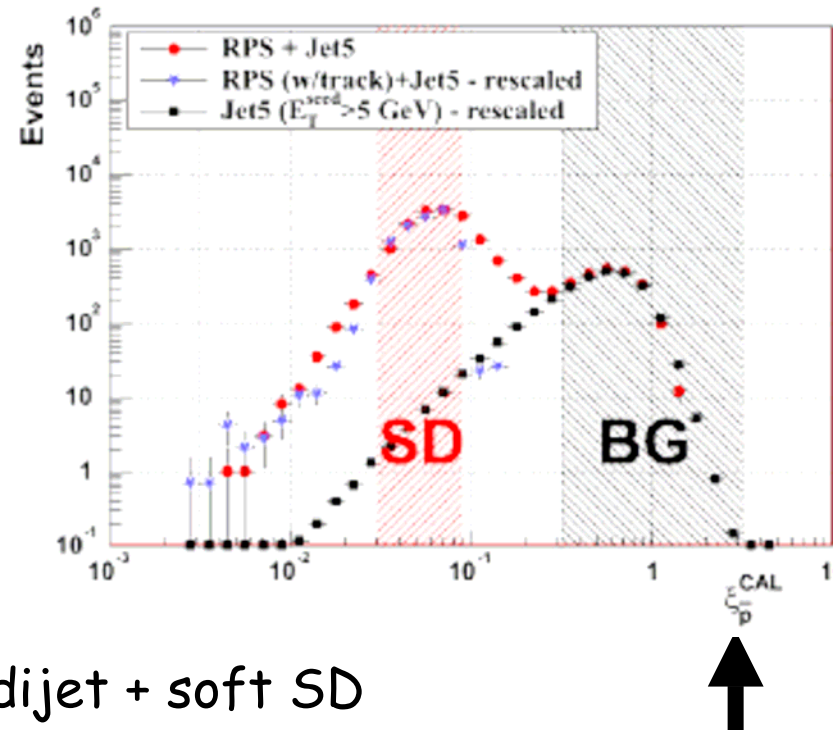


Diffractive Dijet Signal

2002-2003 data: $\langle \text{InstL} \rangle \sim 1.5E31$



Low InstLum $\sim 0.5E30$



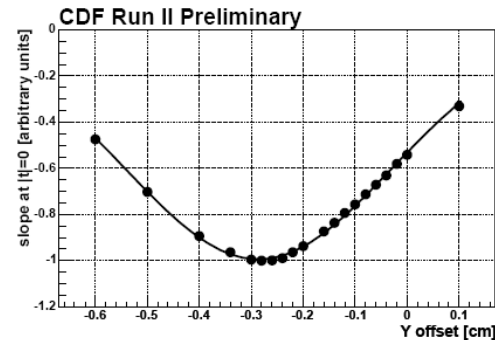
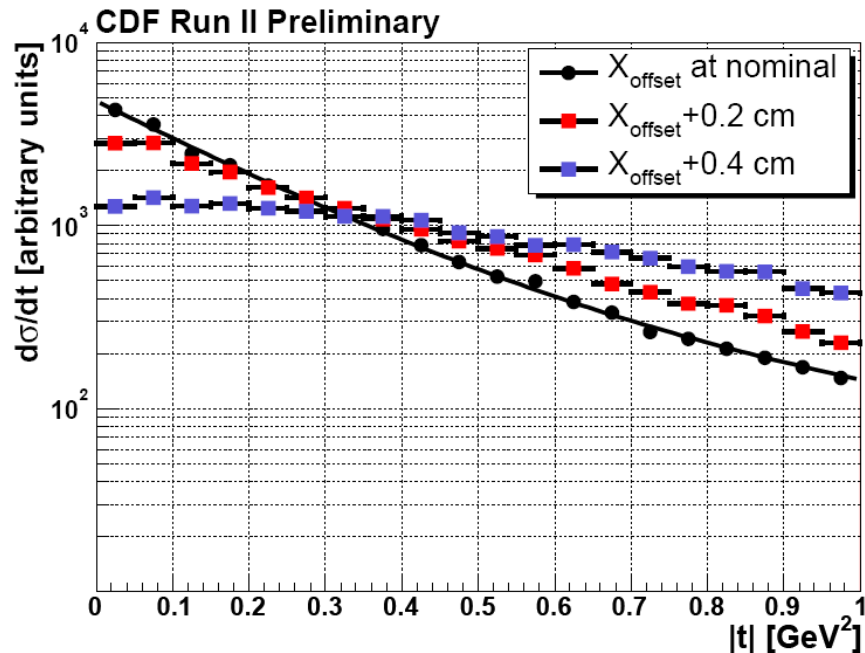
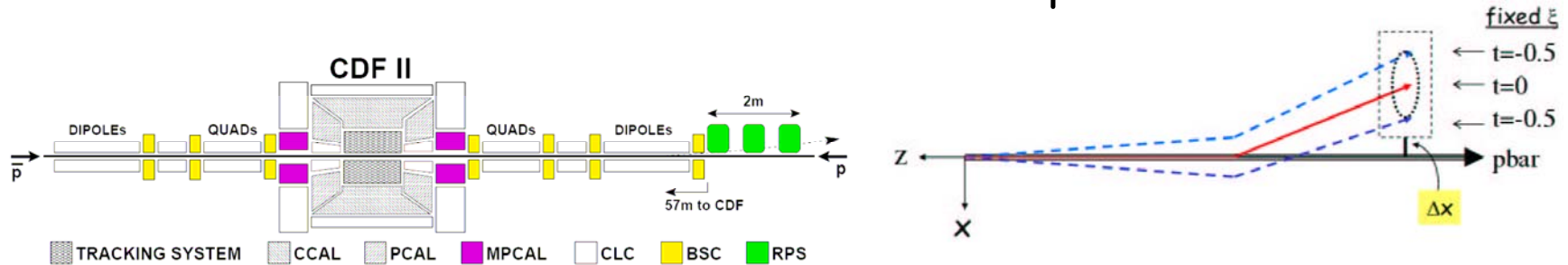
BG \rightarrow ND dijet + soft SD

$$\frac{d\sigma}{d\xi} \propto \frac{1}{\xi} \Rightarrow \frac{d\sigma}{d \log \xi} = \text{constant}$$

$$\xi^{\text{CAL}} = \frac{\sum_i E_T^i e^{-\eta_i}}{\sqrt{s}}$$

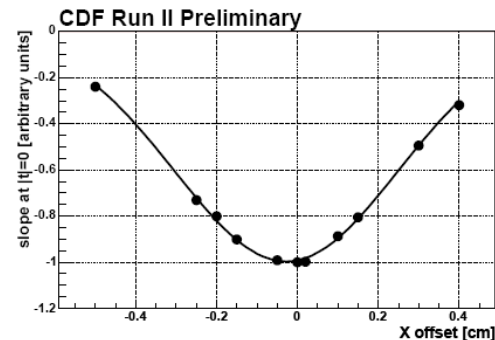
Dynamic Alignment of RPS Detectors

Method: iteratively adjust the RPS X and Y offsets from the nominal beam axis until a maximum in the b-slope is obtained @ $t=0$.



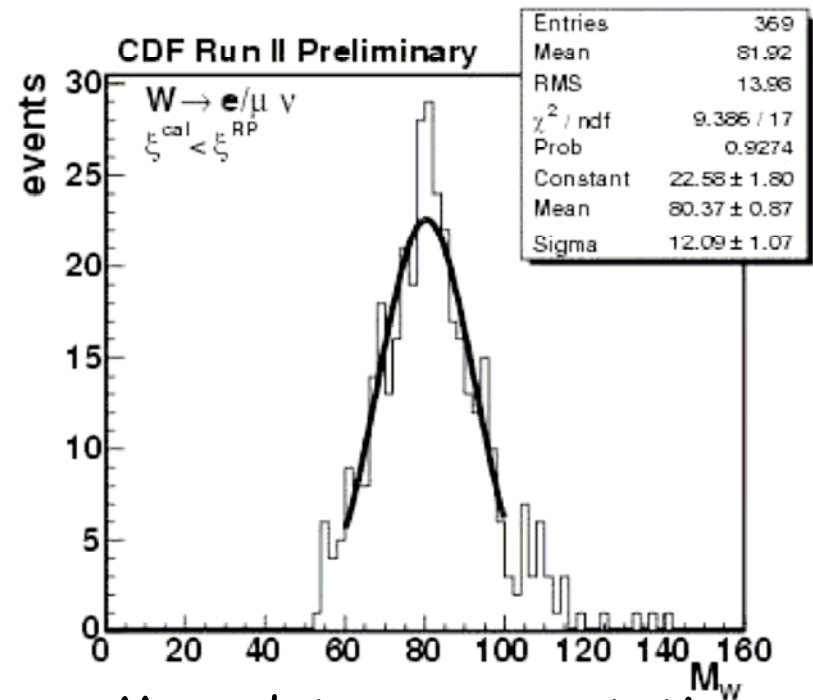
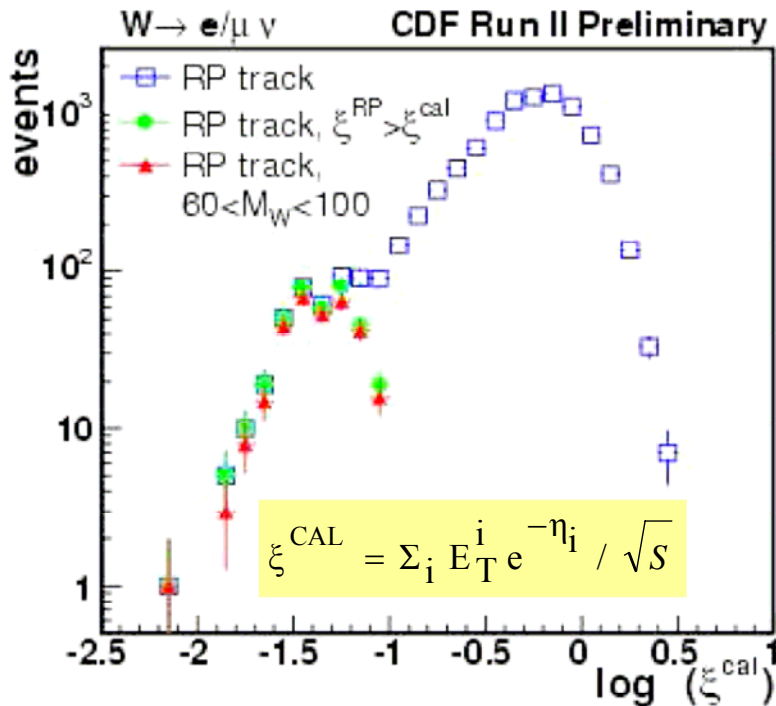
Limiting factors

- 1-statistics
- 2-beam size
- 3-beam jitter

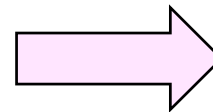


@ CDF
w/lowlum data
 $\pm 30 \mu\text{m}$

P_L Balance $\rightarrow M_W$



M_W - data vs. expectation



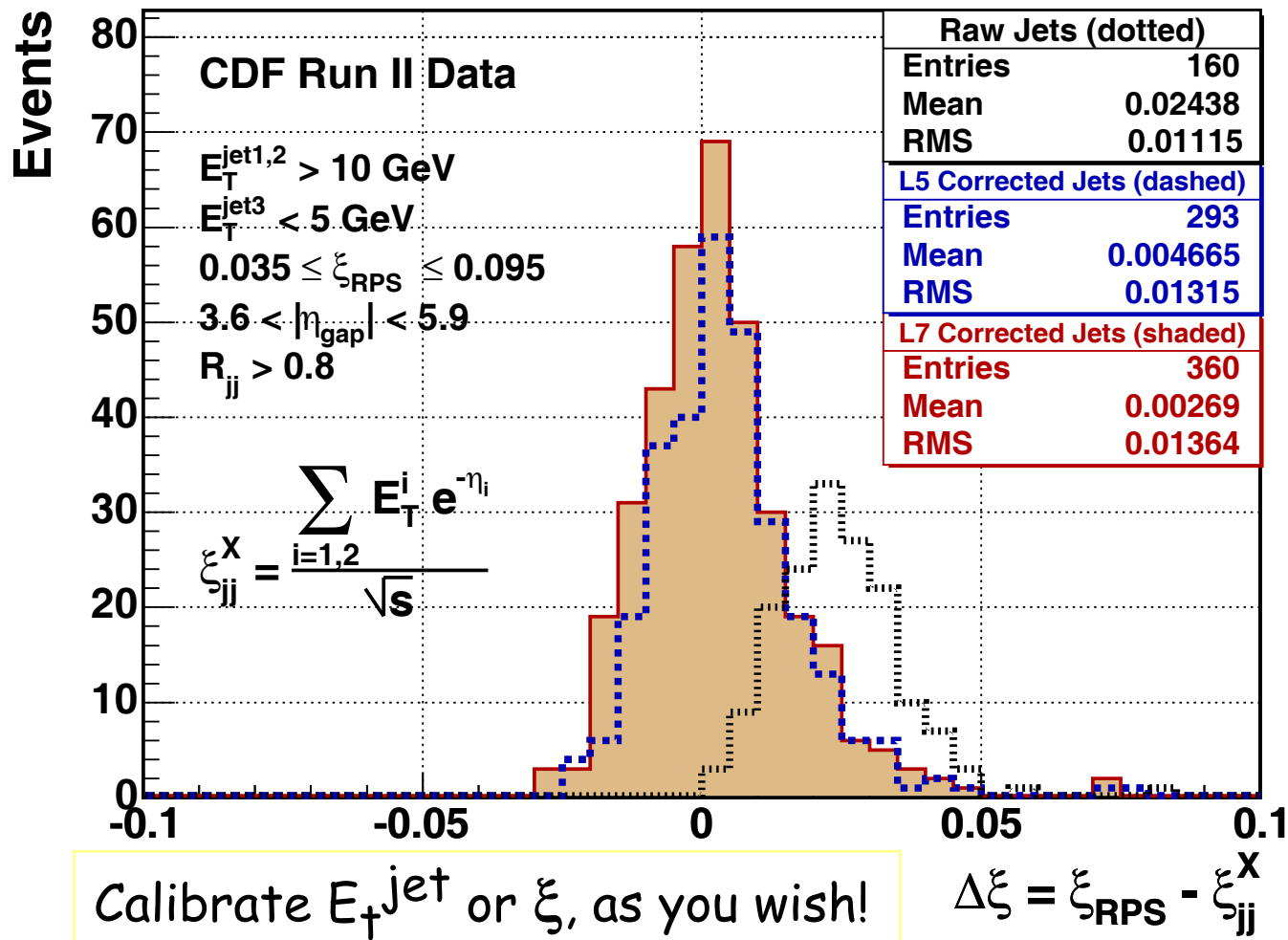
M_W

$$p_L^{\nu} = (1 - \xi) \times p_{\text{beam}} - \sum_{\text{cal}} p_L$$

$$p_T^{\nu} = \text{missing } E_T$$

E_T^{jet} Calibration

→ use RPS information to check jet energy corrections ←





thank you