Signal modeling in different categories study

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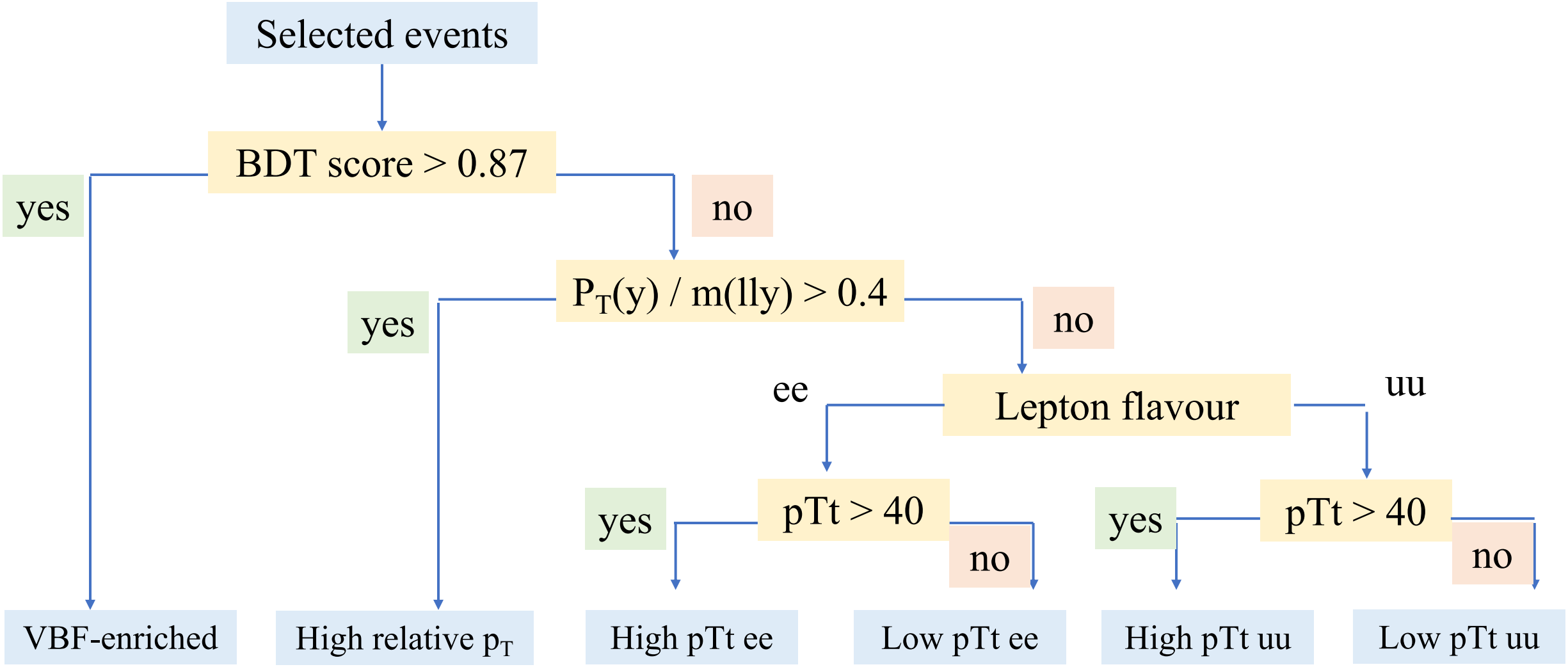
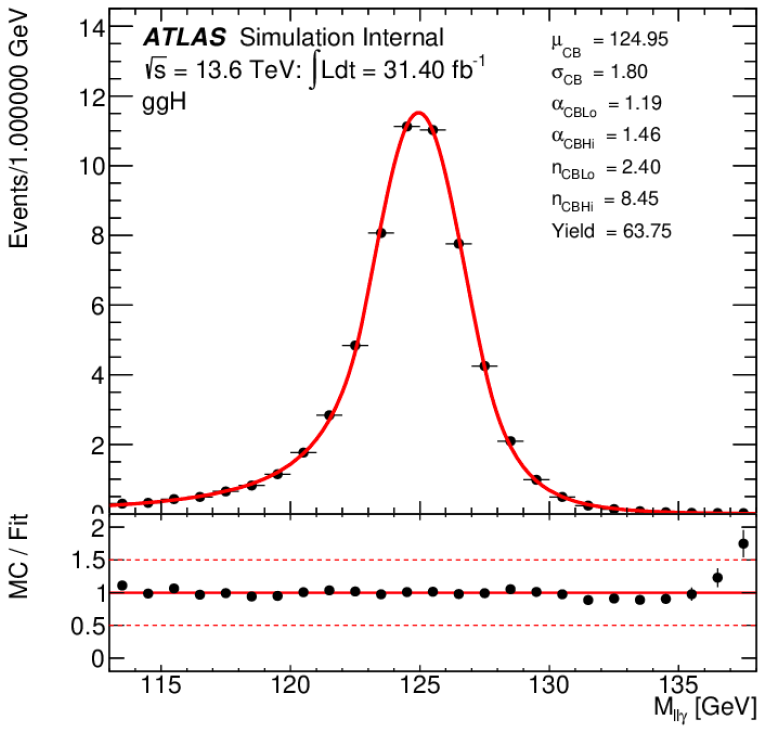
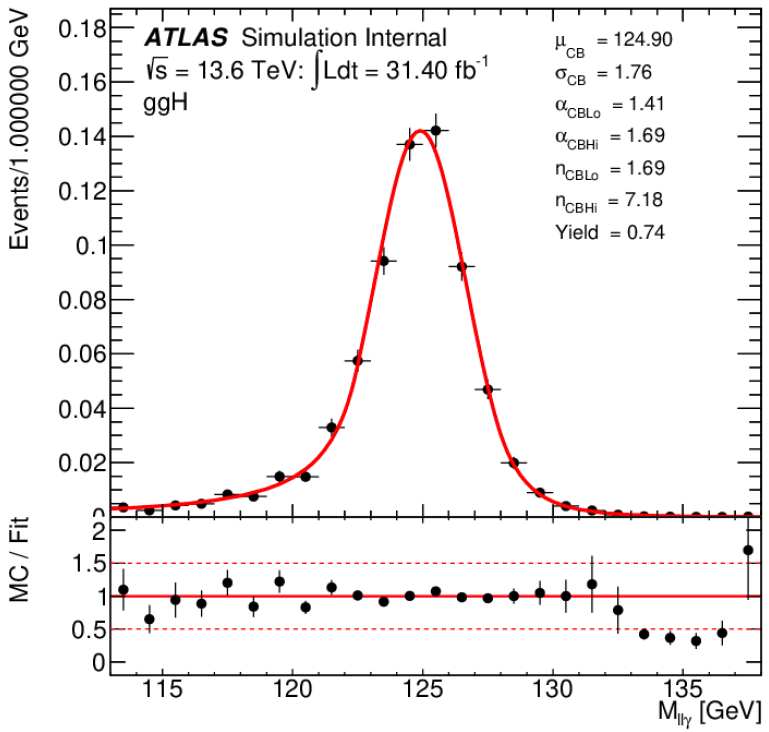
Event categorization in Run2



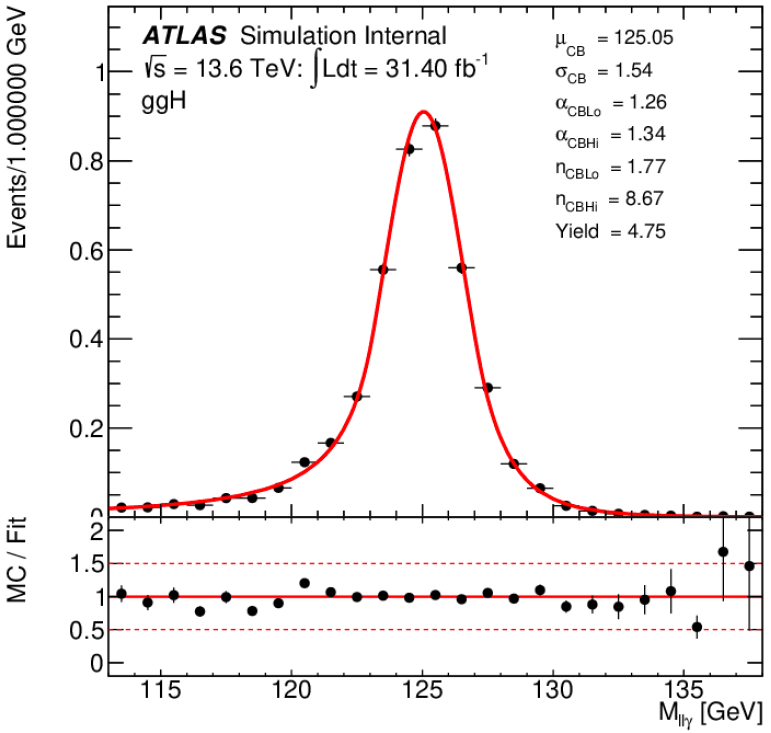
DSCB fit in different categorization



Inclusive



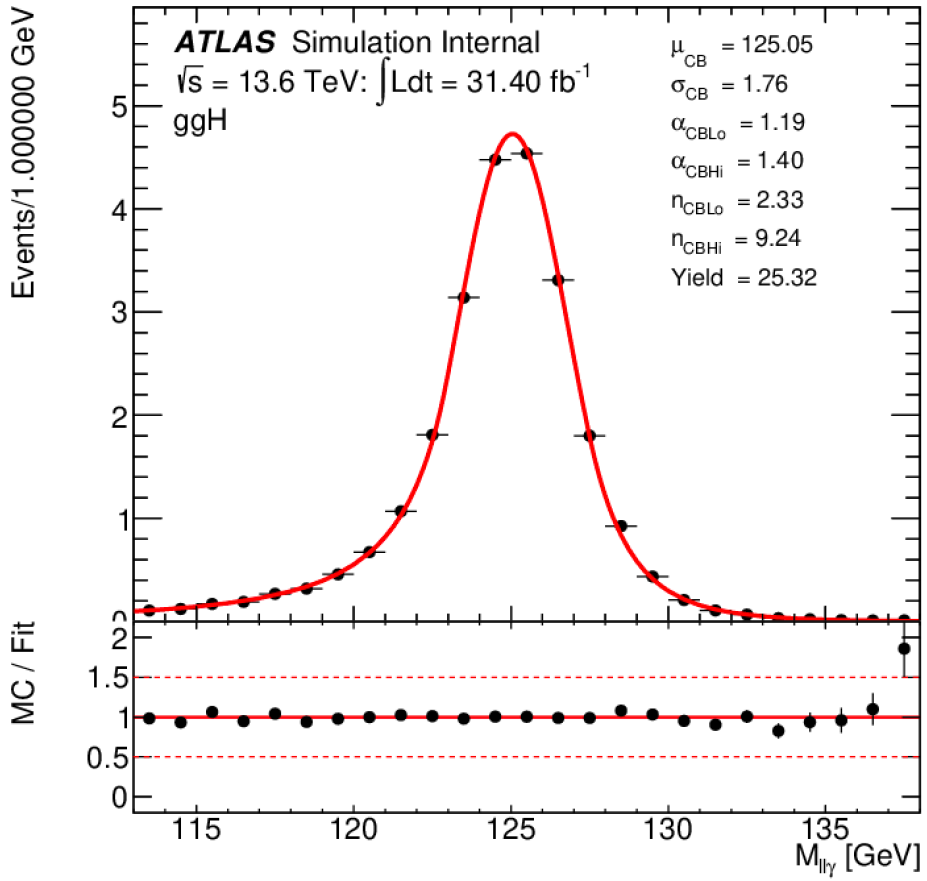
VBF-enriched



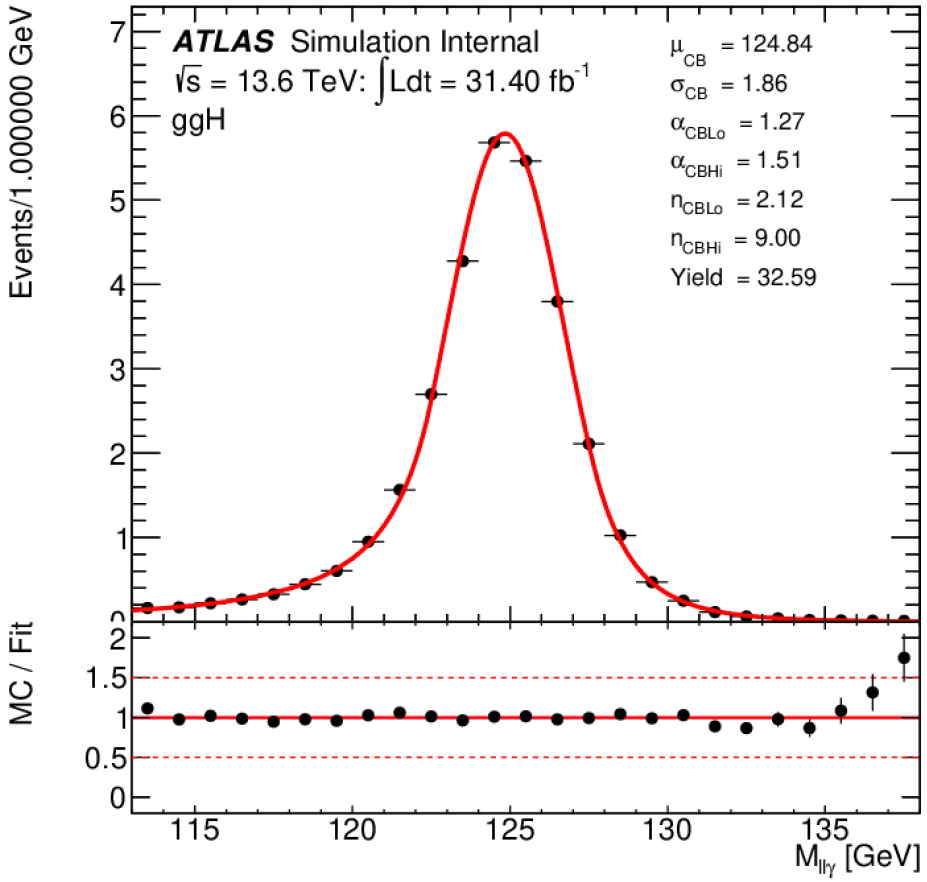
High relative p_T

Including: ggF, VBF, WmH, WpH, ZH, ttH

DSCB fit in different categorization



ee



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Summary

- I have partially implemented event categorization for signal modeling
- I will finish the categorization in one to two days

Backup

Signal modeling in H to Zγ Analysis

The signal mass distribution for the Higgs boson decay into Zγ is well modelled by a double-sided Crystal Ball (DSCB) function (a Gaussian function with power-law tails on both sides).
The peak position and width of the Gaussian component are represented by μ_{CB} and σ_{CB}, respectively.

name	Name that identifies the PDF in computations.
title	Title for plotting.
x	The variable of the PDF.
x0	Location parameter of the Gaussian component.
sigmaLR	Width parameter of the Gaussian component.
alphaL	Location of transition to a power law on the left, in standard deviations away from the mean.
nL	Exponent of power-law tail on the left.
alphaR	Location of transition to a power law on the right, in standard deviations away from the mean.
nR	Exponent of power-law tail on the right.

PDF implementing the generalized Asymmetrical Double-Sided Crystall Ball line shape.

$$f(m; m_0, \sigma, \alpha_L, n_L, \alpha_R, n_R) = \begin{cases} A_L \cdot (B_L - \frac{m-m_0}{\sigma_L})^{-n_L}, & \text{for } \frac{m-m_0}{\sigma_L} < -\alpha_L \\ \exp\left(-\frac{1}{2} \cdot \left[\frac{m-m_0}{\sigma_L}\right]^2\right), & \text{for } \frac{m-m_0}{\sigma_L} \leq 0 \\ \exp\left(-\frac{1}{2} \cdot \left[\frac{m-m_0}{\sigma_R}\right]^2\right), & \text{for } \frac{m-m_0}{\sigma_R} \leq \alpha_R \\ A_R \cdot (B_R + \frac{m-m_0}{\sigma_R})^{-n_R}, & \text{otherwise,} \end{cases}$$

times some normalization factor, where

$$A_i = \left(\frac{n_i}{|\alpha_i|}\right)^{n_i} \cdot \exp\left(-\frac{|\alpha_i|^2}{2}\right)$$
$$B_i = \frac{n_i}{|\alpha_i|} - |\alpha_i|$$

Definition at line 13 of file RooCrystalBall.h.