Progress report

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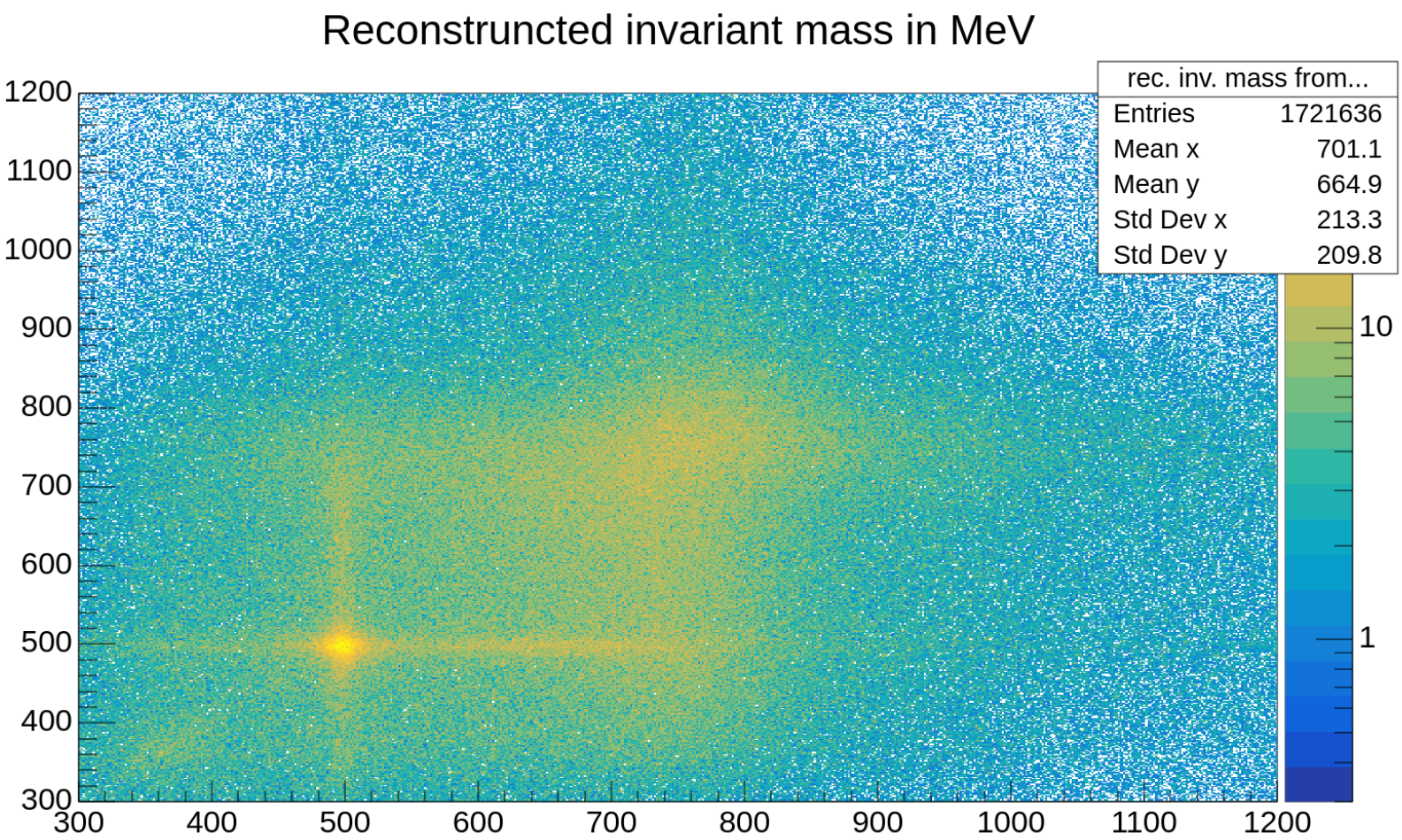
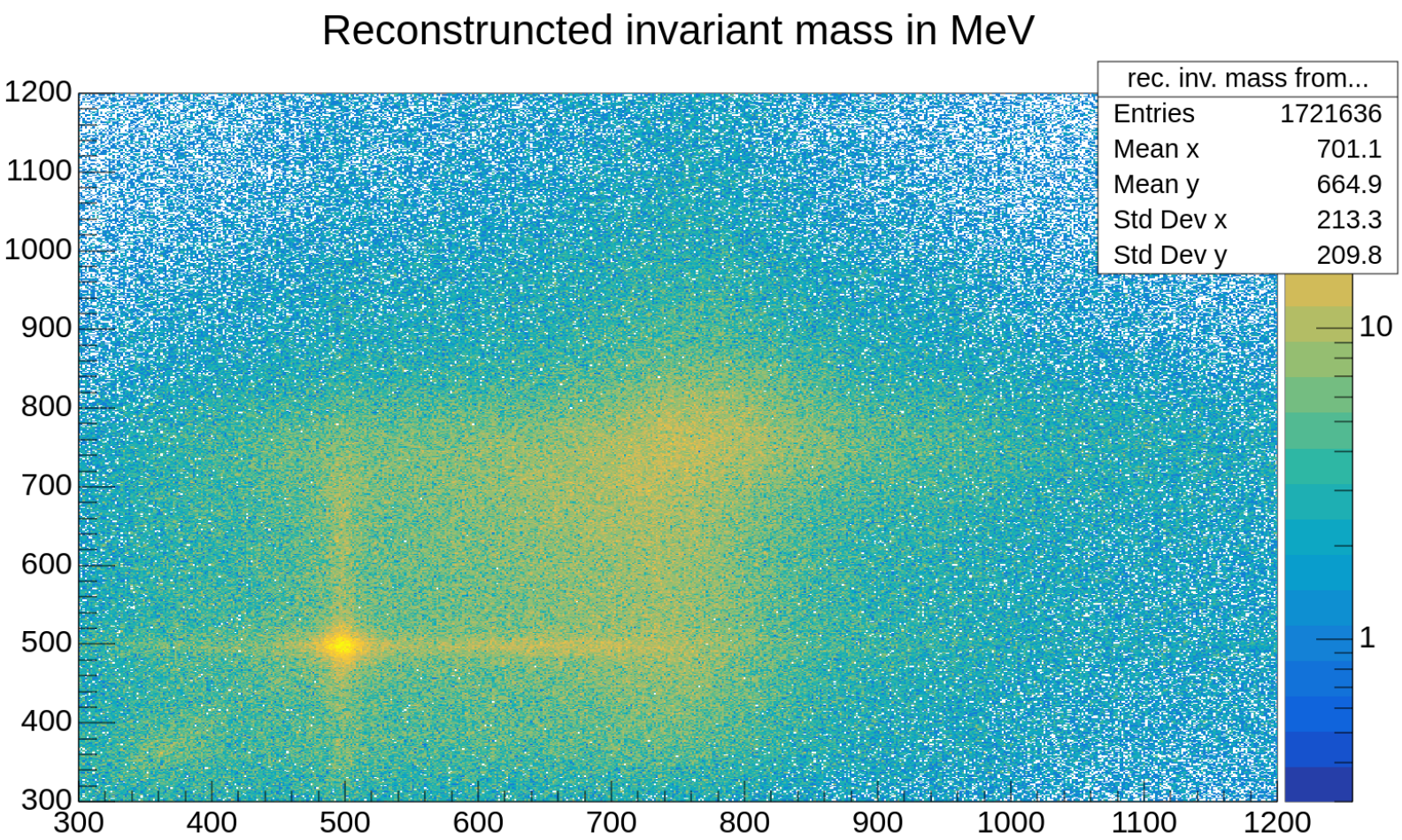
ρ invariant mass reconstruction



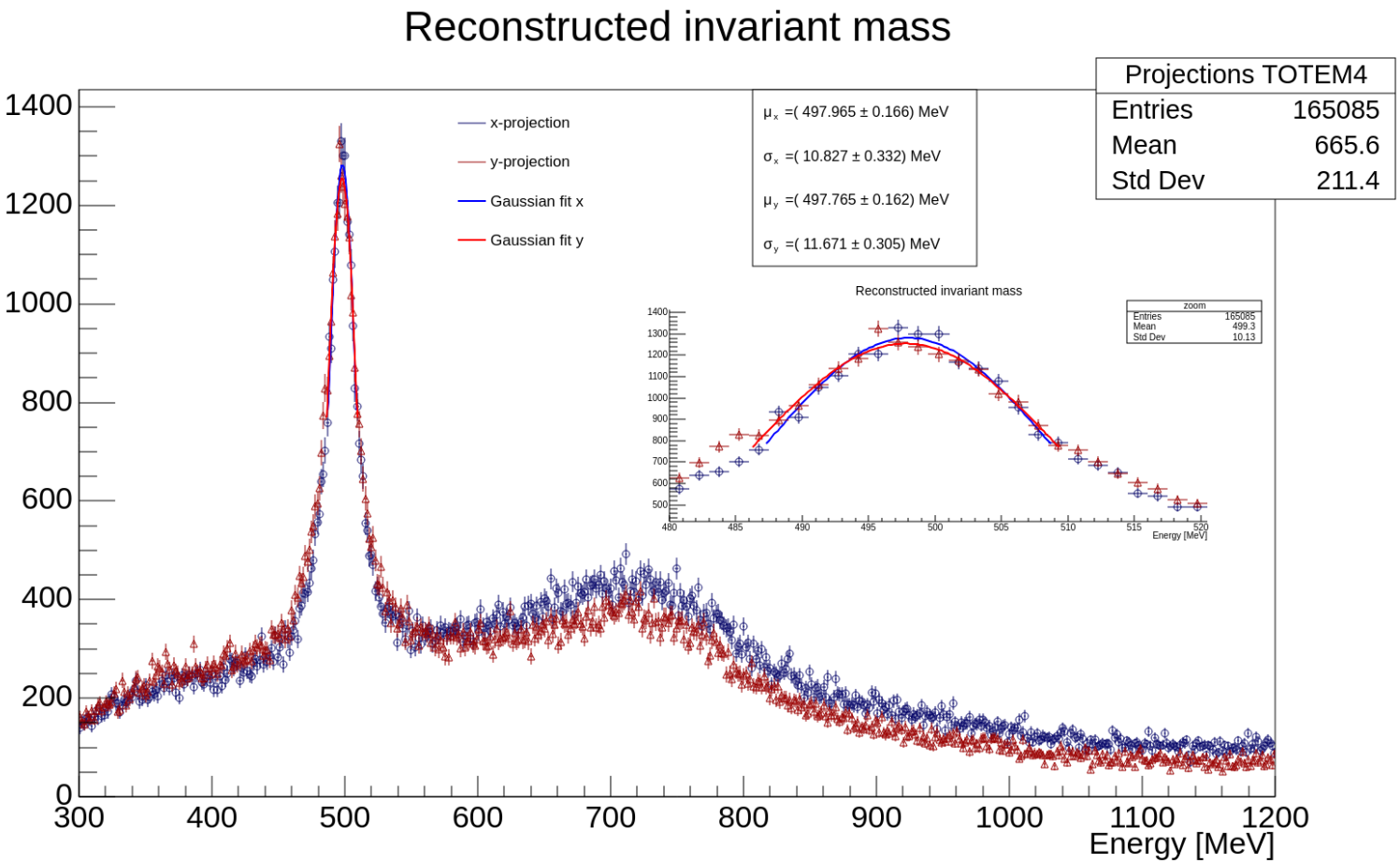
TOTEM2

ρ invariant mass reconstruction



TOTEM4

Kaon mass fit TOTEM4



$$\mu_{\text{avg}} = 497.865(164)\,\text{MeV}$$
$$\sigma_{\text{avg}} = 11.249(319)\,\text{MeV}$$

- Used $\pm 3\sigma$ for summation in projection and $\pm 1\sigma$ for fitrange
- PDG value: $m_{K_0} = 497.677(13)\,\text{MeV} \Rightarrow$ in agreement with data

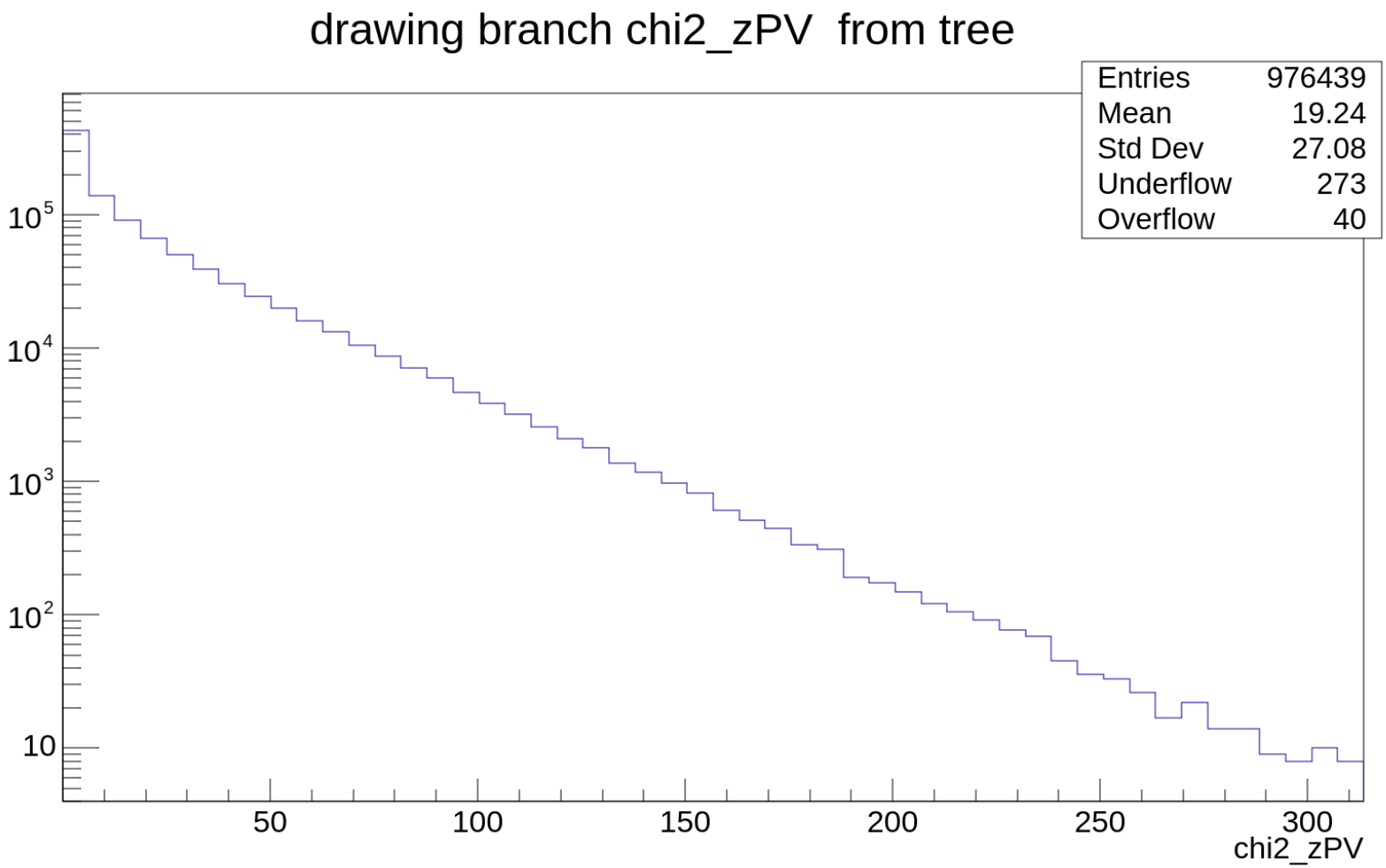
Introducing χ^2-like variables

- We use the combined data sets TOTEM2 and TOTEM4
- Define new variable

$$\chi^2 := \sum_{i=1}^{ntrk=4} (\mu_x - x_i)^2, \text{ for } x \in \{\text{zPV}, \text{dxy/dxyerr}, \text{dz/dzerr}\} \quad (1)$$

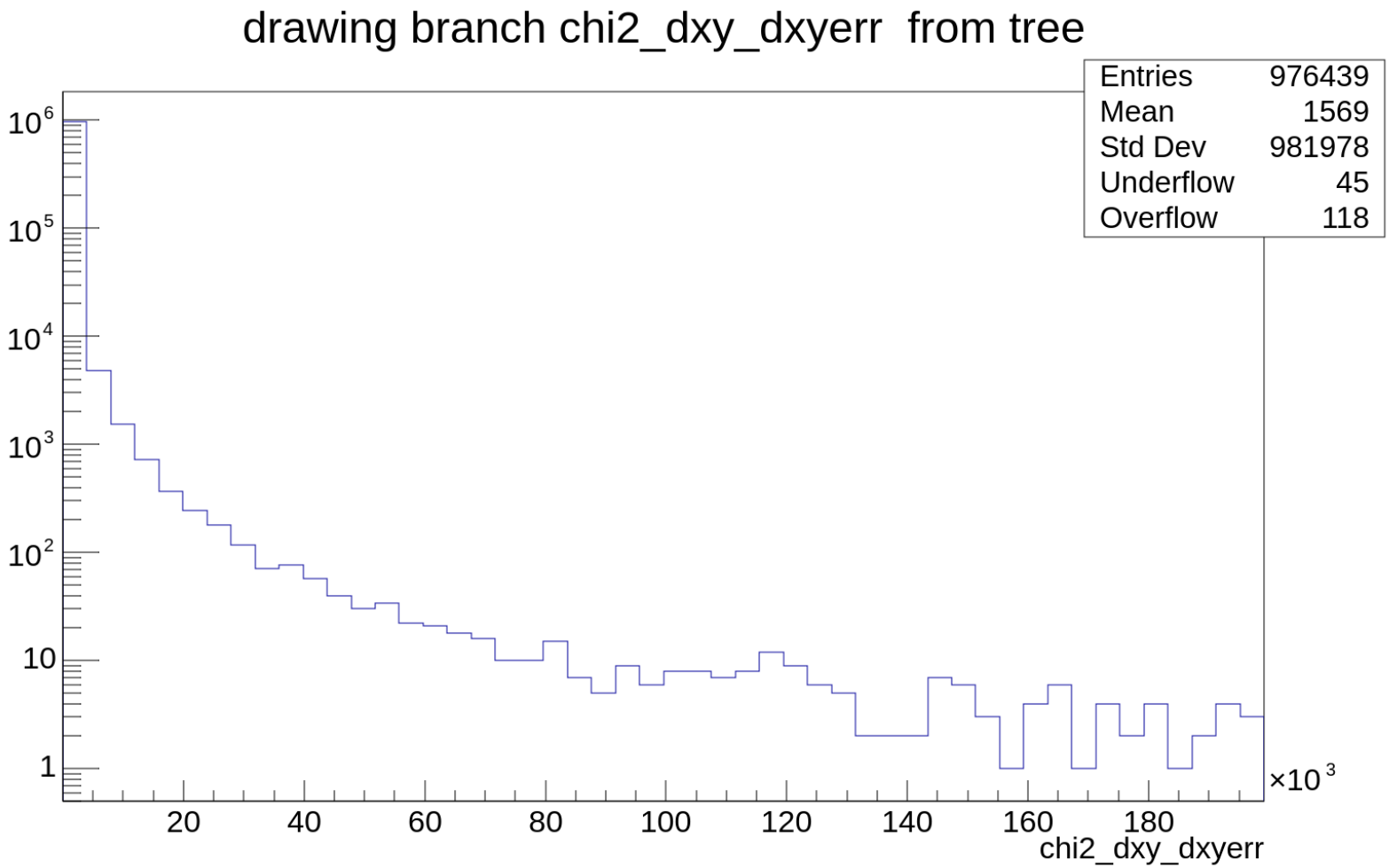
- μ_x is constant coming from gaussian fit of x over entire data set
- Every event has multiple χ^2s on which we can cut

χ^2-like variables



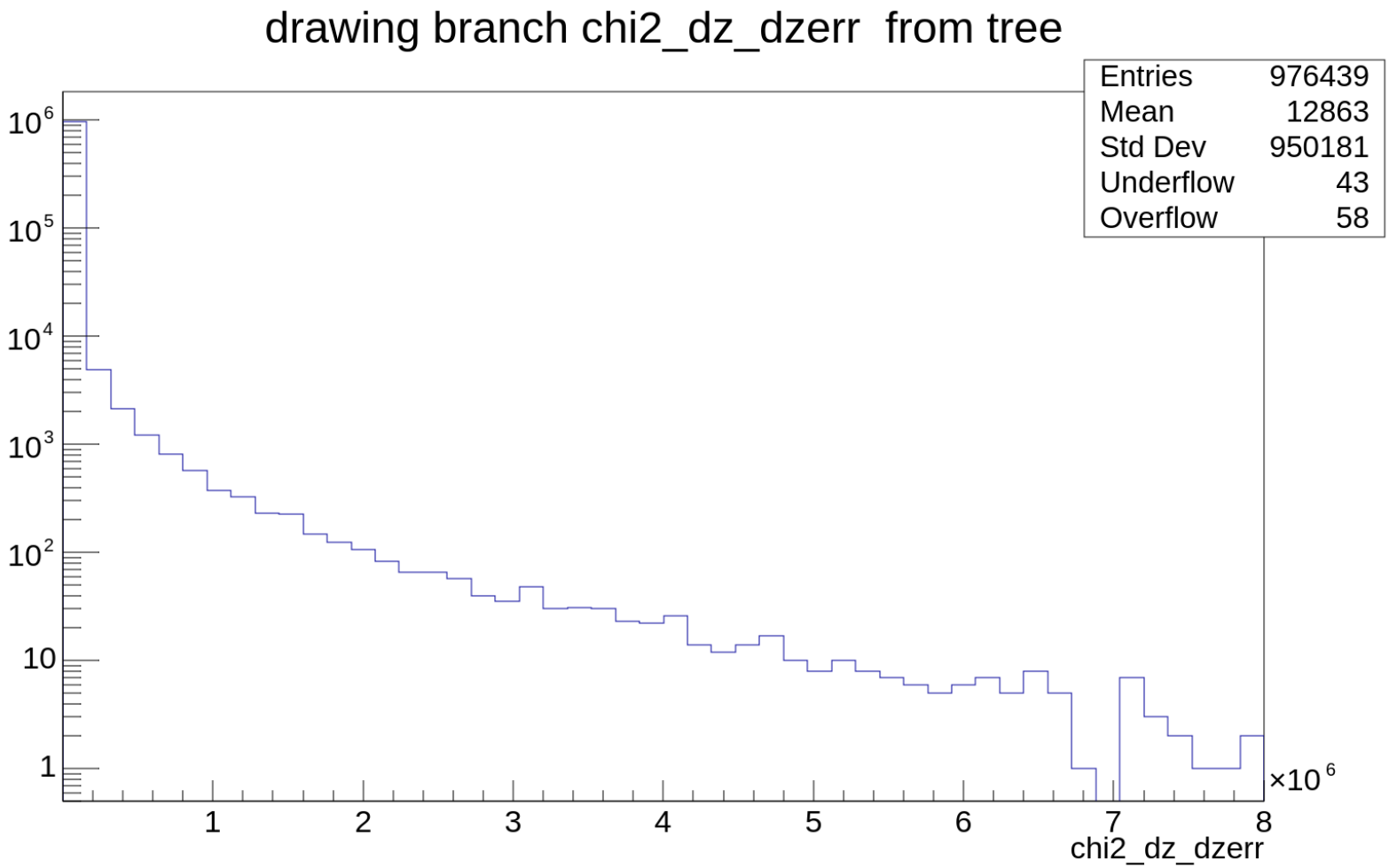
TOTEM2, mean used: $\mu_{\text{zPV}} = -0.291$ (units?)

χ^2-like variables



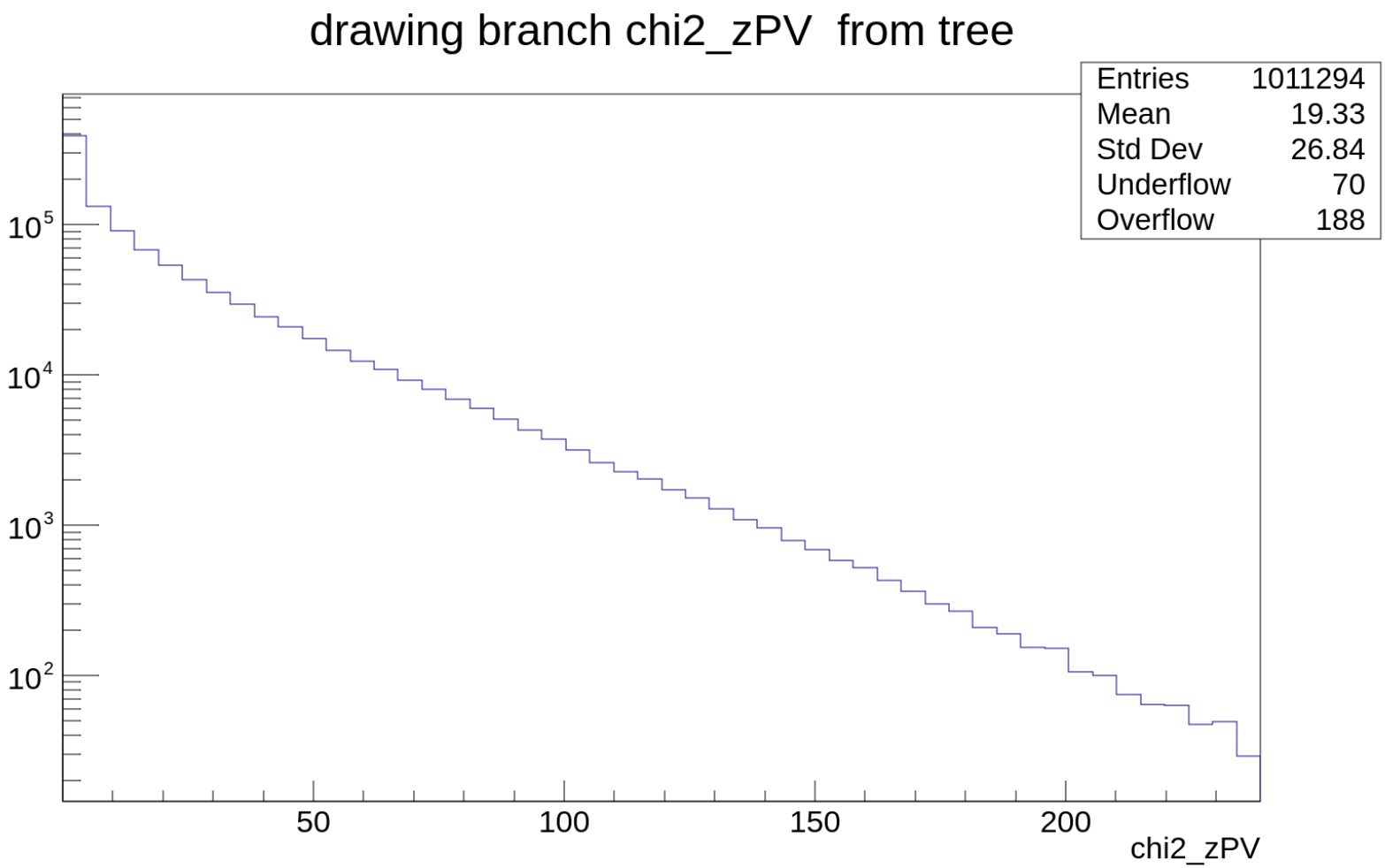
TOTEM2, mean used: $\mu_{\text{dxy/dxy\_err}} = 0.002$ (units?)

χ^2-like variables



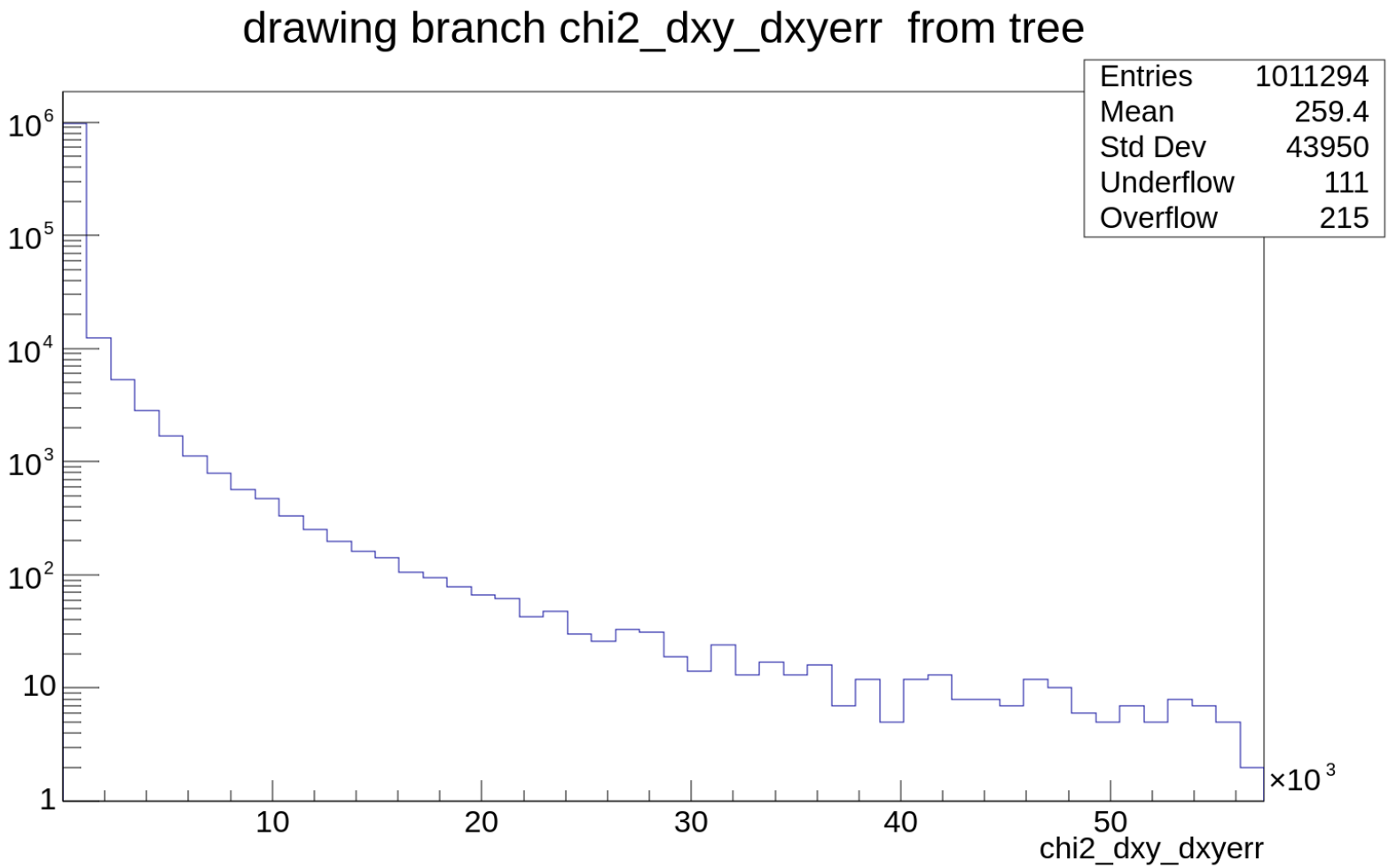
TOTEM2, mean used: $\mu_{\text{dz/dz\_err}} = 0.001$ (units?)

χ^2-like variables



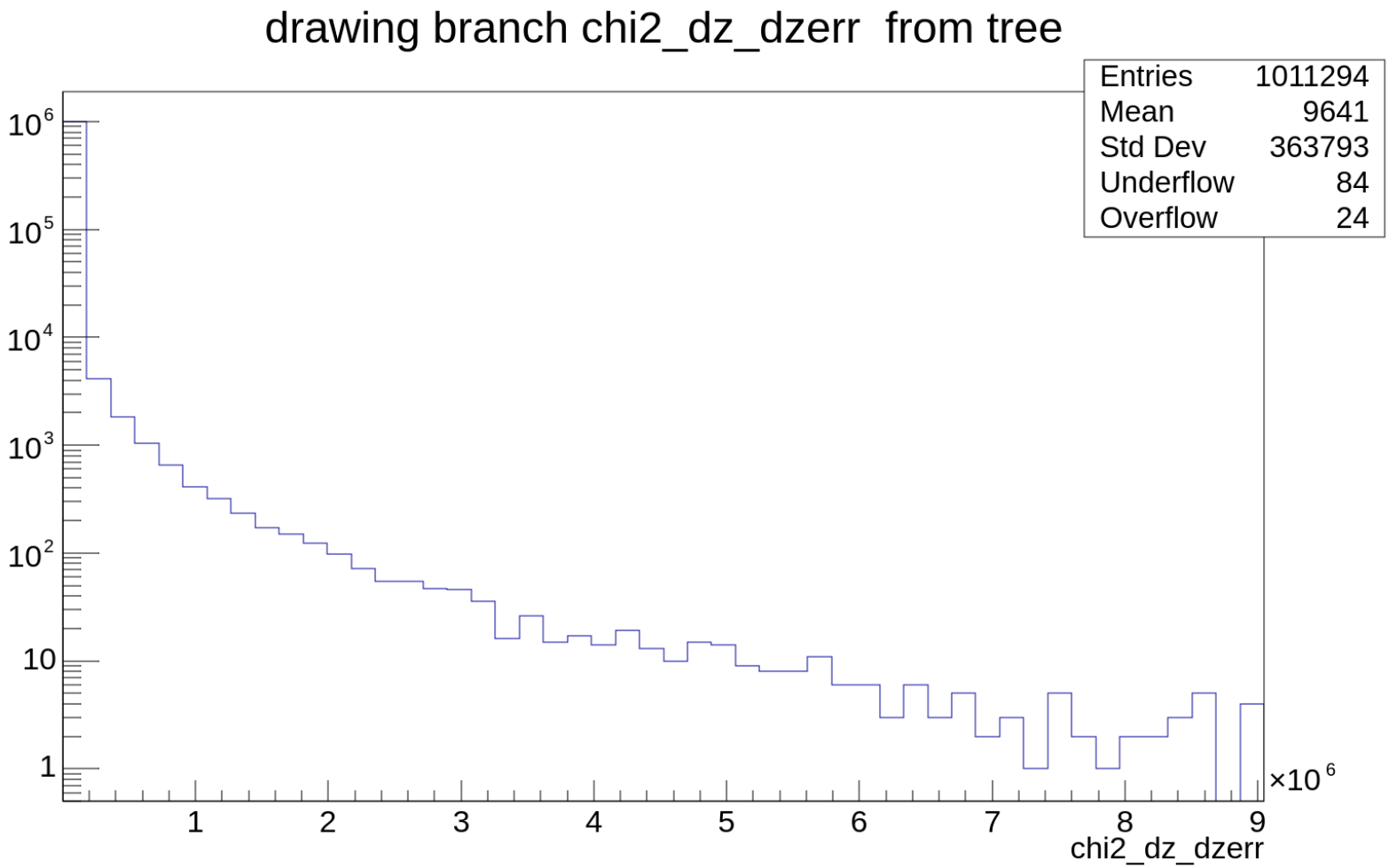
TOTEM4, mean used: $\mu_{\text{zPV}} = -0.313$ (units?)

χ^2-like variables



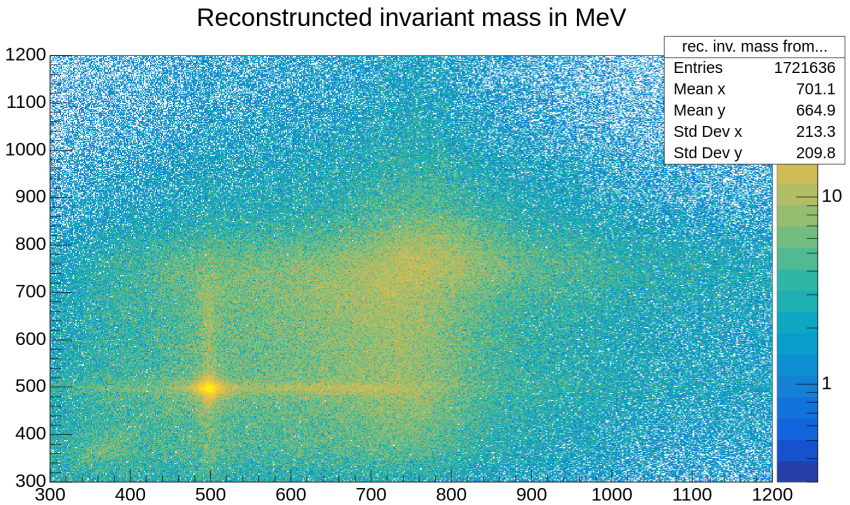
TOTEM4, mean used: $\mu_{\text{dxy/dxy\_err}} = -0.001$ (units?)

χ^2-like variables

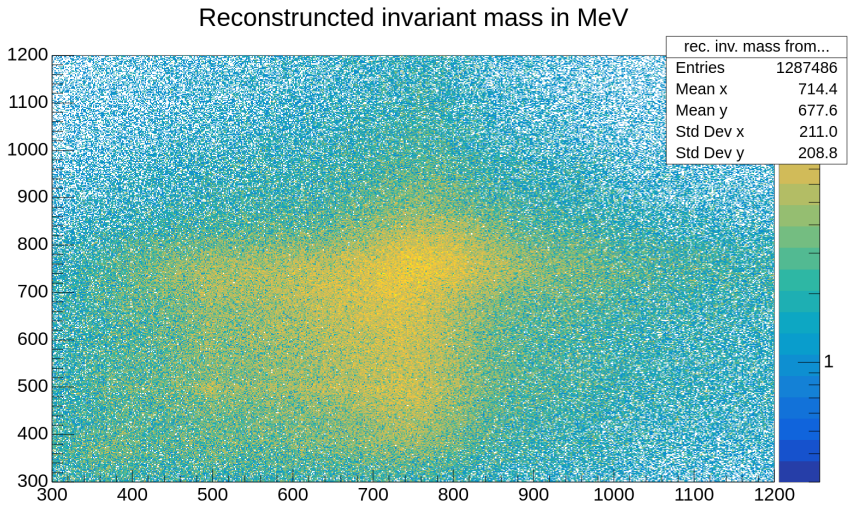


TOTEM4, mean used: $\mu_{\text{dz/dz\_err}} = 0.000$ (units?)

χ^2 Cuts



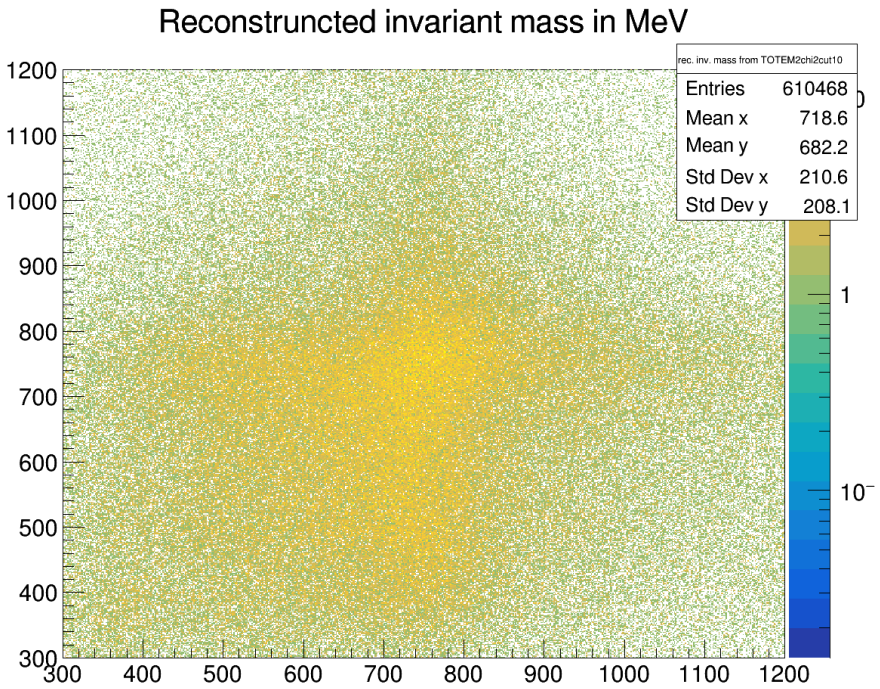
TOTEM2 before χ^2 cut



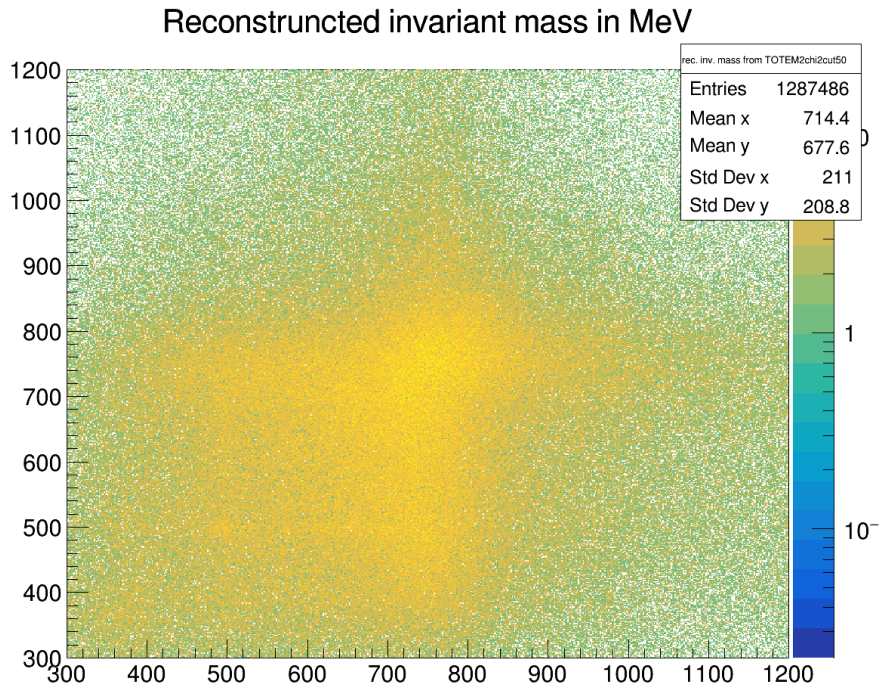
TOTEM2 after χ^2 cut

- Cuts at $\chi^2_{\text{zPV}} < 50$ and $\chi^2_{\text{dxy/dxyerr}} < 50$ $\chi^2_{\text{dz/dzerr}} < 50$

χ^2 Cuts



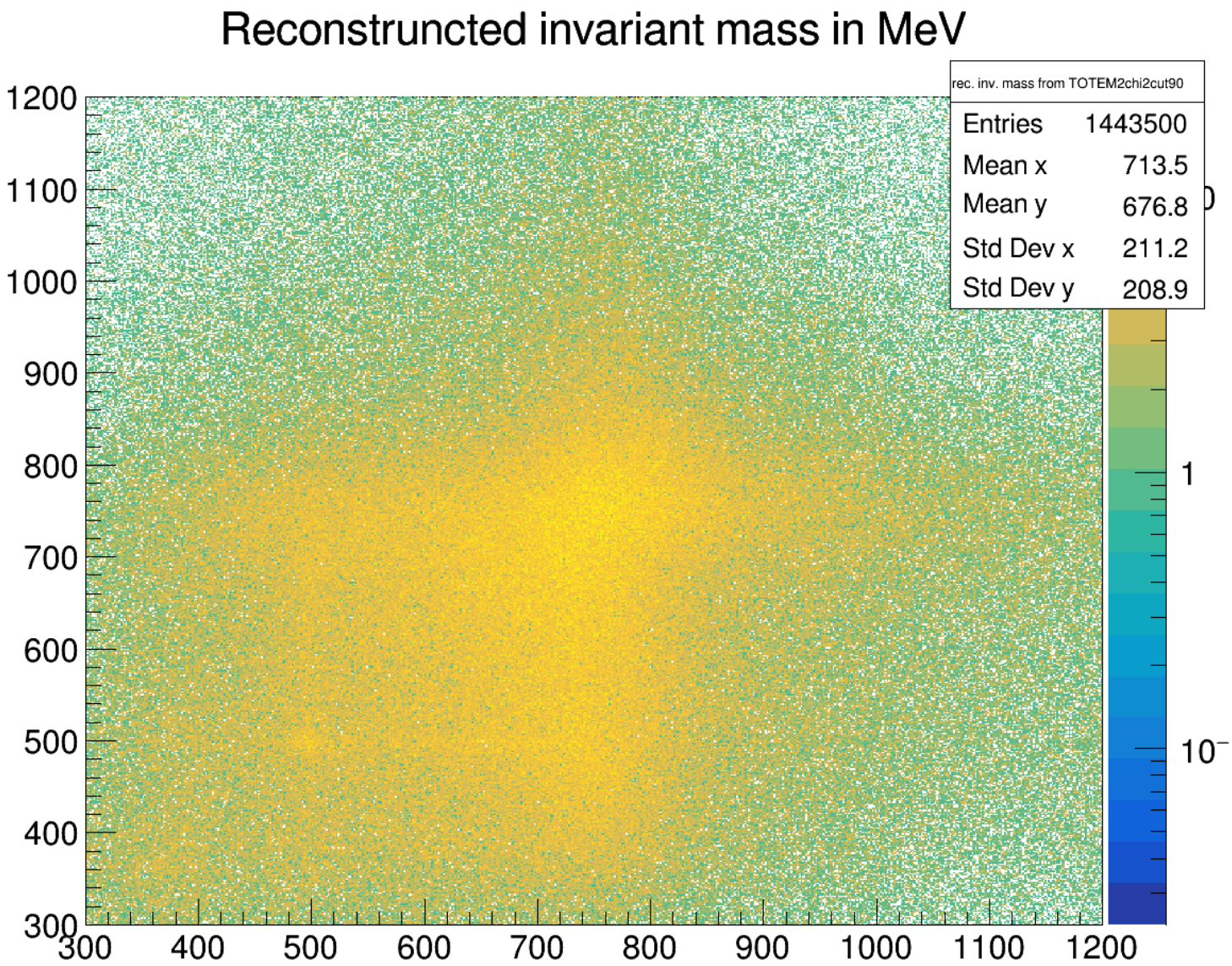
TOTEM2 before $\chi^2 < 10$



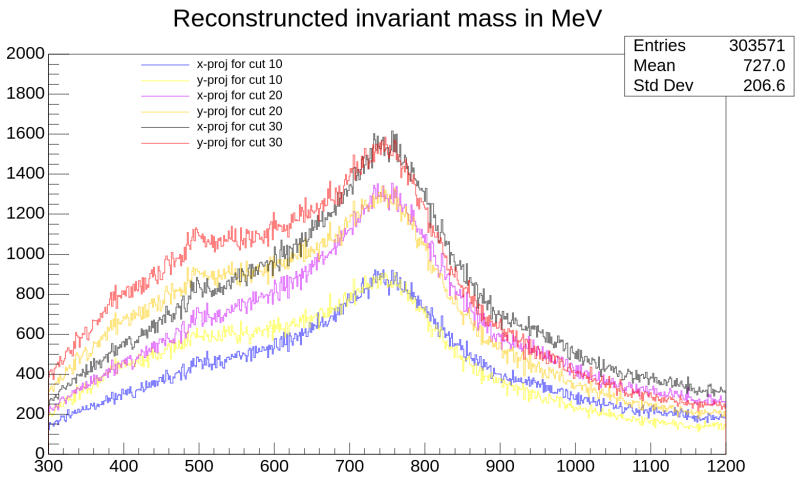
TOTEM2 after $\chi^2 < 50$ cut

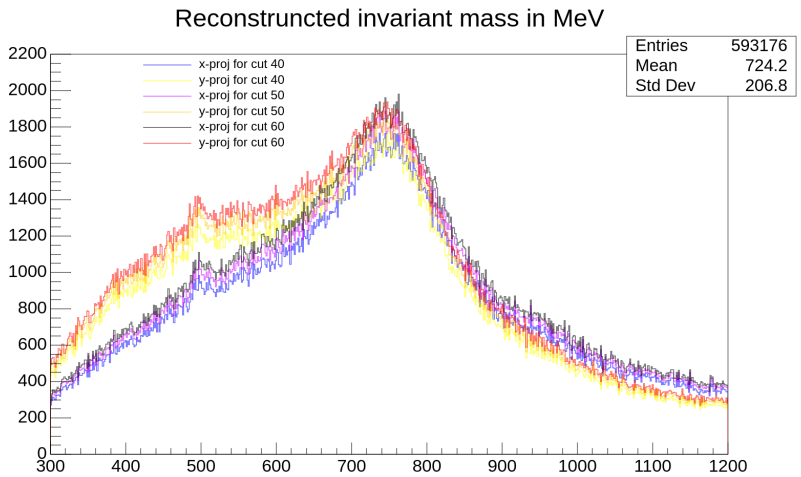
- Same cuts applied to χ^2_{zPV}, $\chi^2_{\text{dxy/dxyerr}}$ and $\chi^2_{\text{dz/dzerr}}$

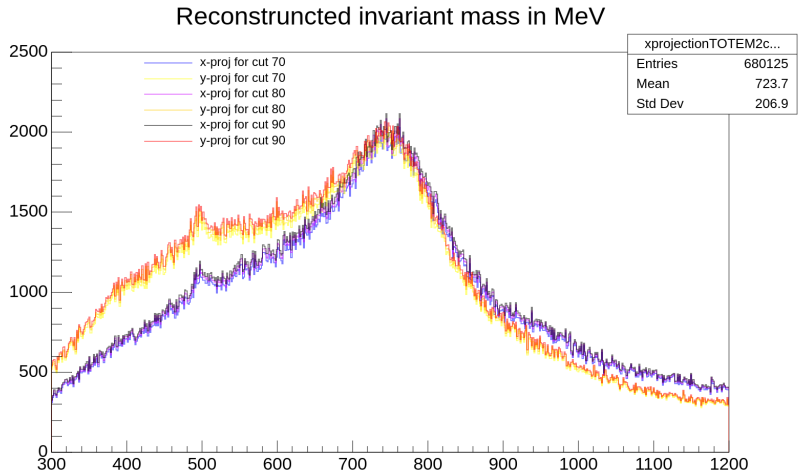
χ^2 cuts


Reconstruncted invariant mass in MeV
rec. inv. mass from TOTEM2chi2cut90
Entries 1443500
Mean x 713.5
Mean y 676.8
Std Dev x 211.2
Std Dev y 208.9
1200
1100
1000
900
800
700
600
500
400
300
300
400
500
600
700
800
900
1000
1100
1200
1
10⁻

Projections χ^2 Cuts







Same cuts applied on all three χ^2

Poor ρ mass fits

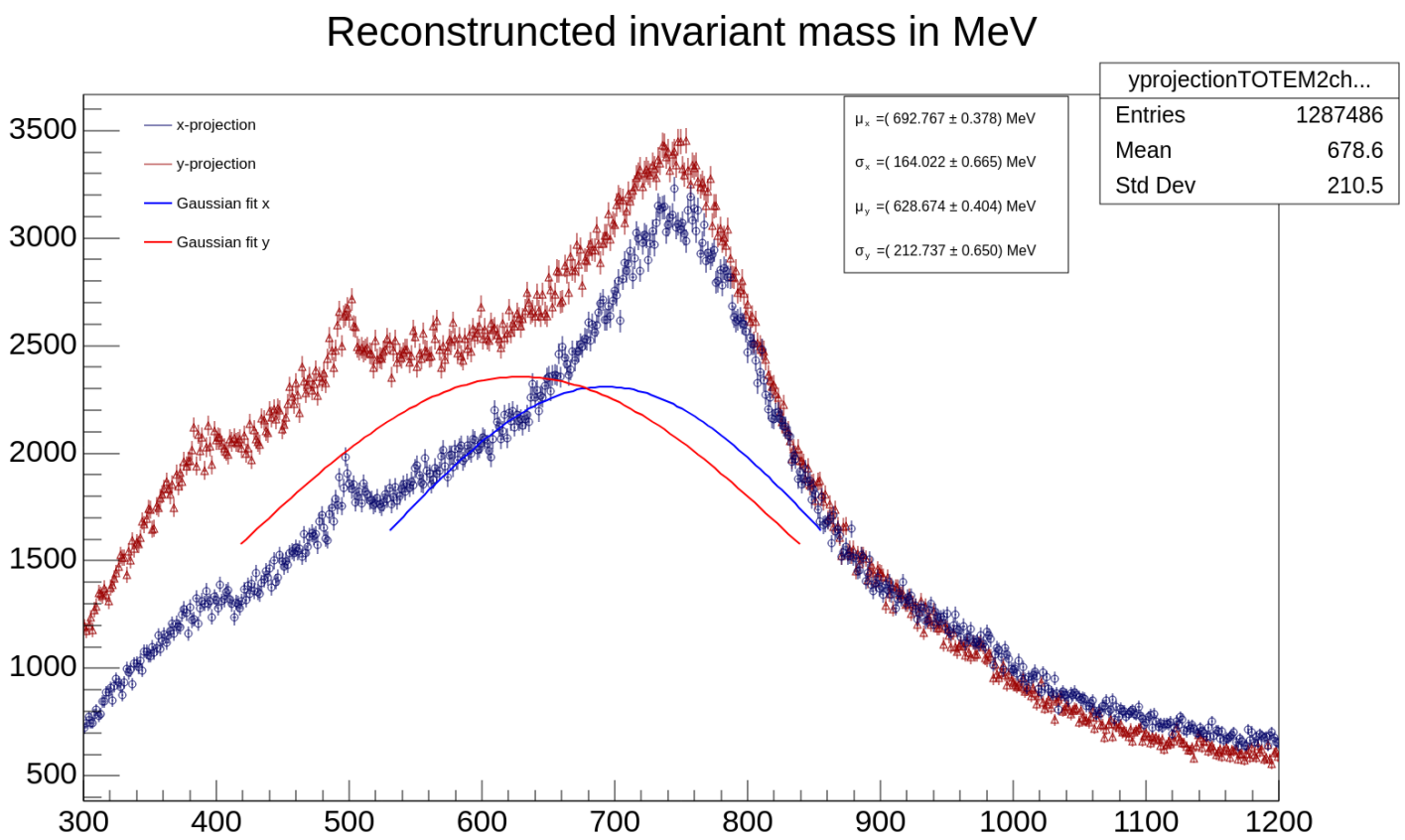


Figure: Fits for $\chi^2 < 50$ cutted TOTEM2. Projection range $\pm 2\sigma$, Fit range $\pm 1\sigma$ around mean