Multiplicity fluctuations in Pb+Pb collisions at energy 158 A GeV

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Data set:

Pb+Pb 160 AGeV minbias 00M

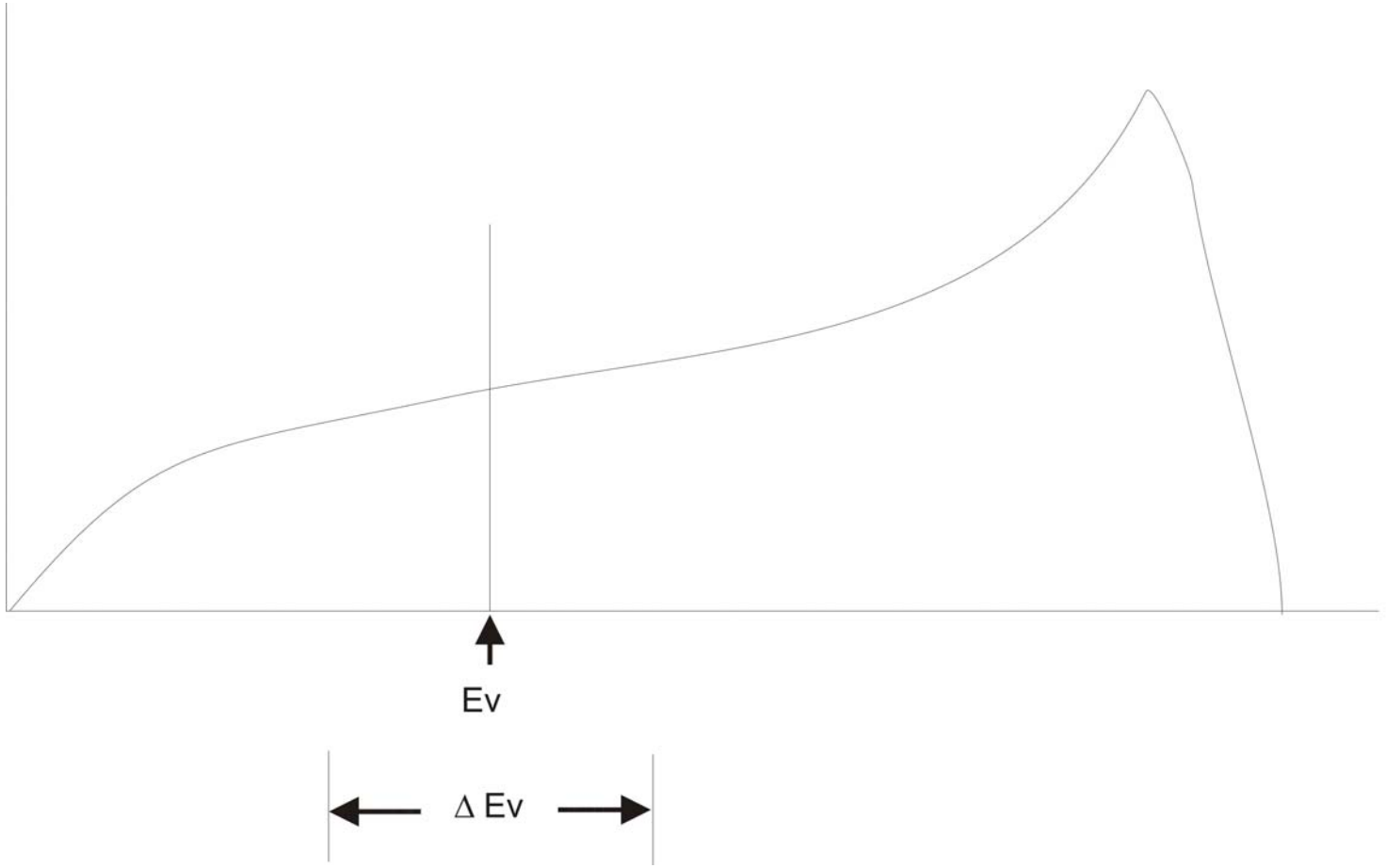
Event Cuts:

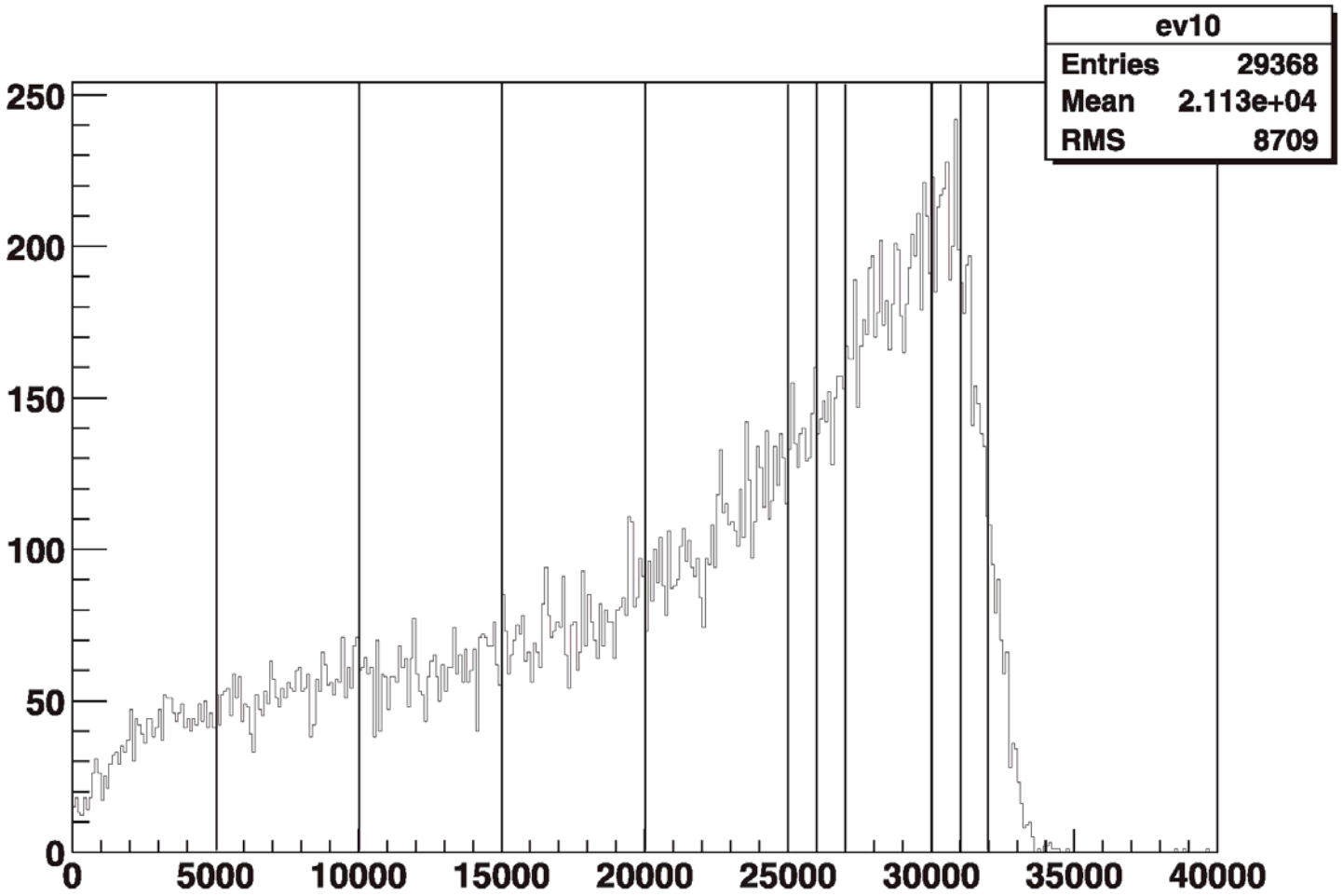
- VertexX (-0.18,-0.02);
- VertexY (-0.08,0.18);
- VertexZ (-579.6,-578.2);
- X_{bpd} - X_{fit} (0.0,0.18);
- Y_{bpd} - Y_{fit} (-0.07,0.05);
- Z_{bpd} - Z_{fit} (-0.8,0.5);

Track Cuts:

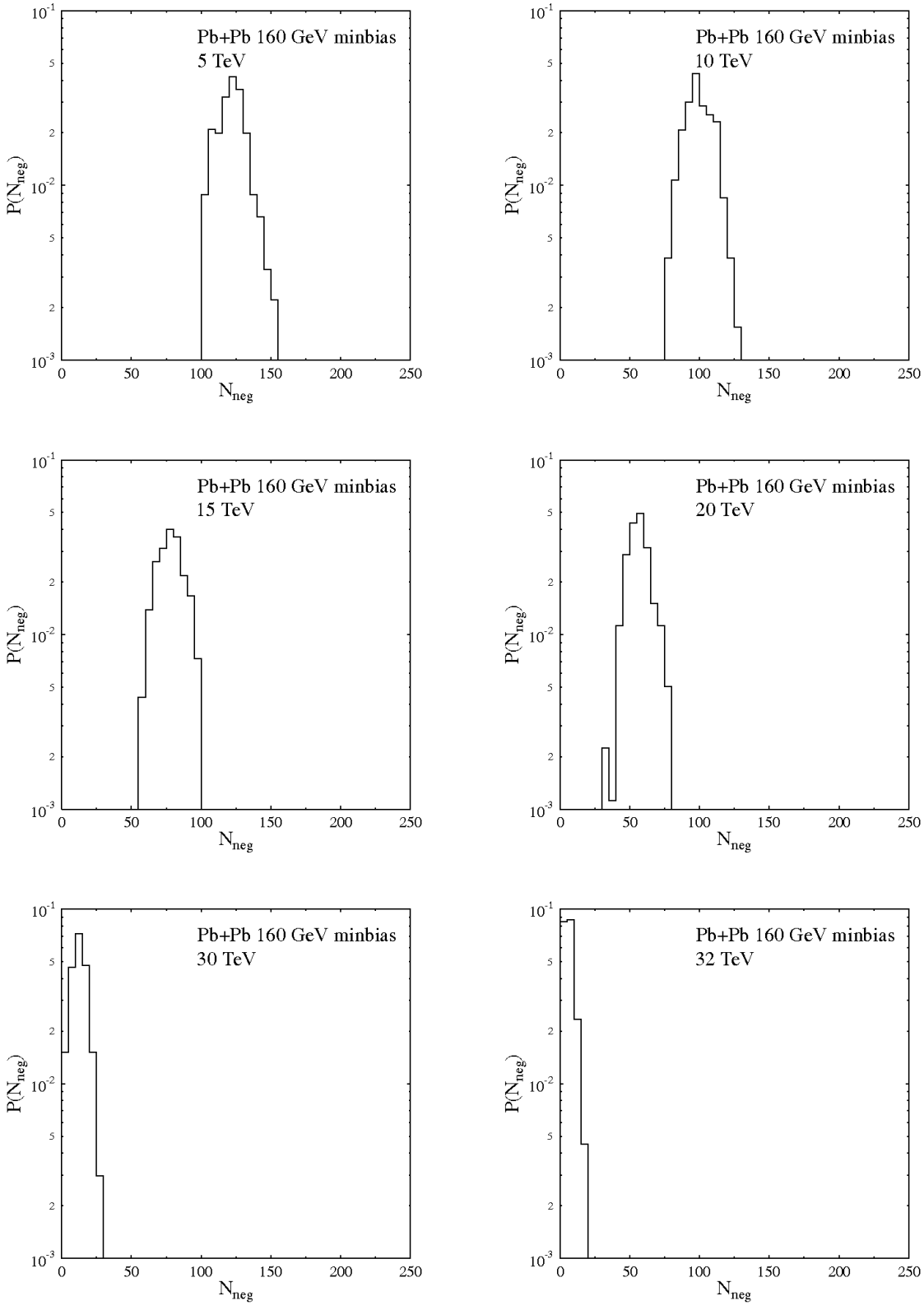
- Only negative particles;
- Bx(-4.0,4.0);
- By(-2.0,2.0);
- NMaxPoint(3,25,240);
- NPointToNMaxPoint(3,0.5);
- $0.005 < p_T < 1.5$;
- $4.0 < y < 5.5$.

MULTIPLICITY DISTRIBUTION DEPENDS ON THE INTERVAL IN E_{VETO} (POSITION – E_V AND WIDTH - ΔE_V) SELECTED FOR THE ANALYSIS

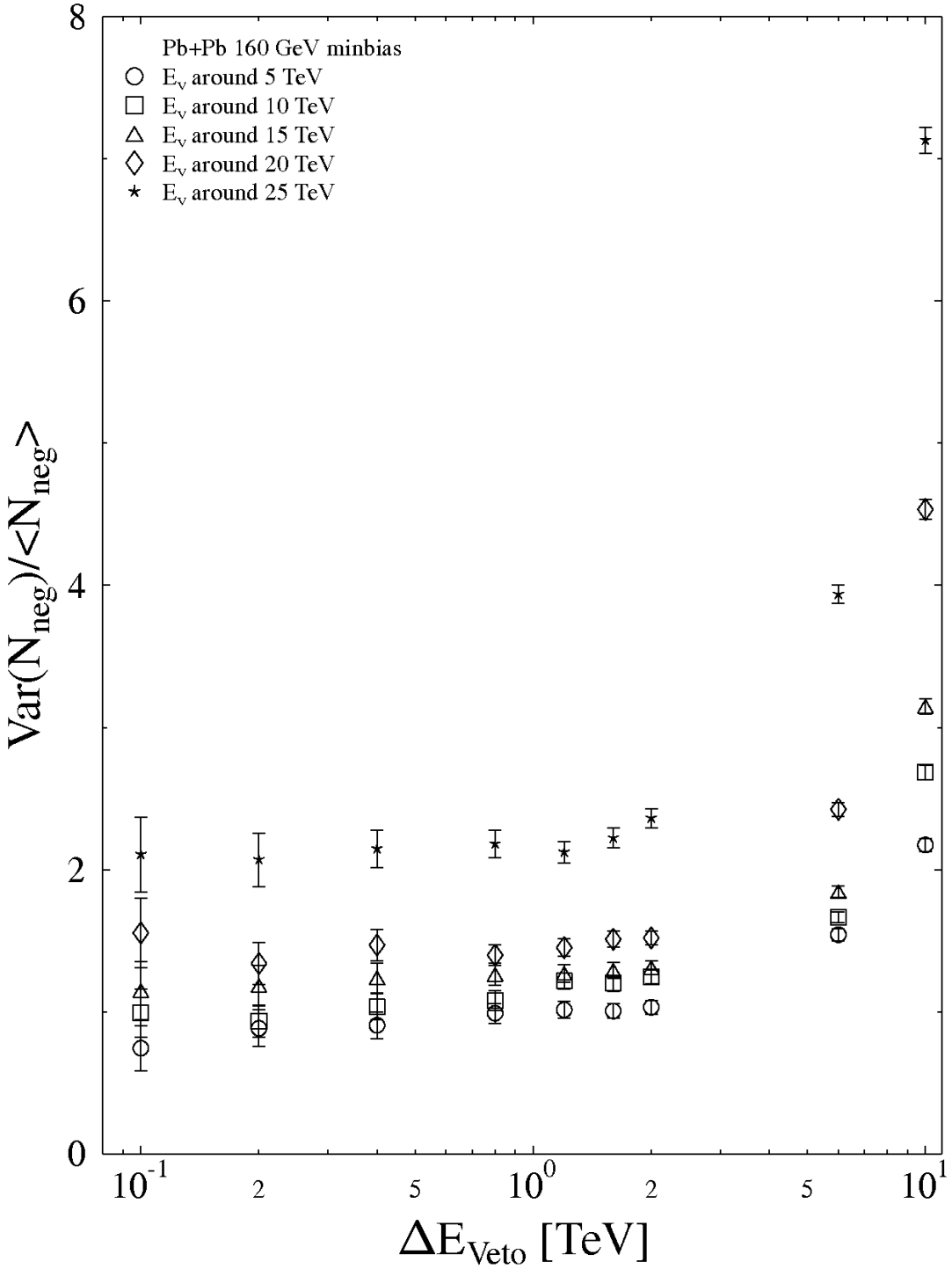




THE POSITIONS OF E_{VETO} INTERVAL SELECTED FOR THE ANALYSIS



MULTIPLICITY DISTRIBUTIONS FOR ΔE_V = 100 GEV FOR VARIOUS POSITIONS OF E_{VETO} INTERVAL



NORMALIZED VARIANCE OF MULTIPLICITY DISTRIBUTIONS FOR NEGATIVELY CHARGED PARTICLES AS A FUNCTION OF WIDTH OF E_{VETO} INTERVAL FOR VARIOUS POSITIONS OF E_{VETO} INTERVAL

MULTIPLICITY FLUCTUATIONS IN WOUNDED NUCLEON MODEL:

$$N = \sum_{i=1}^{k} n_i$$

$$\langle N \rangle = \langle k \rangle \langle n \rangle$$

$$Var(N) = \langle k \rangle Var(n) + \langle n \rangle^2 Var(k)$$

$$\frac{Var(N)}{\langle N \rangle} = \frac{Var(n)}{\langle n \rangle} + \langle n \rangle \frac{Var(k)}{\langle k \rangle}$$

Effect of the finite width of E_V interval

$$k = \left(A - \frac{E_V}{E_{LAB}}\right) \tag{1}$$

$$Var(k) = Var\left(\frac{E_V}{E_{LAB}}\right) \tag{2}$$

$$< k >= A - \frac{< E_V >}{E_{LAB}} \tag{3}$$

$$\frac{Var(k)}{< k >} = \frac{\frac{1}{E_{LAB}} Var(E_V)}{E_{LAB} A - < E_V >} \tag{4}$$

$$\frac{Var(N)}{< N >} = \frac{Var(n)}{< n >} + < n > \frac{\frac{1}{E_{LAB}} Var(E_V)}{E_{LAB} A - < E_V >} \tag{5}$$

Effect of Veto resolution

$$\sigma(E_V) = 2\sqrt{E_V} \quad [GeV] \tag{1}$$

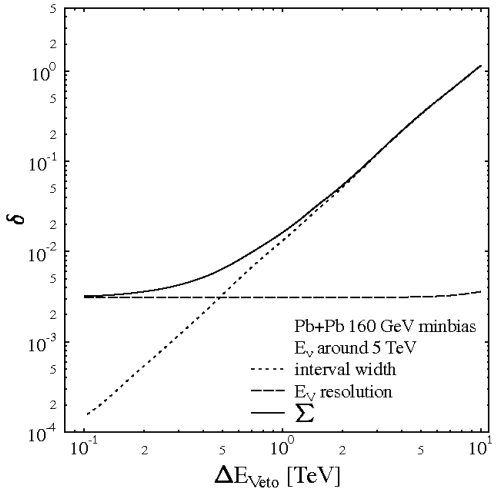
$$Var(E_V)_{RES} = 4 < E_V > \tag{2}$$

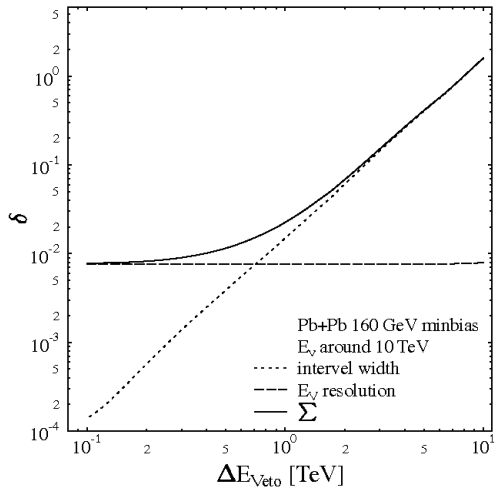
$$\boxed{\frac{Var(N)}{< N >} = \frac{Var(n)}{< n >} + < n > \frac{\frac{1}{E_{LAB}}\Big(Var(E_V) + Var(E_V)_{RES}\Big)}{E_{LAB}A - < E_V >}}$$

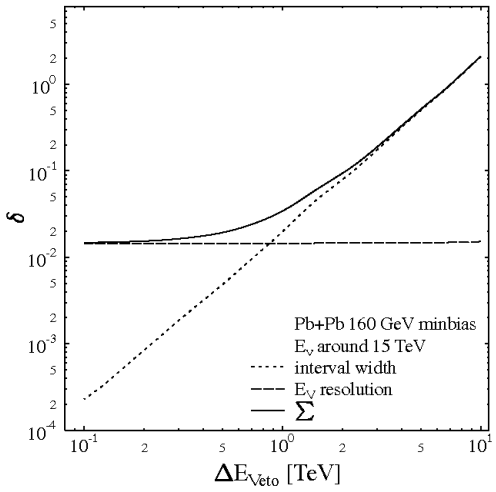
$$\frac{Var(n)}{<n>} = C_1$$

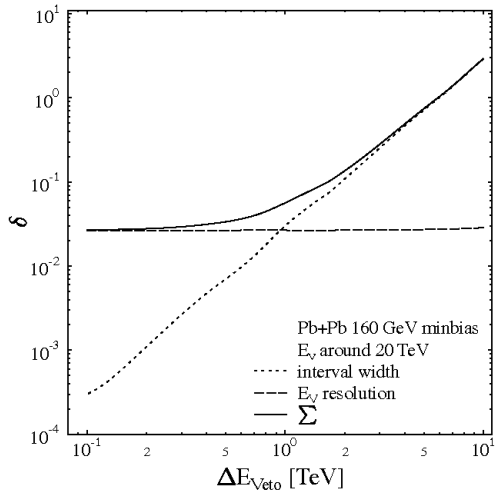
$$< n > \frac{\frac{1}{E_{LAB}}\Big(Var(E_V) + Var(E_V)_{RES}\Big)}{E_{LAB}A - <E_V>} = \delta$$

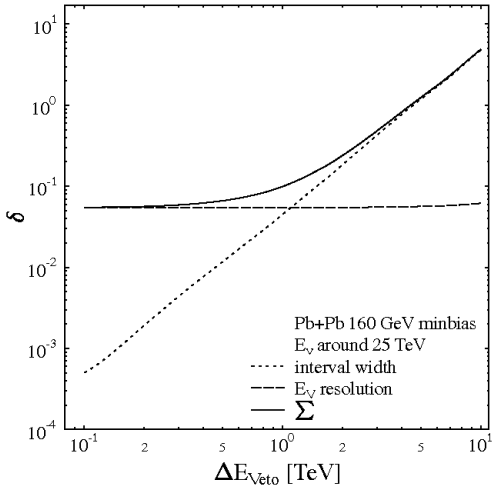
$$\frac{Var(N)}{< N >} = C_1 + \delta$$

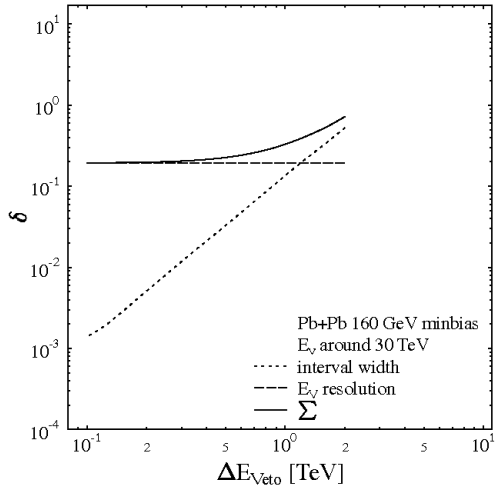




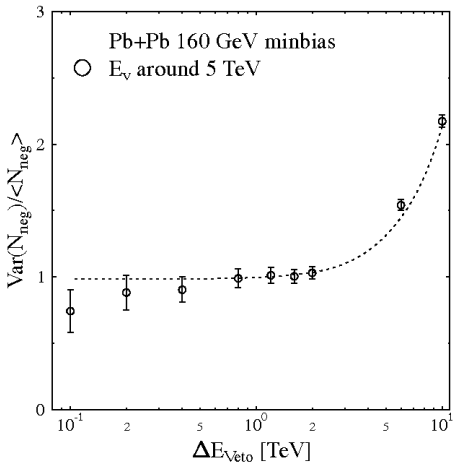


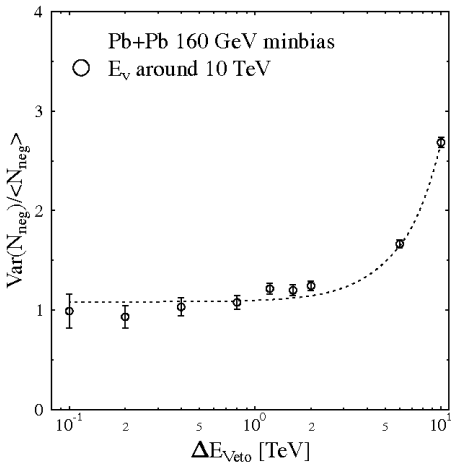


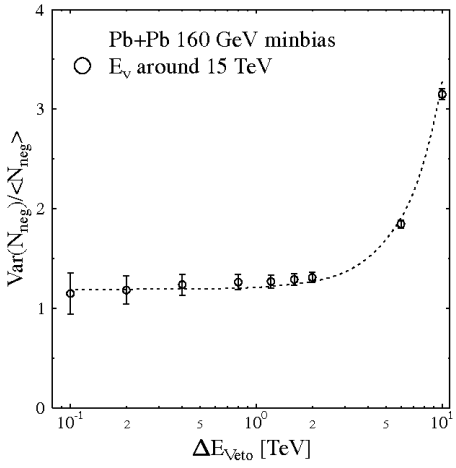


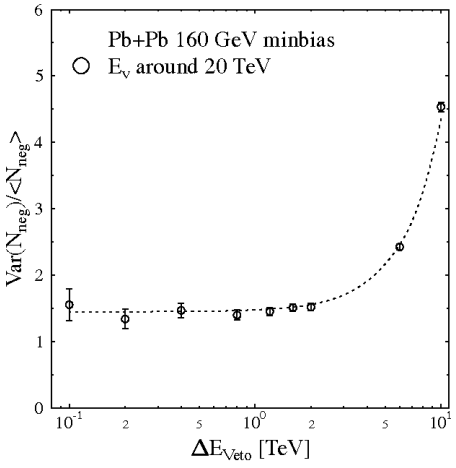


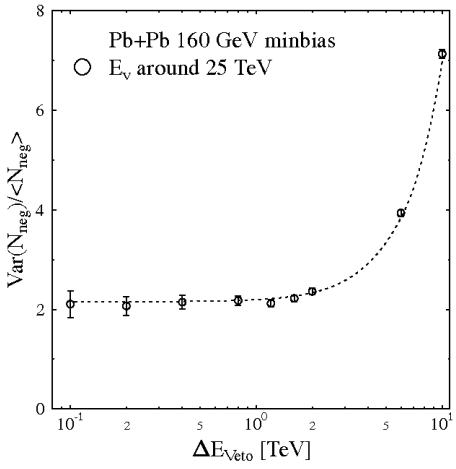
THE CORRECTIONS FOR INTERVAL WIDTH AND E_{VETO} RESOLUTION AS A FUNCTION OF INTERVAL WIDTH FOR VARIOUS POSITIONS OF INTERVAL



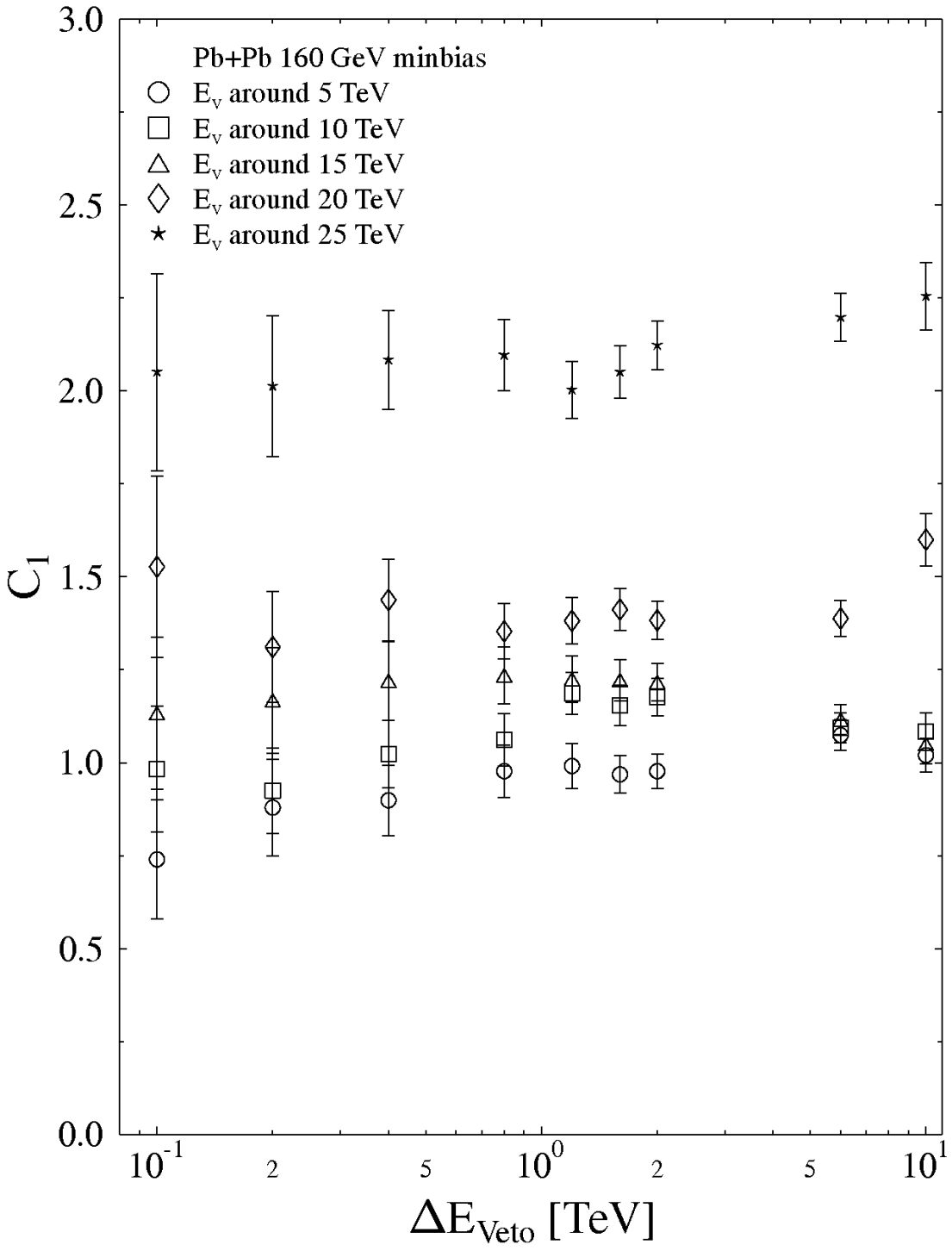




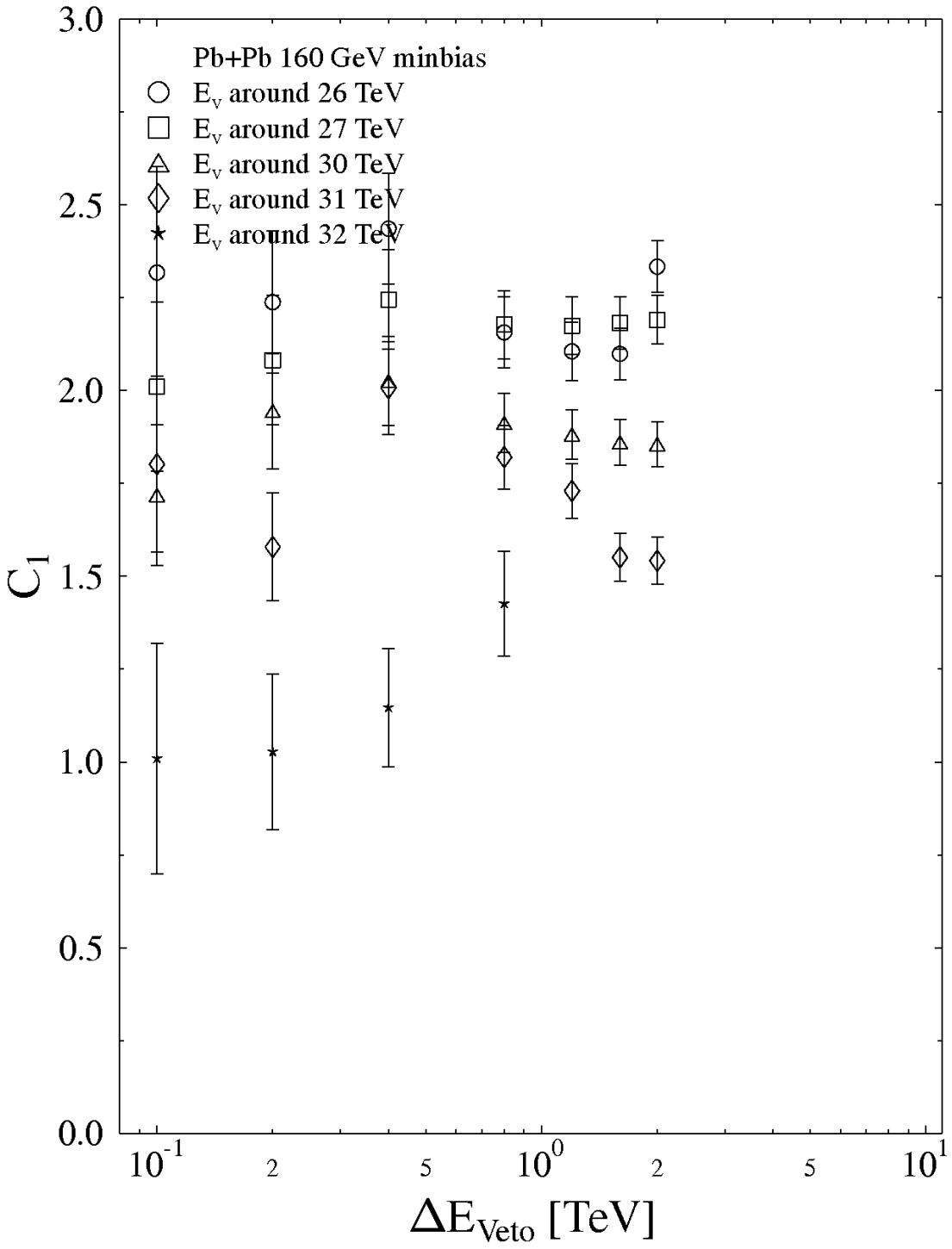




NORMALIZED VARIANCE OF MULTIPLICITY DISTRIBUTIONS FOR NEGATIVELY CHARGED PARTICLES AS A FUNCTION OF WIDTH OF E_{VETO} INTERVAL FOR VARIOUS POSITIONS OF E_{VETO} INTERVAL FITTED BY THE MODEL



THE C_1 PARAMETER (THE NORMALIZED VARIANCE OF MULTIPLICITY DISTRIBUTIONS FOR NEGATIVELY CHARGED PARTICLES AFTER SUBTRACTION OF CORRECTIONS FOR INTERVAL WIDTH AND E_{VETO} RESOLUTION) AS A FUNCTION OF INTERVAL WIDTH FOR VARIOUS POSITIONS OF INTERVAL



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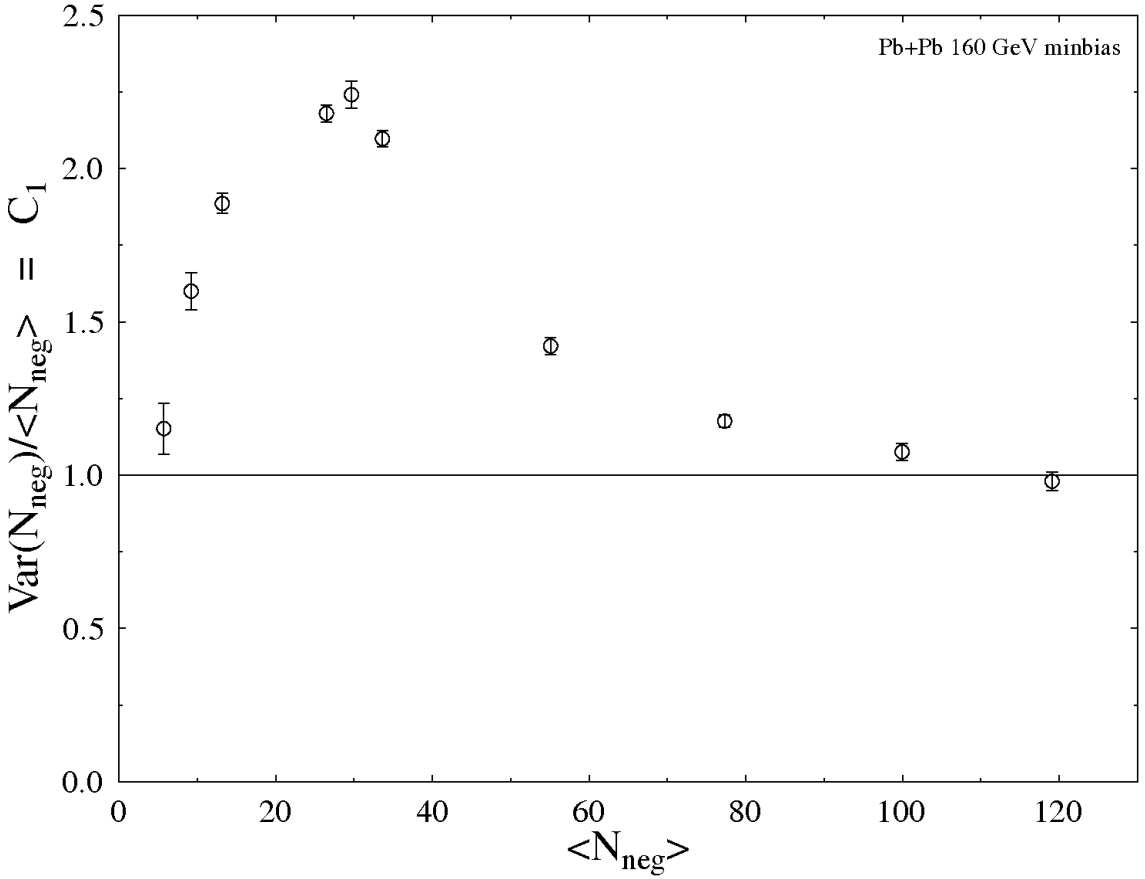
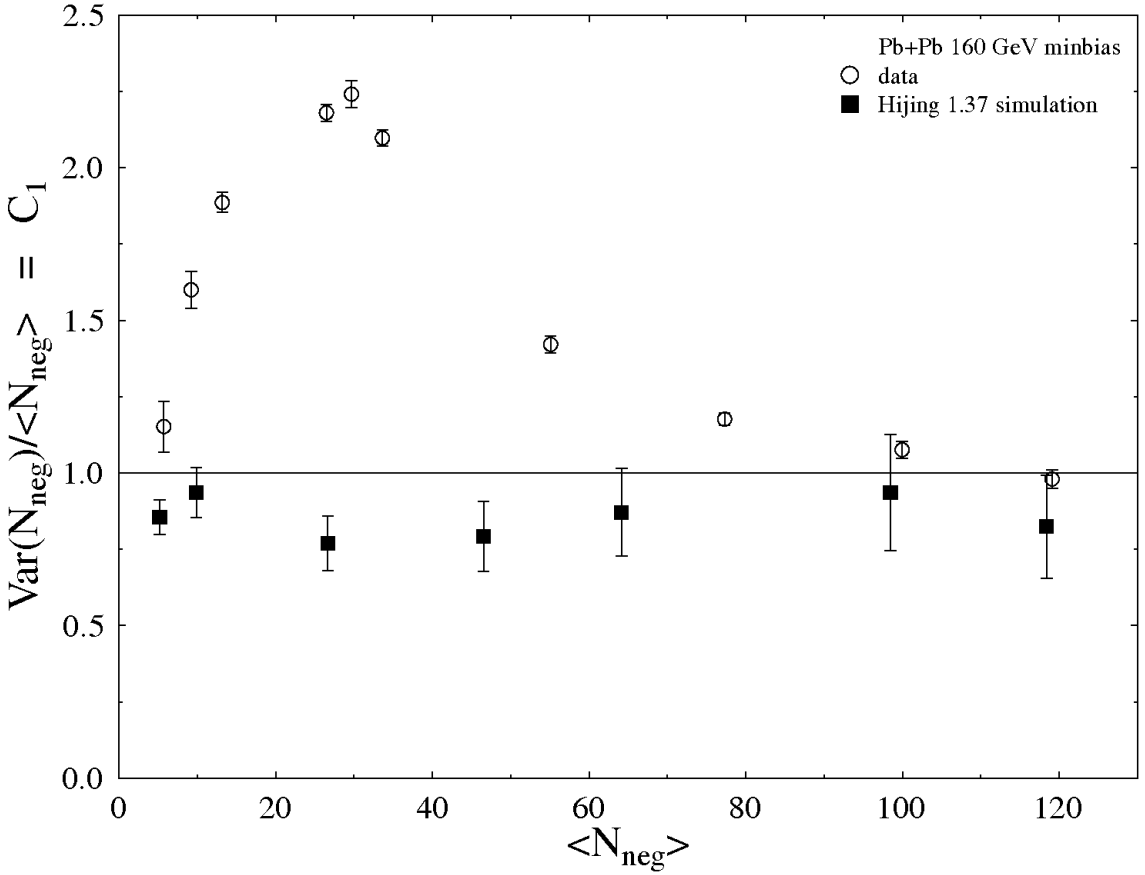
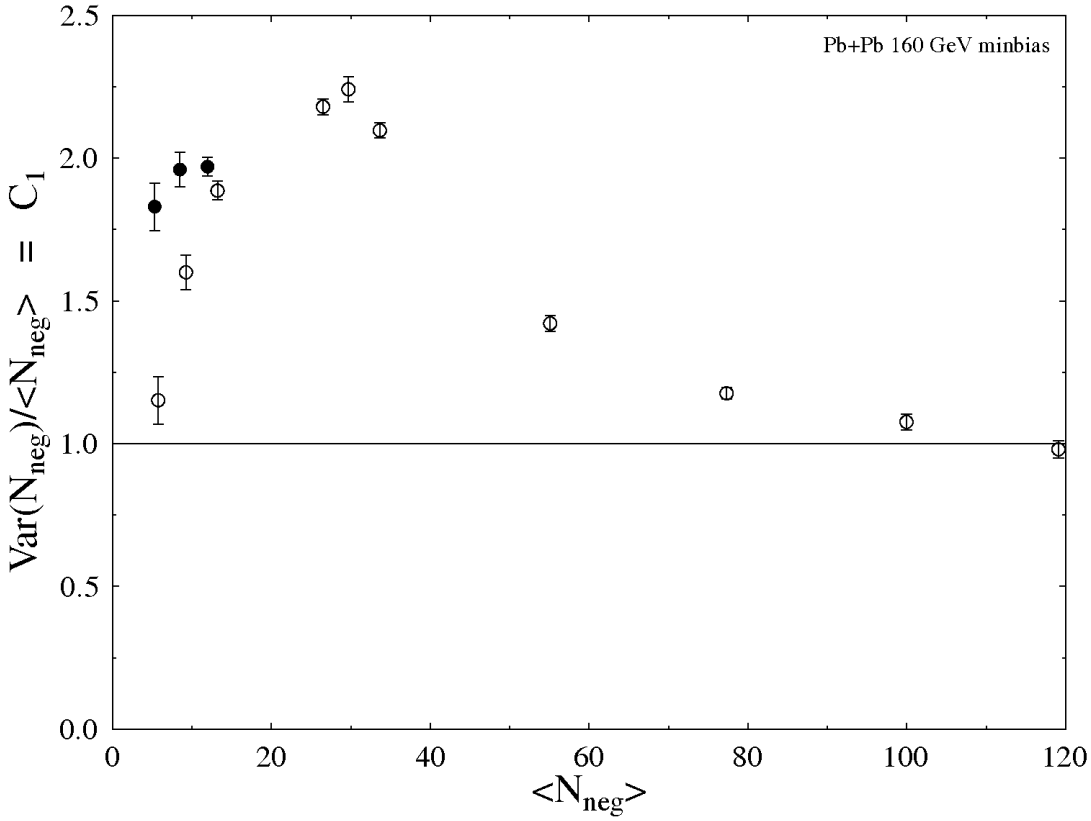


THE C_1 PARAMETER (THE NORMALIZED VARIANCE OF MULTIPLICITY DISTRIBUTIONS FOR NEGATIVELY CHARGED PARTICLES AFTER SUBTRACTION OF CORRECTIONS FOR INTERVAL WIDTH AND E_{VETO} RESOLUTION) AS A FUNCTION OF MEAN NEGATIVE MULTIPLICITY



THE C_1 PARAMETER (THE NORMALIZED VARIANCE OF MULTIPLICITY DISTRIBUTIONS FOR NEGATIVELY CHARGED PARTICLES AFTER SUBTRACTION OF CORRECTIONS FOR INTERVAL WIDTH AND E_{VETO} RESOLUTION) AS A FUNCTION OF MEAN NEGATIVE MULTIPLICITY IN COMPARISON WITH HIJING 1.37 SIMULATION



THE C_1 PARAMETER (THE NORMALIZED VARIANCE OF MULTIPLICITY DISTRIBUTIONS FOR NEGATIVELY CHARGED PARTICLES AFTER SUBTRACTION OF CORRECTIONS FOR INTERVAL WIDTH AND E_{VETO} RESOLUTION) AS A FUNCTION OF MEAN NEGATIVE MULTIPLICITY. FULL CIRCLES SHOWS NORMALIZED VARIANCE WITHOUT CORRECTIONS

RESULT LOOKS INTRESTING
BUT FURTHER STUDIES ARE NEEDED

- Quantify effect of non-vertex events:

First test for most peripheral collisions:
$\Delta Z = 1.4\ cm$
$< N >= 5.75 \quad Var(N) = 11.47 \quad \frac{Var(N)}{<N>} = 1.99$
$\Delta Z = 0.7\ cm$
$< N >= 6.2 \quad Var(N) = 12.2 \quad \frac{Var(N)}{<N>} = 1.97$

- Study sensitivity on Veto resolution