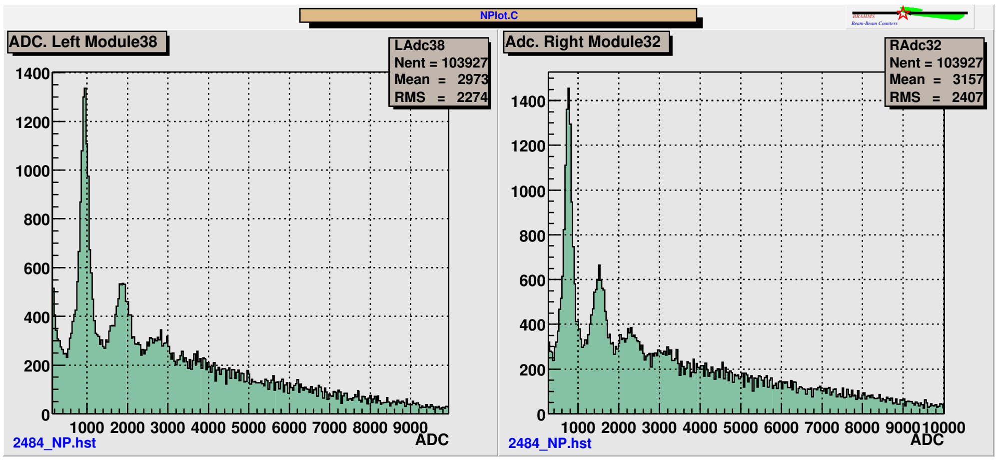
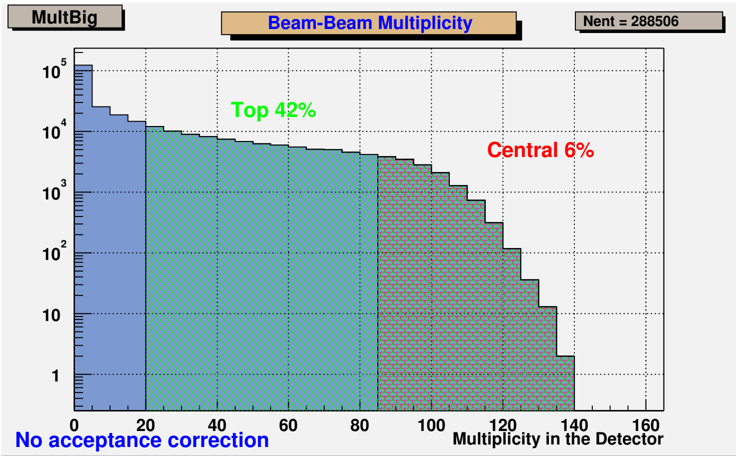
December 27, 2000

1 $dN/d\eta$ extraction

1. **Get pedestals:**
   Extract $PedMean$ for adc with $synch$ trig. only.
2. **Get AdcGain0:**
   Do $(adc - PedMean)$ for MinBias events (trig 1, 4 and 6 inclusive).



3. **Get Number of hits per tube n and for all Big Tubes $BigMult$:**
   $if\ ((adc[i] - PedMean[i])/AdcGain0[i] > .7)$
   $n[i] = (adc[i] - PedMean[i])/AdcGain0[i];$
   $else\ n[i] = 0;$
   Add over all Big Tubes to get $BigMult = \sum n[i]$:



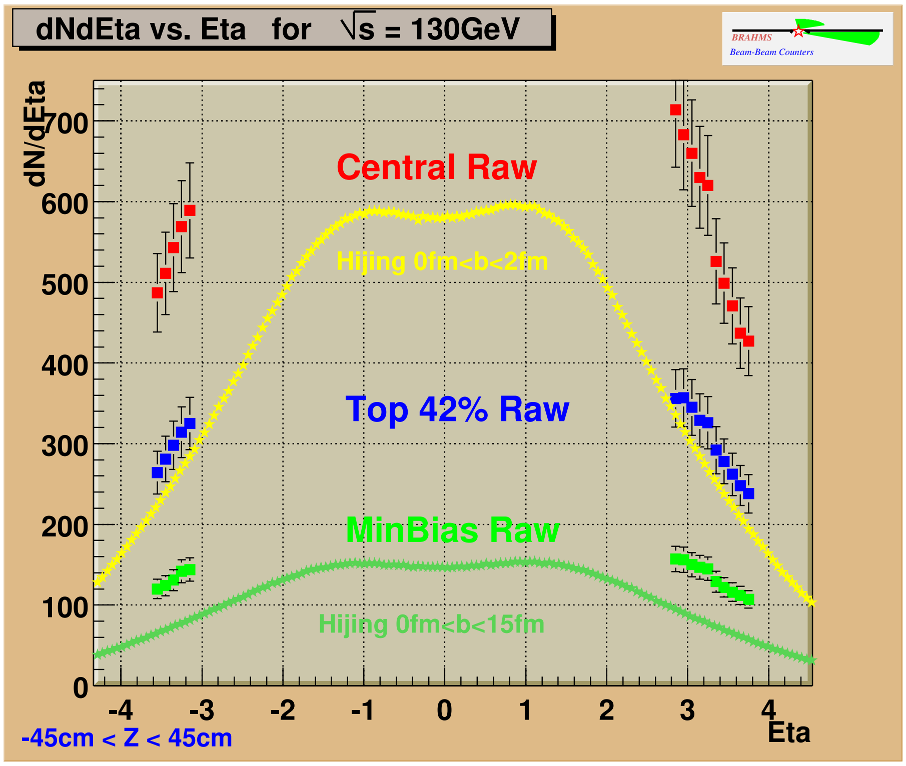
4. **Get $VertexZ$ location:** to be addressed later.

5. **Select events:**
   BB acceptance asks for $|VertexZ| \leq 45cm$.

   - **MinBias:** Trig 1, 4 and 6 inclusive
   - **Central:** Top 6% of the total Multiplicity

6. **Do acceptance correction for every tube:**
   $$N = \frac{RingArea}{TubeArea} \cdot n \ , \qquad \text{where}$$
   $RingArea = \pi(R+r)^2 - \pi(R-r)^2 = 4\pi Rr$, $\quad TubeArea = \pi r^2$,
   where R is the distance to the ring of tubes from the beam-pipe;

7. **Get η, $\Delta\eta$ and $dN/d\eta$:**
   $\eta = -log\left(tan(\frac{\theta}{2})\right)$, $\qquad \theta = tan^{-1}\left(\frac{R}{d}\right)$, $\qquad \Delta\eta = \eta|_{R=R+r} - \eta|_{R=R-r}$,
   d – distance from the vertex to the array location along the z-axis:
   $$d_L = 220cm + z_o \text{ and } d_R = 220cm - z_o,\ z_o \text{ - event Vertex}$$
   For each event for every tube we have a point $\{\eta,\ dN/d\eta\}$.



8. **Errors:**
   $$\delta\eta \simeq 3\%, \quad \delta(dN/d\eta)_{System} \simeq 10\%, \quad \delta(dN/d\eta)_{Stat} \simeq 3\%$$

2 VertexZ and t0

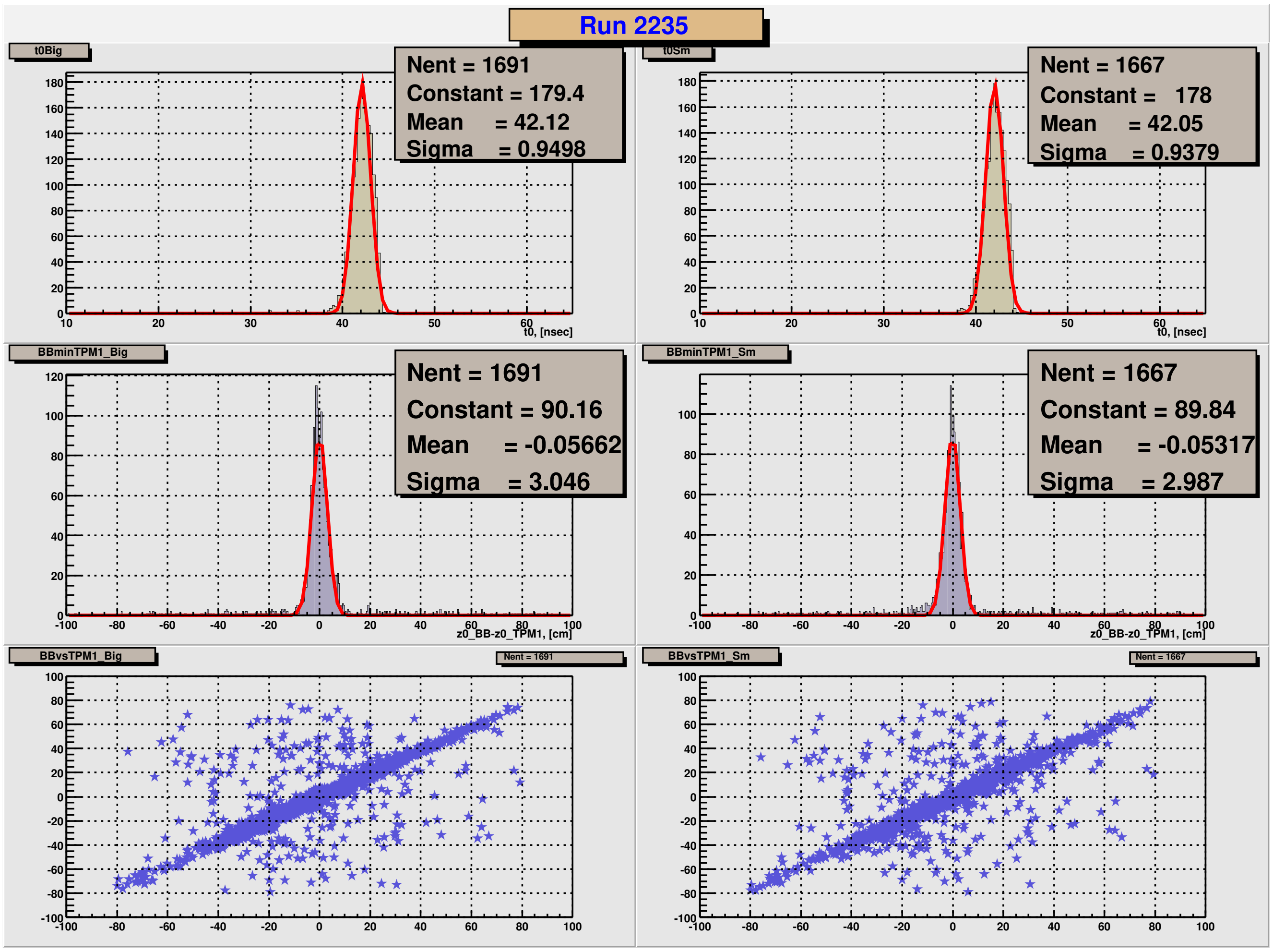
$$t_o = \frac{1}{2}(t_{Left} + t_{Right}) - \frac{1}{c}(220cm + \Delta z), \qquad z_o = \frac{c}{2}(t_{Left} - t_{Right}) + \Delta z$$

- **Big Tubes:** $if\ (adc[i]/AdcGain0[i] > .7\ \&\&\ TdcValid[i])$
- **Small Tubes:**
  $if\ (adc[i] > (AdcGain0[i] - 100)\ \&\&\ adc[i] < (AdcGain0[i] + 100)$
  $\&\&\ TdcValid[i])$

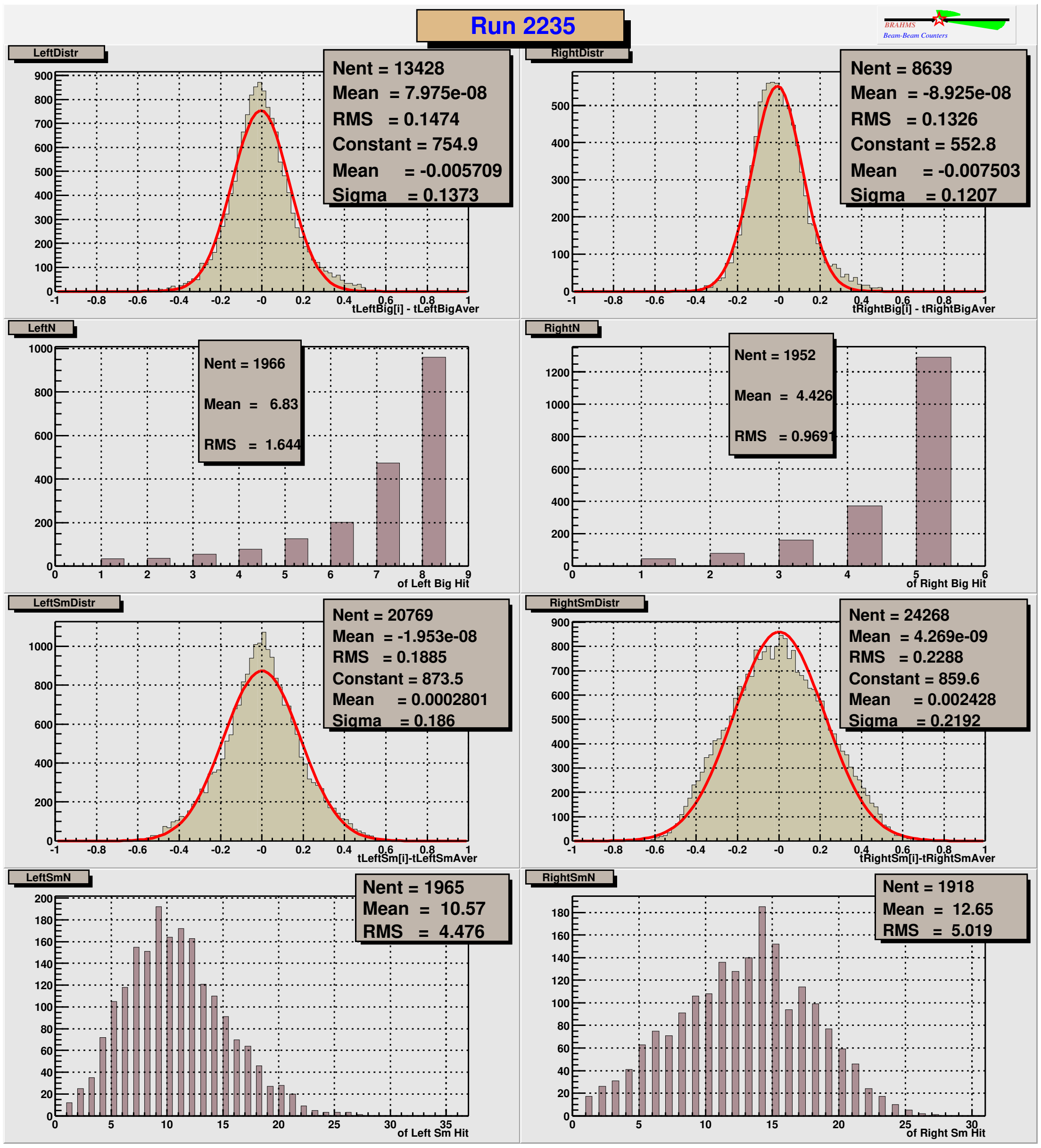
$$t_{Left}[i] = TickLength \cdot \left(tdc[i] + \frac{k[i]}{\sqrt{adc[i]}} + \Delta tdc[i] \right);$$
$$t_{Left} = \frac{1}{NumOfValidTubes} \sum t_{Left}[i]$$

With second iteration (removing $(t_{Left} - 500psec) < t_{Left}[i] < (t_{Left} + 500psec)$)

BB Resolution as compared to TPM1:



BB intrinsic Resolution:



- **Big Tubes:**

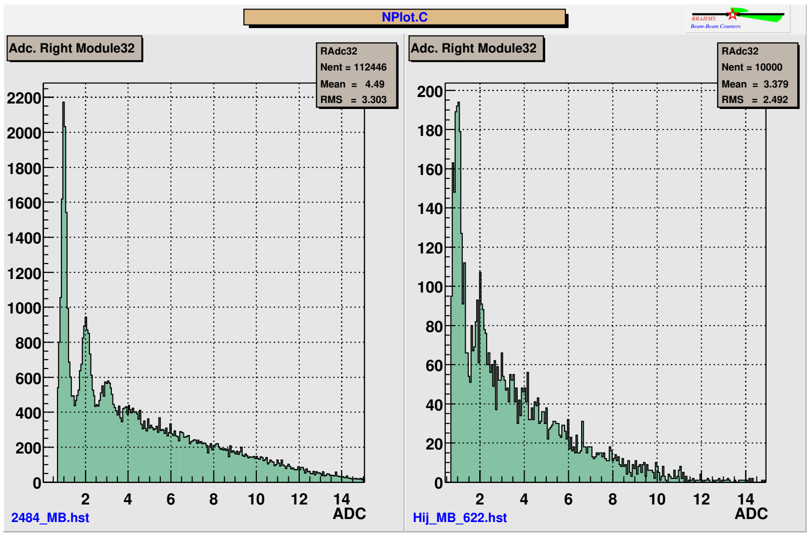
$$\left.\begin{array}{rcl} \delta t_L & = & \frac{137psec}{\sqrt{6.83}} \simeq 52psec \\ \delta t_R & = & \frac{121psec}{\sqrt{4.43}} \simeq 57psec \end{array}\right\} \Rightarrow \delta(z0) = (c/2)\sqrt{(\delta t_L)^2 + (\delta t_R)^2} \simeq 12mm$$

- **Small Tubes:**

$$\left.\begin{array}{rcl} \delta t_L & = & \frac{186psec}{\sqrt{10.57}} \simeq 57psec \\ \delta t_R & = & \frac{219psec}{\sqrt{12.65}} \simeq 62psec \end{array}\right\} \Rightarrow \delta(z0) = (c/2)\sqrt{(\delta t_L)^2 + (\delta t_R)^2} \simeq 13mm$$

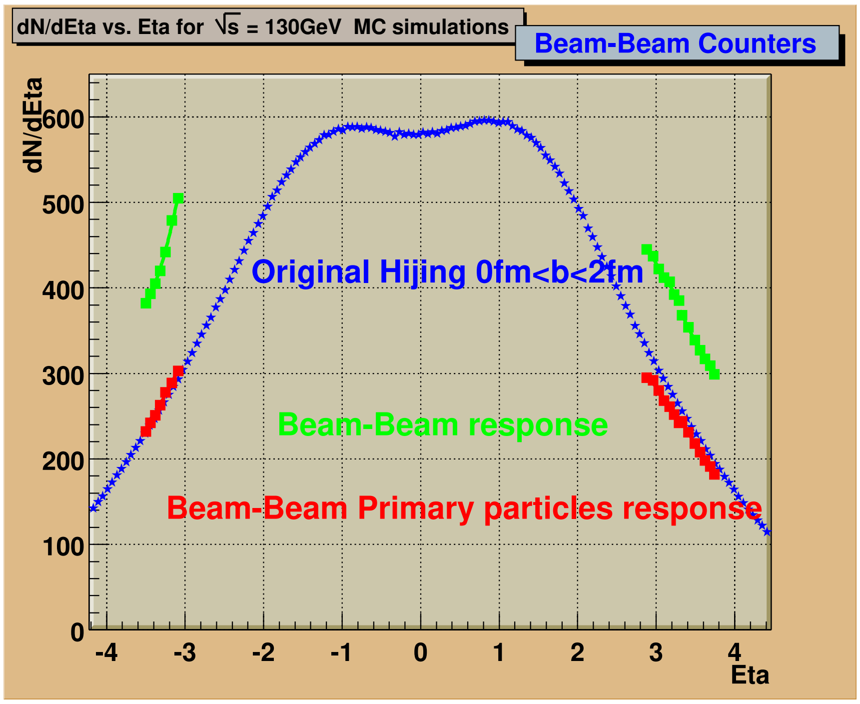
3 Background correction

1. Hijing and RawData Min Bias events:



2. Set of Hijing Central with $VertexZ = 0cm;\ \pm 15cm;\ \pm 30cm;\ \pm 45cm$

3. Same digitization routine as Raw Data for 2 kinds of events:



4. Extract set of fractions $\frac{dN/d\eta_{with\_BG}}{dN/d\eta_{Prim}}$ for diiferent η values

5. Final distributions with BG Correction: