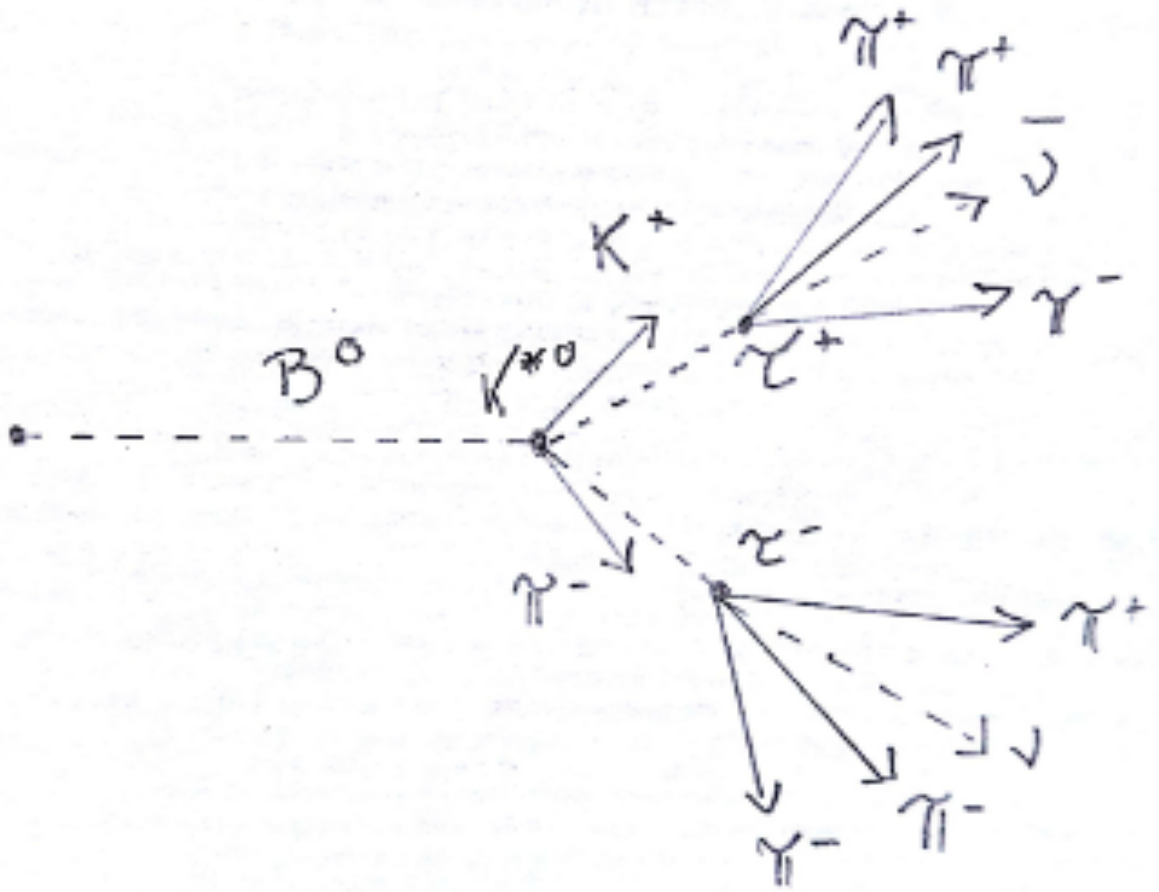
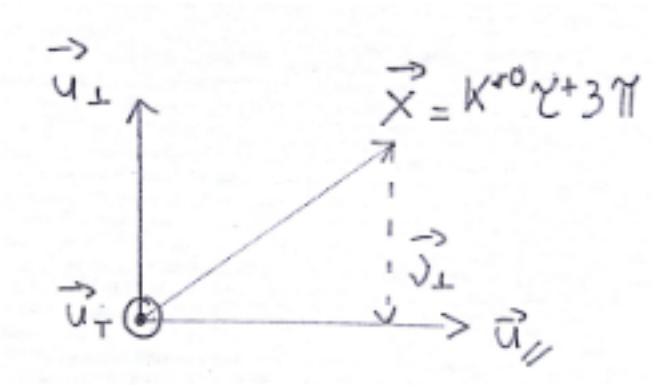
Decay of the B° meson in the LHCb experiment

Decay's topology

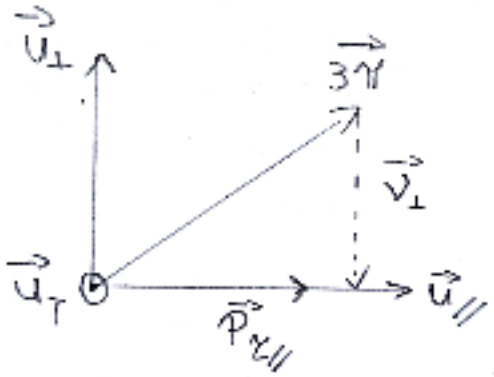


First-method's frame



$$\begin{cases} \overrightarrow{p_{B^0}} = p_{B^0}\overrightarrow{u_{//}} \\ p_{B^0\perp} = 0 \end{cases}$$

Second-method's frame



$$\overrightarrow{p_\tau} = p_{\tau//}\overrightarrow{u_{//}}$$

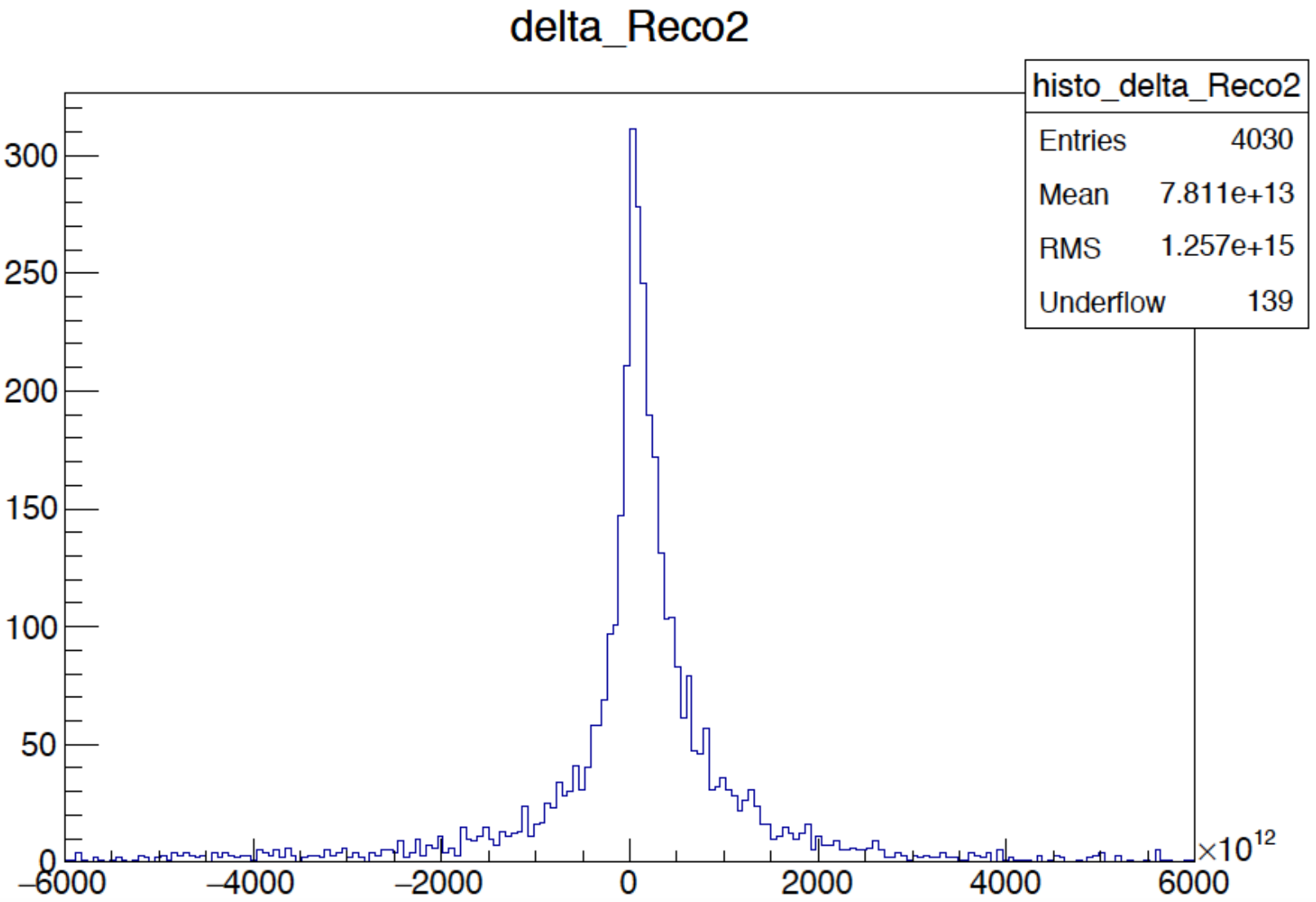
First method : second degree equation and solutions

$$(m_X^2 + p_{X\perp}^2)p_{\nu//}^2 + 2p_{X//}(p_{\nu\perp}^2 - \Delta m)p_{\nu//} - (\Delta m - p_{\nu\perp}^2)^2 + p_{\nu\perp}^2(m_X^2 + p_X^2) = 0$$

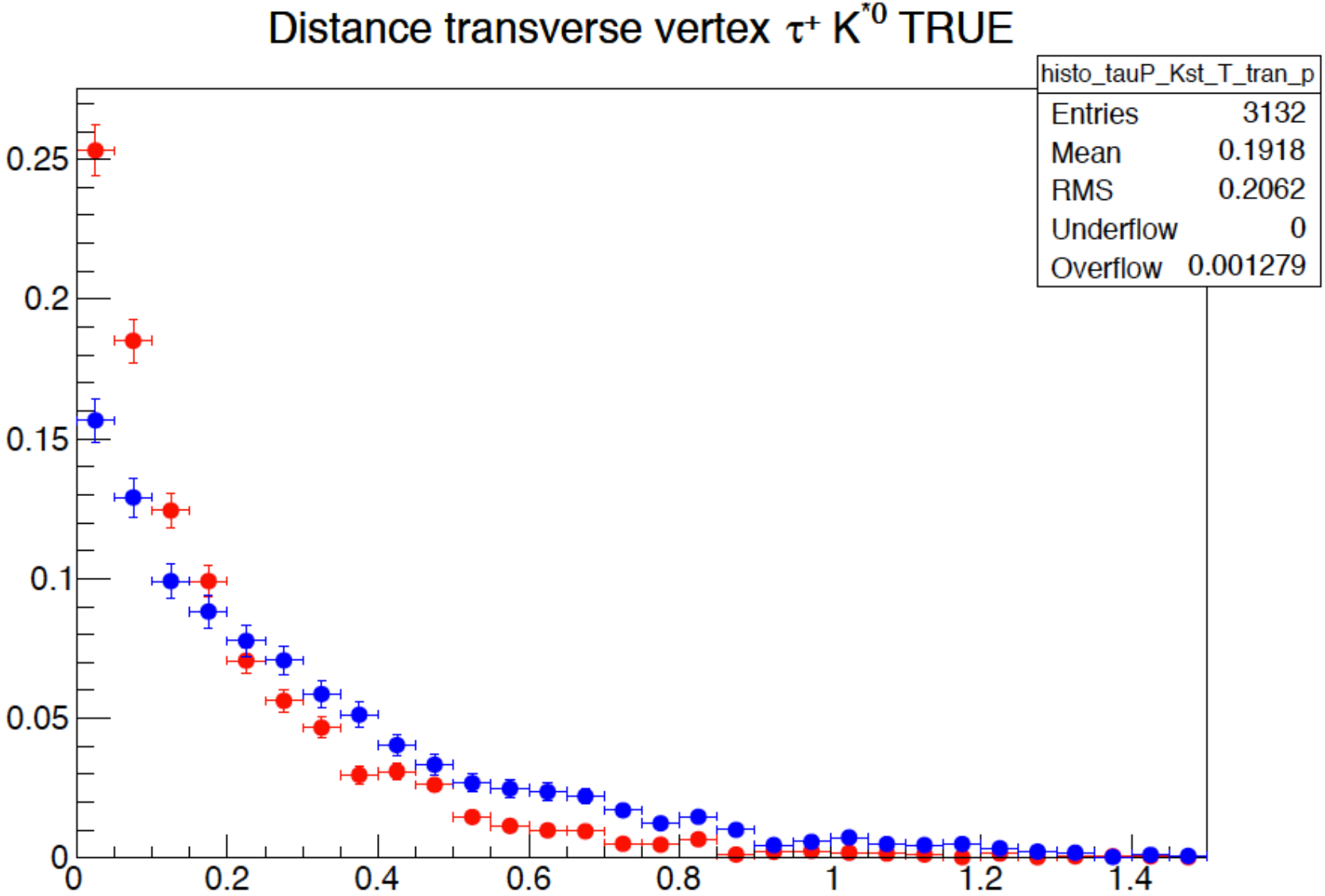
$$p_{\nu//}^{1/2} = \frac{2(\Delta m - p_{\nu\perp}^2)p_{X//} \pm \sqrt{\Delta}}{2(m_X^2 + p_{X\perp}^2)}$$

Solution 1 : -b+sqrt(delta)/2a (« Positiv solution »)
Solution 2 : -b-sqrt(delta)/2a (« Negativ solution »)

Delta values and 1st cut



Evaluation of the Delta > 0 cut



Second cut

Momentum difference : Abs(dp2)-Abs(dp1)

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dp12 = TMath::Abs(phat_nutaubar2_para - Vect_nutaubar * u_para)-TMath::Abs(phat_nutaubar1_para - Vect_nutaubar * u_para)
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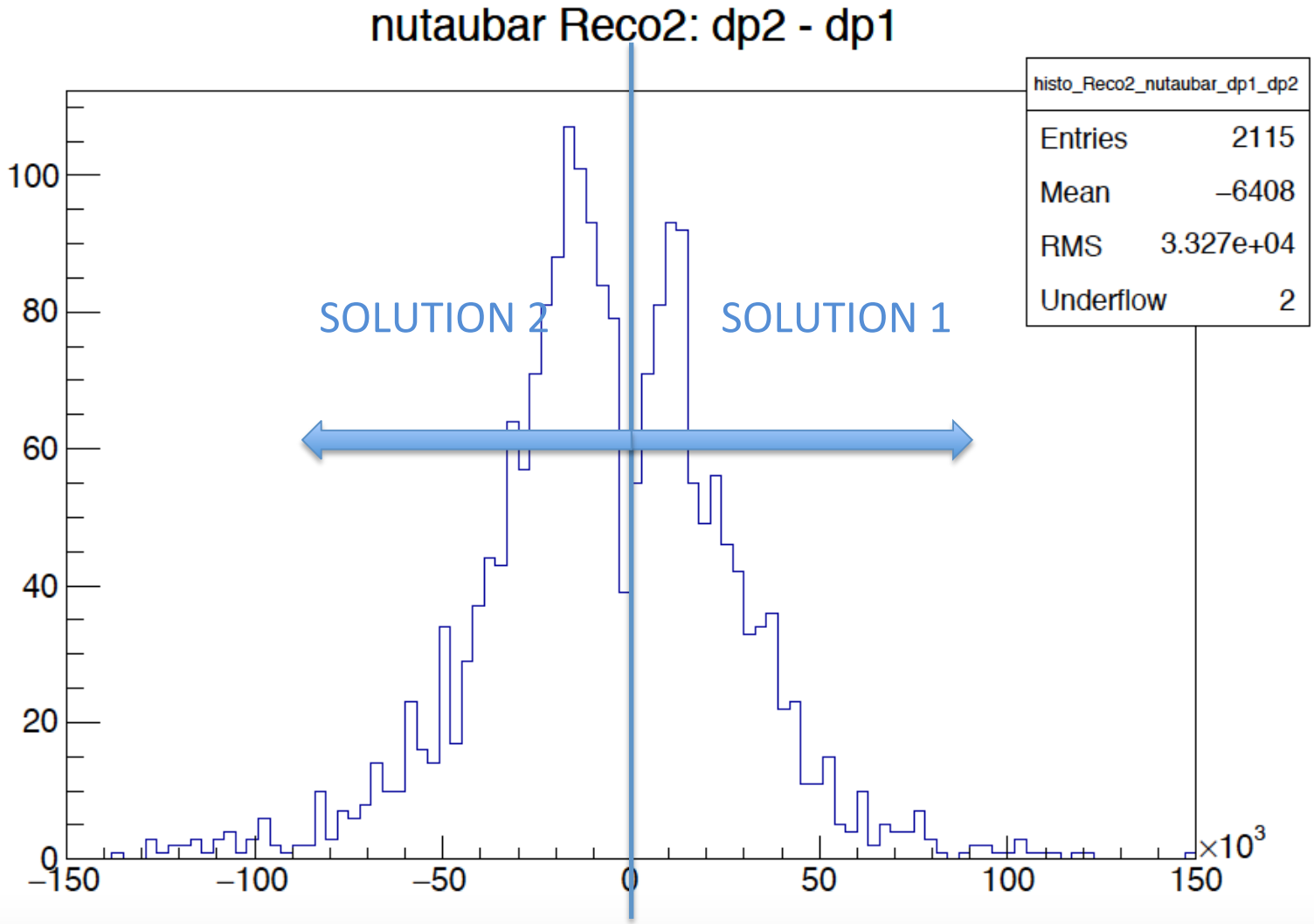
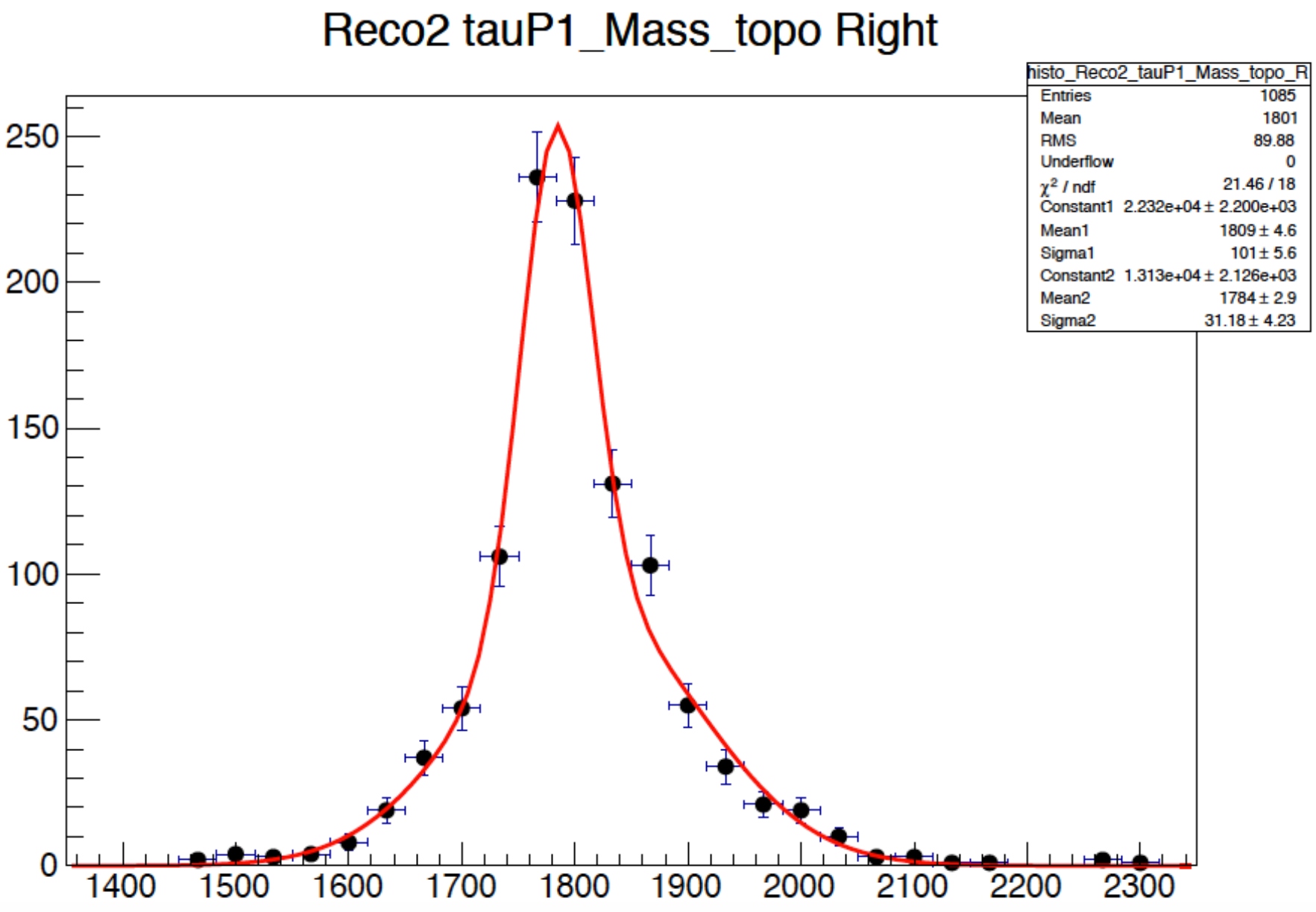


Fit with two gaussians, 1st solution



Fit with two gaussians, 2nd solution