



Preselection definition and related trigger studies

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June 2, 2021

Issue with preselection definition



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- I found a **bug in our preselection**
- Currently, our preselection is defined as:
 - ① $N_{\text{loose } \tau_h} > 0$
 - ② $N_{\text{loose jets}} \geq 4$
 - ③ $N_{\text{loose b-jets}} \geq 2$
- **Problem:** point number 2 is incompatible with some of our category requirements
- In pt.s 1 and 3 we cut on looser objects than the ones used in category definitions; in pt. 2 we cut on the same objects used in category definitions
- This means that we define categories with $N_{\text{loose jets}} \geq 2$ (1tau3L and 2tau2L) but they'll always have $N_{\text{loose jets}} \geq 4$
- **Possible issue:** trigger studies were made in the preselection region



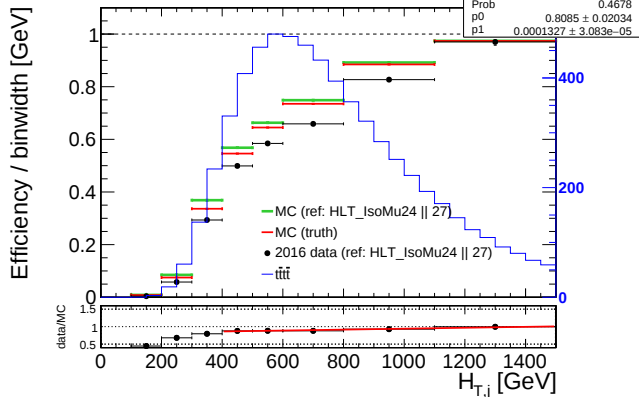
- Try to change the preselection having a looser cut on $N_{\text{loose jets}}$:
 - ① $N_{\text{loose } \tau_h} > 0$
 - ② $N_{\text{loose jets}} \geq 2$
 - ③ $N_{\text{loose b-jets}} \geq 2$
- Redo the trigger studies

Old preselection: 1D efficiency



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- Preselection + 1μ
- Fitted the ratio with a straight line of the form

$$y = mx + q$$

$$m = 0.0001327 \pm 3.083e-05$$
$$q = 0.8085 \pm 0.02034$$

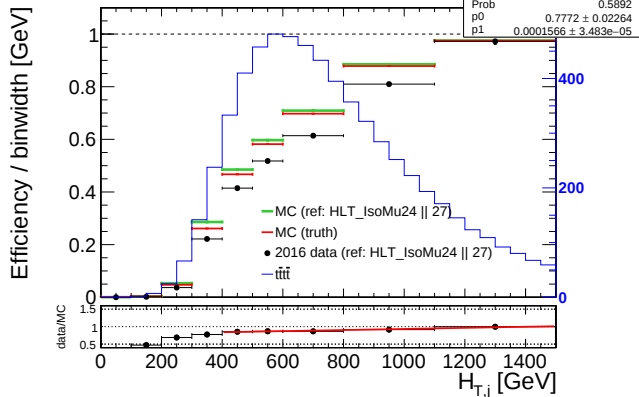
- Also plotted H_T distribution for signal

New preselection: 1D efficiency



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- Preselection + 1μ
- Fitted the ratio with a straight line of the form

$$y = mx + q$$

$$m = 0.0001566 \pm 3.483e-05$$
$$q = 0.7772 \pm 0.02264$$

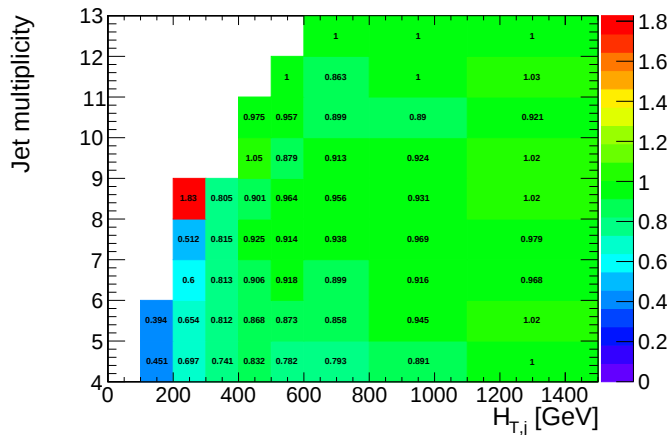
- Also plotted H_T distribution for signal

Old preselection: 2D Trigger efficiency DATA/MC



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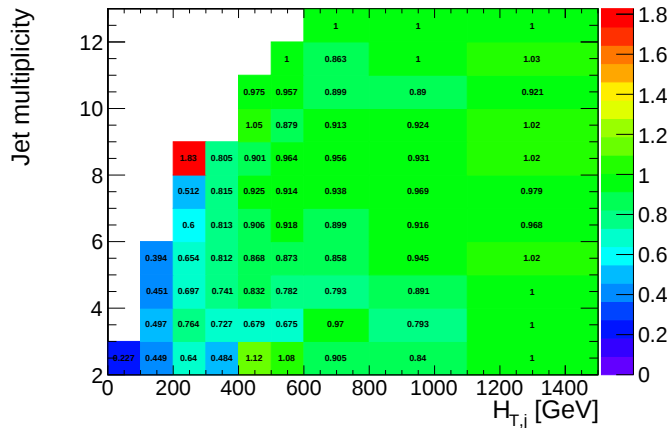


New preselection: 2D Trigger efficiency DATA/MC



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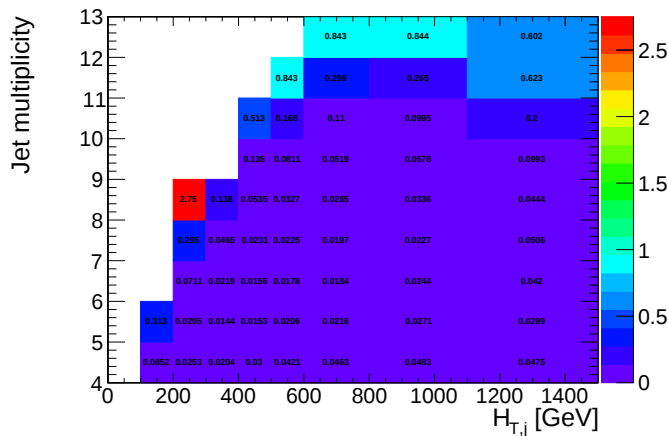
● Preselection + 1μ

Old preselection: 2D Trigger efficiency DATA/MC errors



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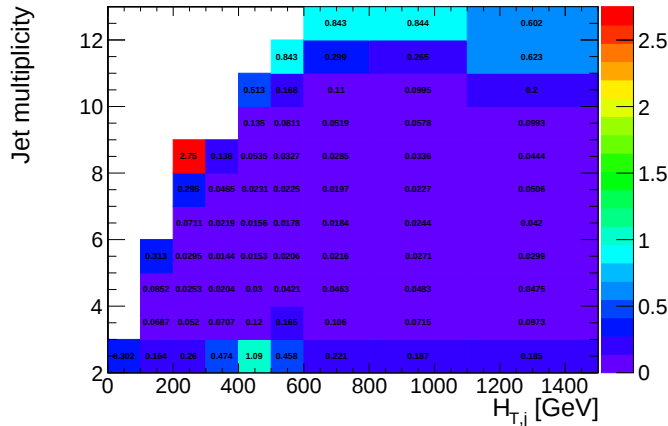
● Preselection + 1μ

New preselection: 2D Trigger efficiency DATA/MC errors



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- Preselection + 1μ
- **Large errors in low jet multiplicity bins: consider rebinning there**

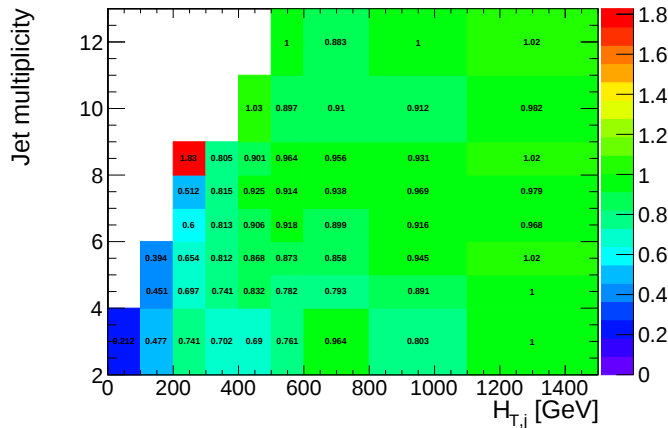
New preselection: rebinned 2D Trigger efficiency

DATA/MC



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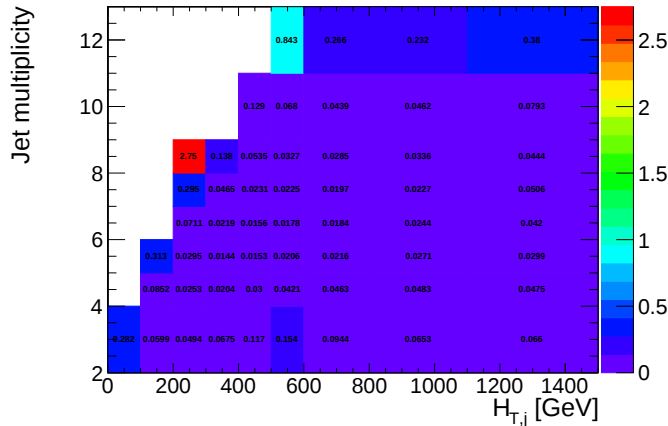
- Preselection + 1μ
- Merged bins 2-4, 9-11 and 11-13

New preselection: rebinned 2D Trigger efficiency DATA/MC errors



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- Preselection + 1μ
- Merged bins 2-4, 9-11 and 11-13
- Errors are reduced in low jet multiplicity bins