

- Double-SidedCrystalBallfunction (DSCB).

$$t = \frac{\Delta m_H}{\sigma_{CB}}, \quad \Delta m_H = m_{ll\gamma} - \mu_{CB}$$
$$f(t) = N \times \begin{cases} e^{-t^2/2}, & -\alpha_{LO} \leq t \leq \alpha_{HI} \\ \left(\frac{n_{LO}}{\alpha_{LO}}\right)^{n_{LO}} e^{-\alpha_{LO}^2/2} \left(\frac{n_{LO}}{\alpha_{LO}} - \alpha_{LO} - t\right)^{-n_{LO}}, & t < -\alpha_{LO} \\ \left(\frac{n_{HI}}{\alpha_{HI}}\right)^{n_{HI}} e^{-\alpha_{HI}^2/2} \left(\frac{n_{HI}}{\alpha_{HI}} - \alpha_{HI} + t\right)^{-n_{HI}}, & t > \alpha_{HI} \end{cases}$$

- Parameters :
- μ_{CB} peak of the Gaussian distribution
- σ_{CB} width of the Gaussian distribution
- α_{Lo} (α_{Hi}) the point where the Gaussian becomes a power law on the low (high) mass side
- n_{Lo} (n_{Hi}) the exponent of this power law.
- Yield : Fitted signal yield

Set up

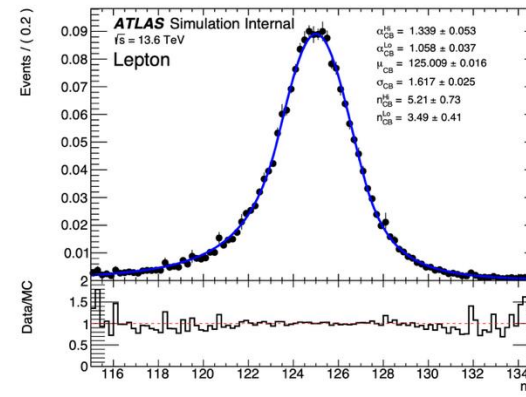
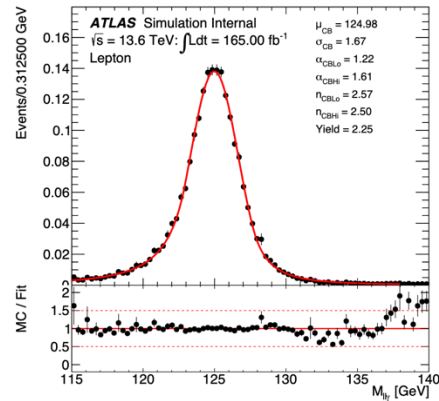
Data : Mc sample of signal (a d e)

Mass range : 115,135

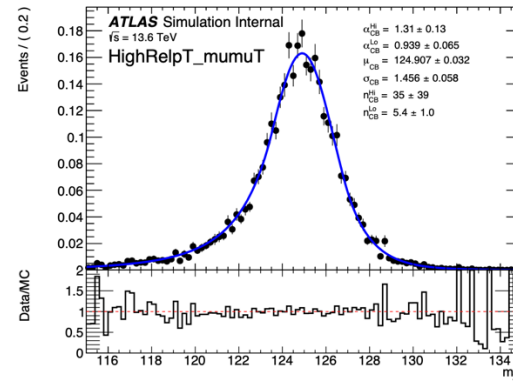
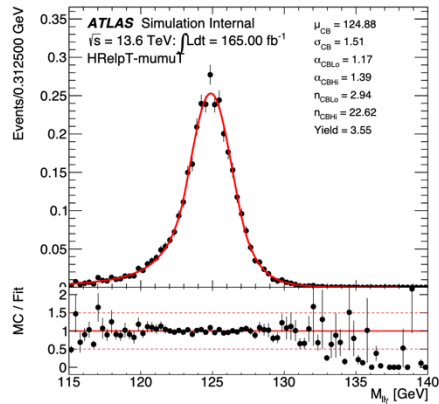
- `crys_alphaLow`: 1.5323 1. 3.
- `crys_alphaHigh`: 2.0264 1. 3.
- `Param_nCBLo`: [9.0,0.1,10]
- `Param_nCBHi`: [5.0,0.1,10]
- `mean_offset`: -0.008 -1.5 0.4
- `sigma_offset`: 1.75 1. 2.5

$\mu_{CB} = 125 \text{ GeV} + \text{mean_offset}$

- Quiet different with result in note



Lepton



HRelpT- $\mu\mu$ T

Background modeling

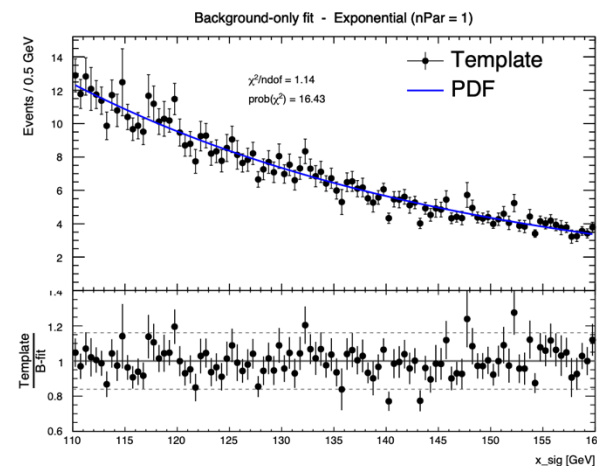
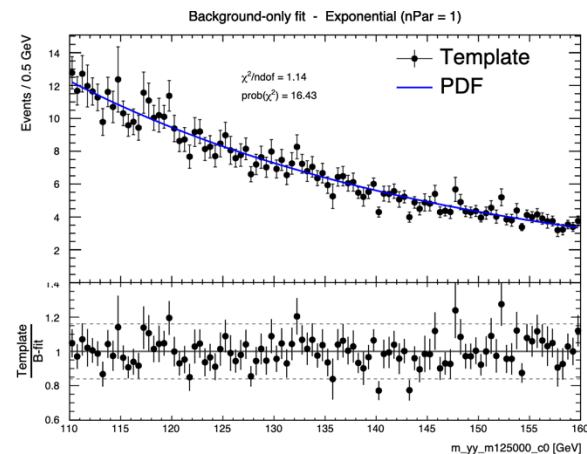
- Mass range : final range + unblind + 0.5Gev/bin
- Template : bkg_v8 from shaoguang (mc Z γ + data-driven Z jets)
- V8 - Signal model in last
- function : Powerfunction Fk0/1/2 Bern2/3/4/5 ExpPoly2/3/4

- Background only Prob(chi2) [%] (more) (pvalue of chi2)

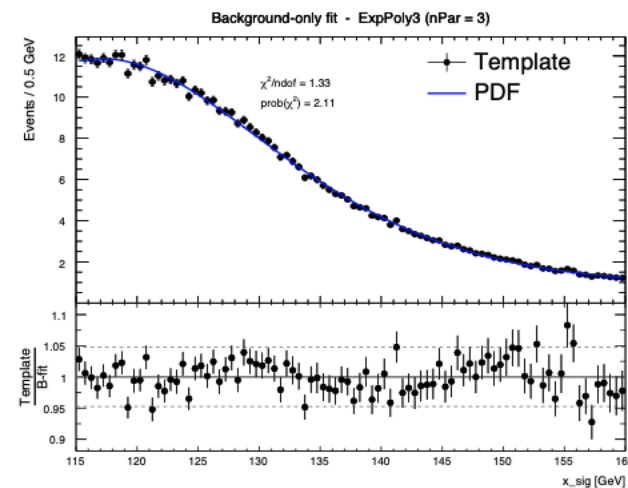
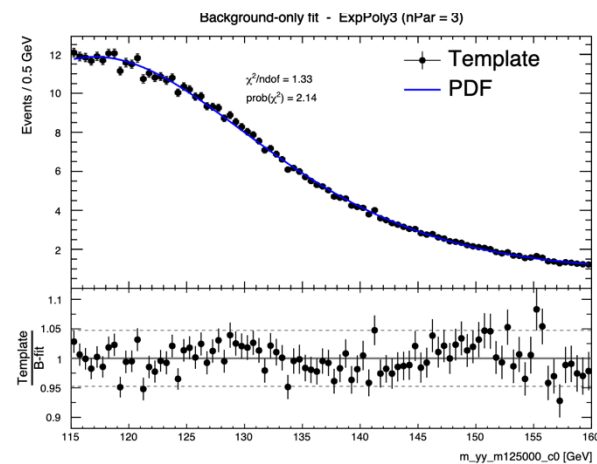
$$\chi^2 = \sum_{i=1}^N \left(\frac{y_i - f(x_i)}{\sigma_i} \right)^2$$

- Background + signal max(S) max(S/ δ S) [%] (max(1sigma/ δ S) [%]) (less)
- Pass condition : Prob(chi2) > 1% max(S/ δ S) < 20% (max(1sigma/ δ S) [%] < 20%)
- Selection: in all pass function select least max S

Result for background modeling

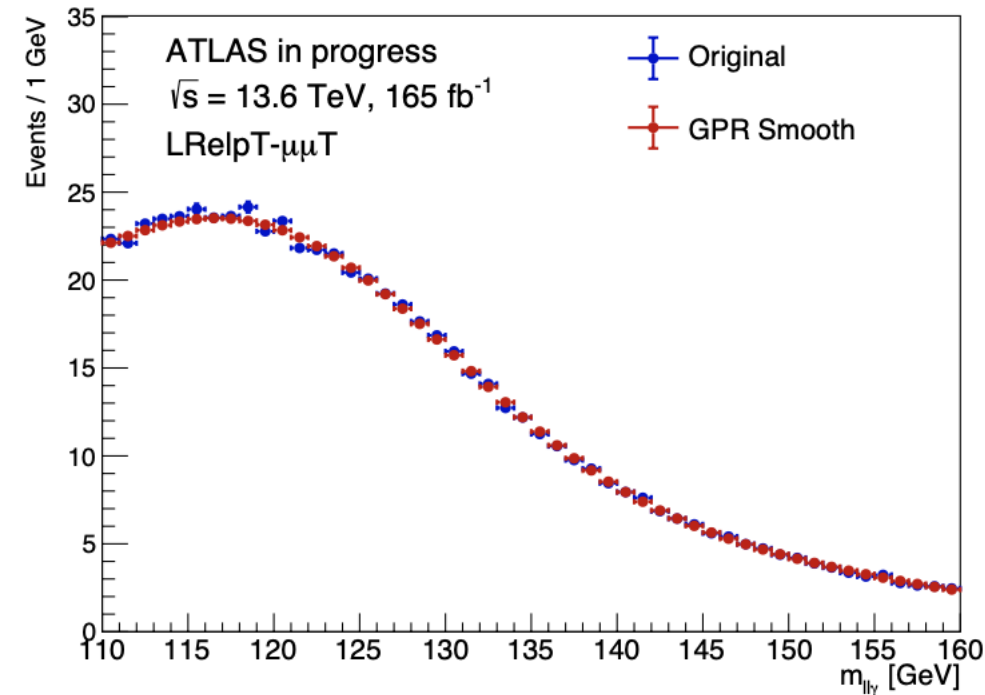
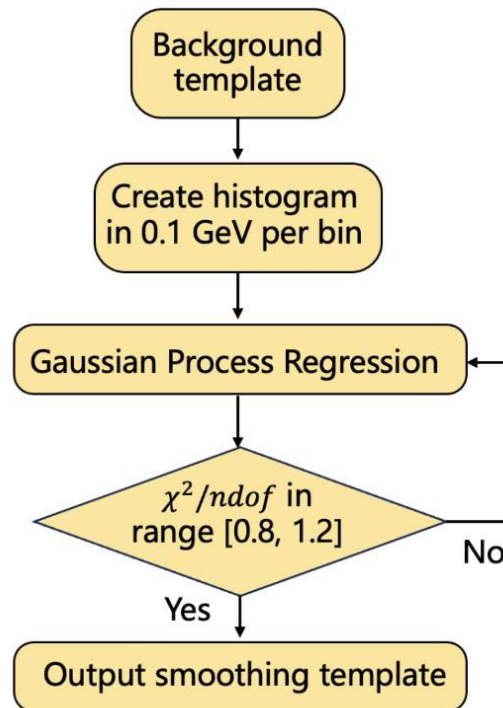


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LRelpT- $\mu\mu$ T

- Spurious signal may arise solely from statistical fluctuations in the background template.



Result for smooth modeling

