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# Higgs +1 Jet Study

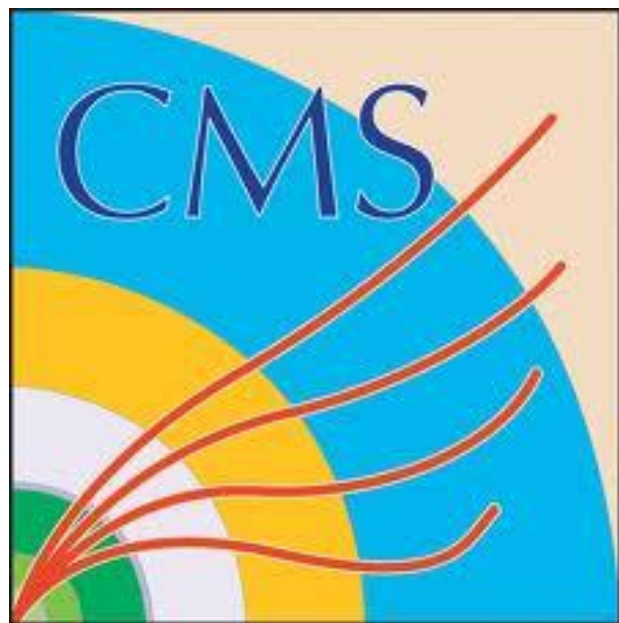
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Nicholas Mehrle

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# Affiliations

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JOHNS HOPKINS  
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MICHIGAN

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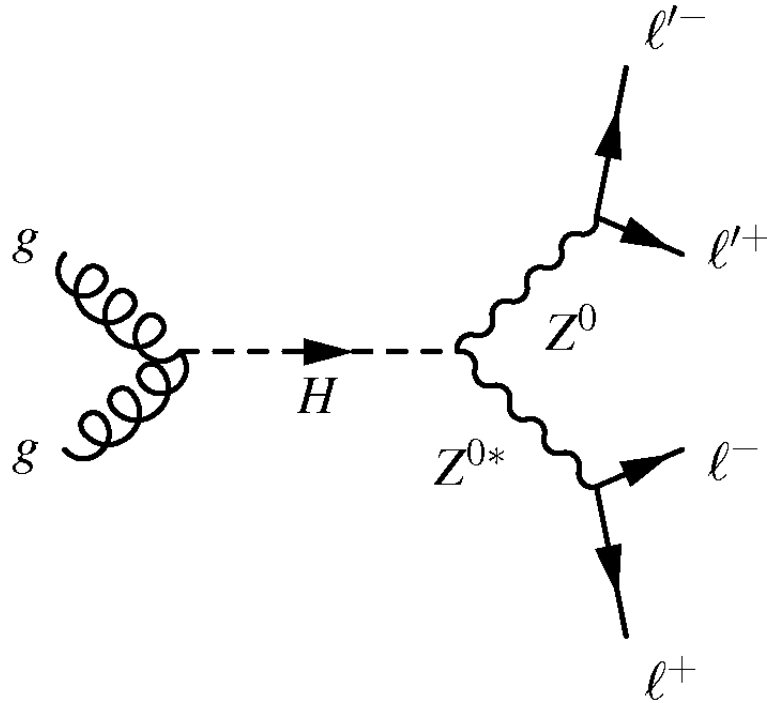
# Activities

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- 1 Jet Study
  - 2 Jet Study
  - Alignment
-

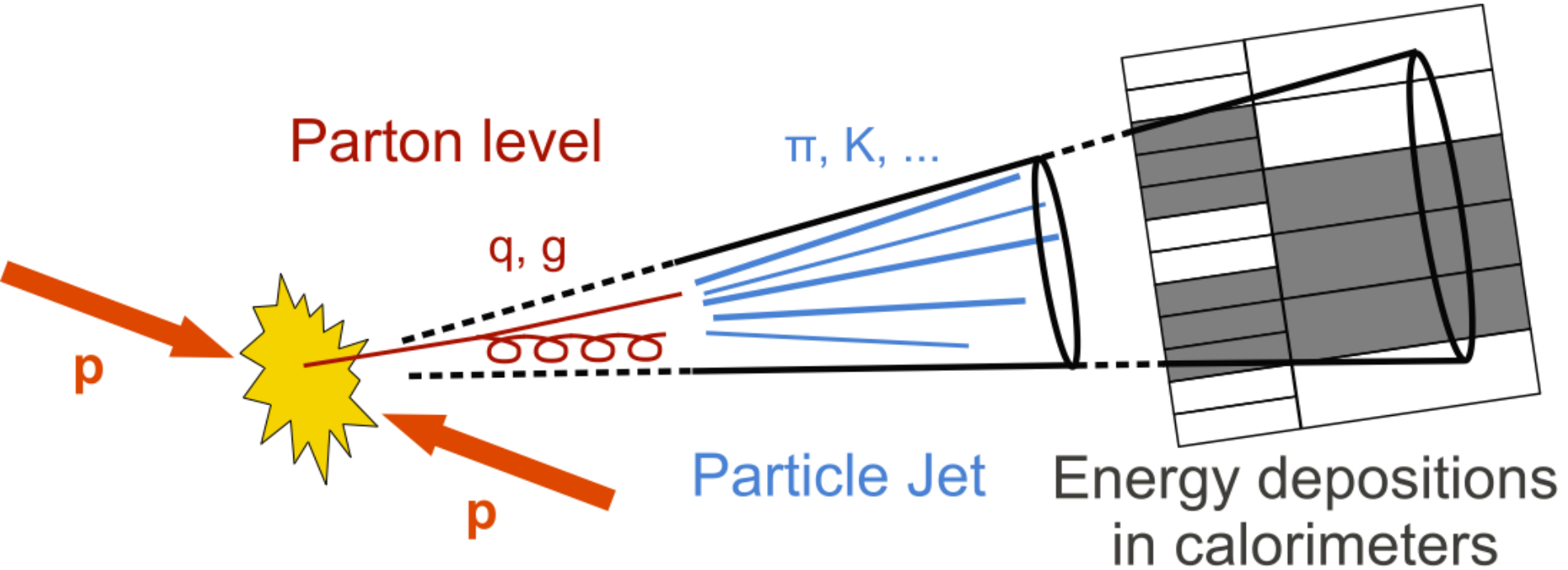
# 1 Jet Study

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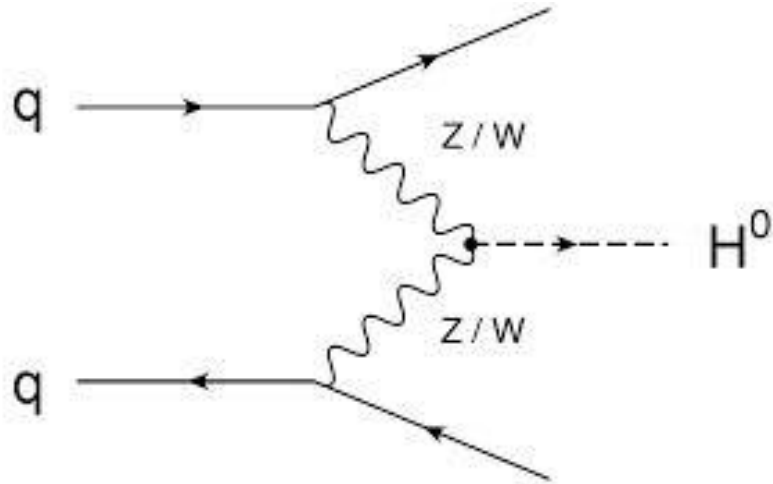
# Jets

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# Major Higgs Production Mechanisms

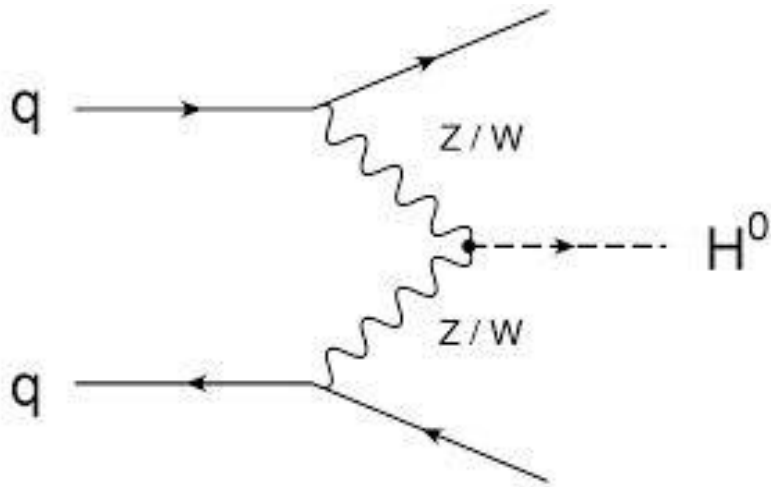
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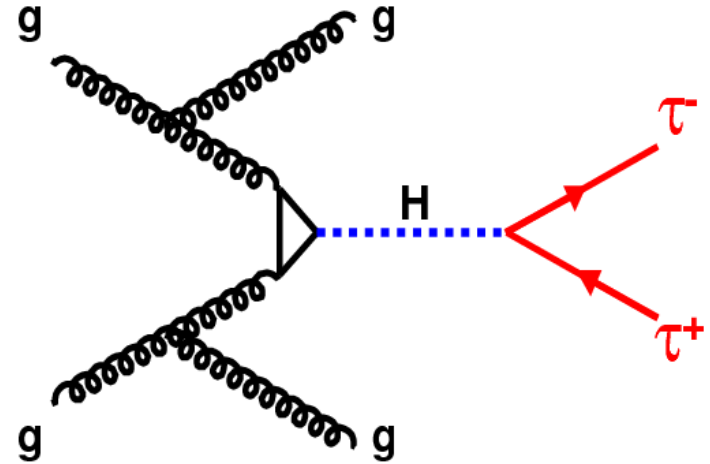
## Vector Boson Fusion

# Major Higgs Production Mechanisms

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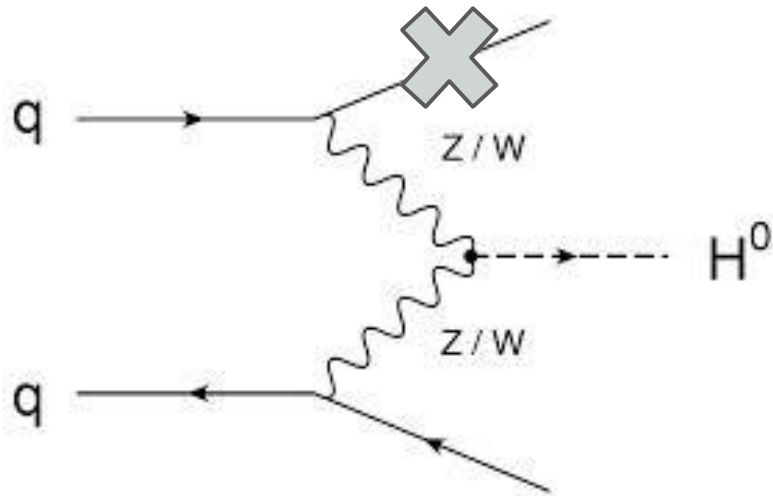


Vector Boson Fusion

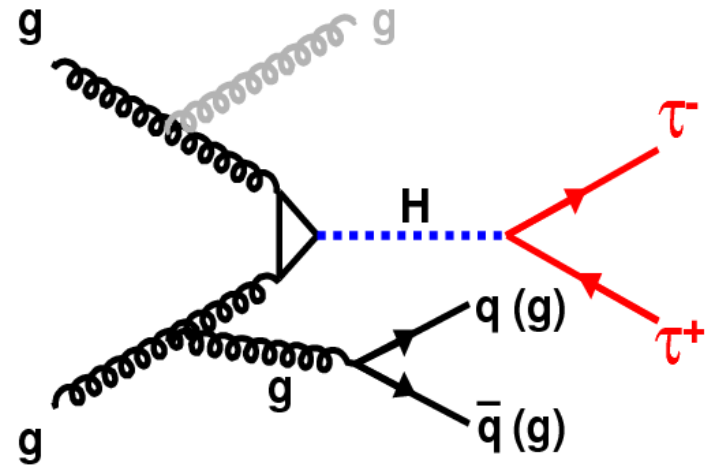


Gluon Fusion

# Major Higgs Production Mechanisms



Vector Boson Fusion

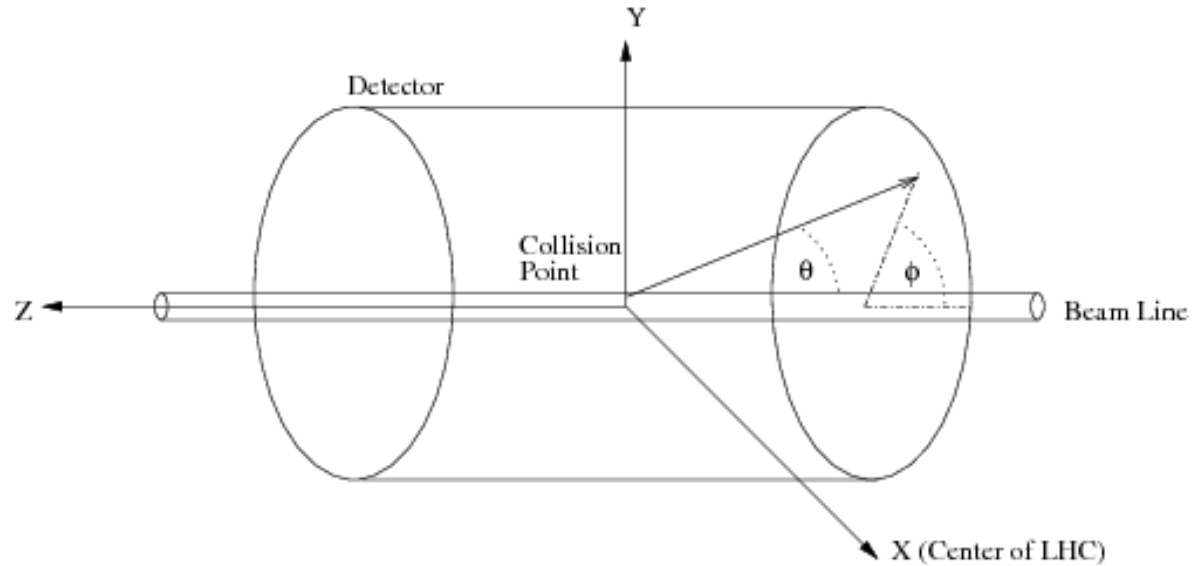


Gluon Fusion



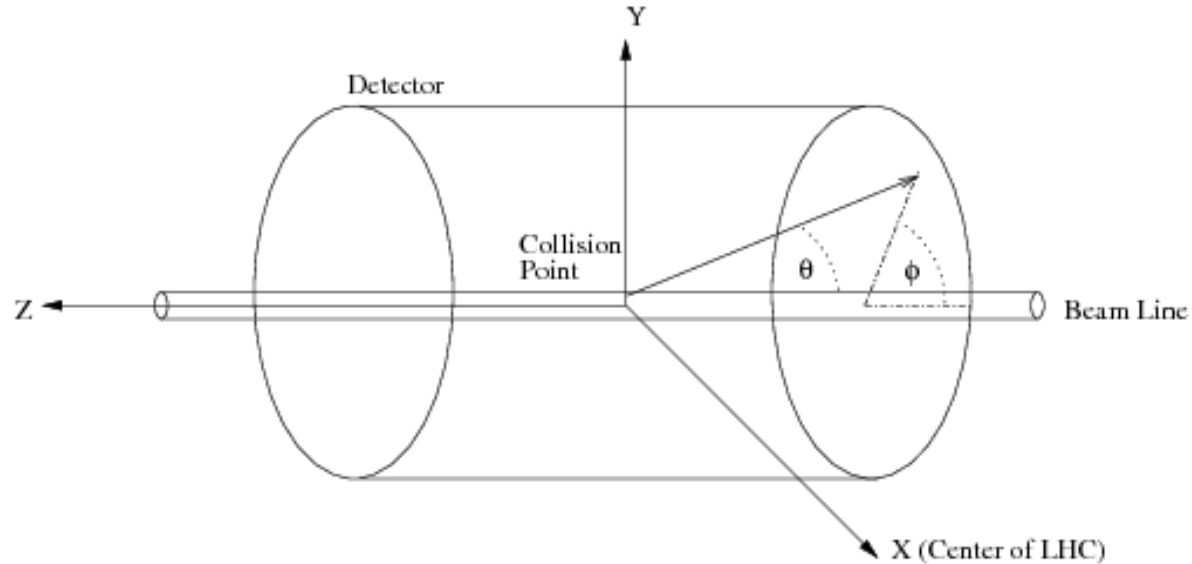
# Fake Jet Construction

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# Fake Jet Construction

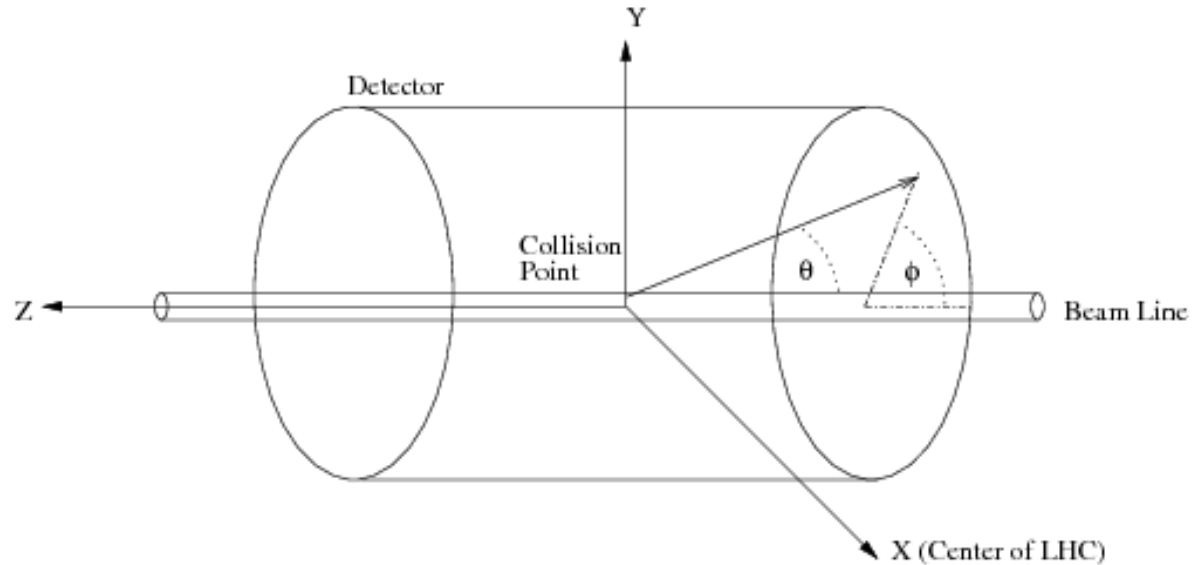
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Balance momentum in X-Y Plane

# Fake Jet Construction

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Z momentum depends on  $\eta$

<http://inspirehep.net/record/1294662/plots>

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# Discriminant

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$$\eta = 2.4$$

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# Discriminant

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$$\eta = 2.4$$

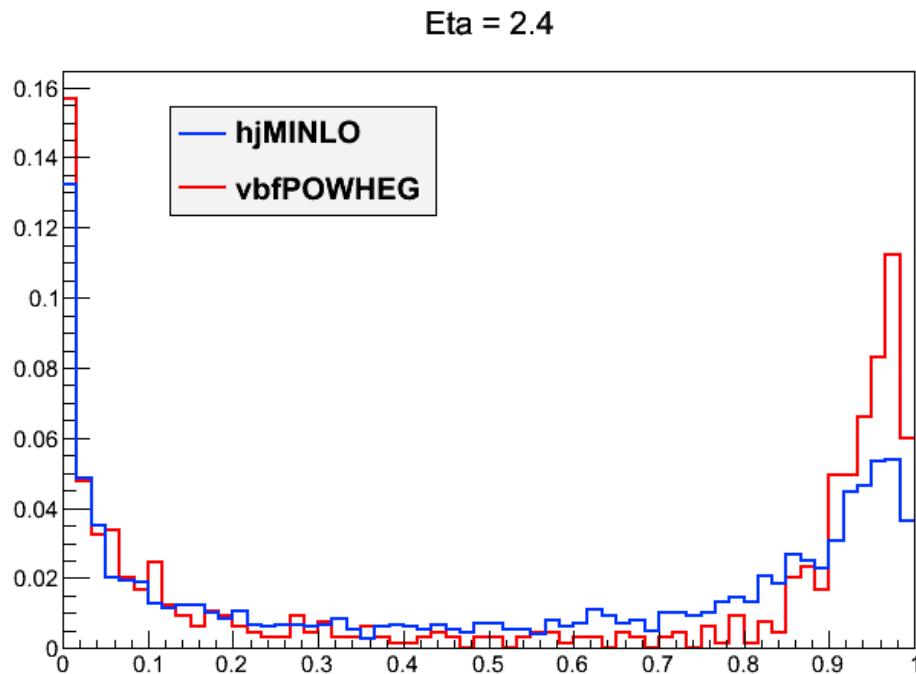
$$\frac{P_{vbf}}{P_{vbf} + P_{HJ}}$$

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# Discriminant

$$\eta = 2.4$$

$$\frac{P_{vbf}}{P_{vbf} + P_{HJ}}$$

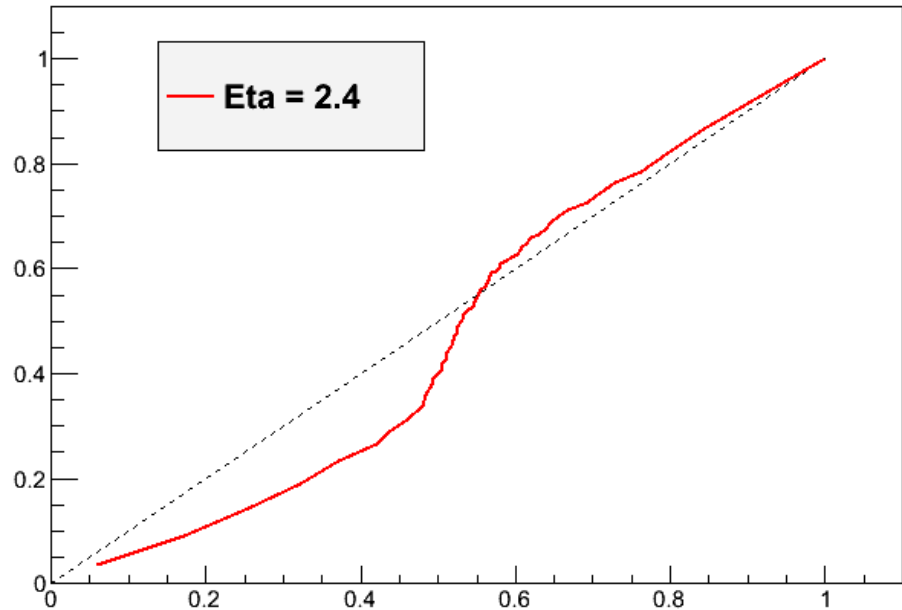


# Discriminant

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$$\eta = 2.4$$

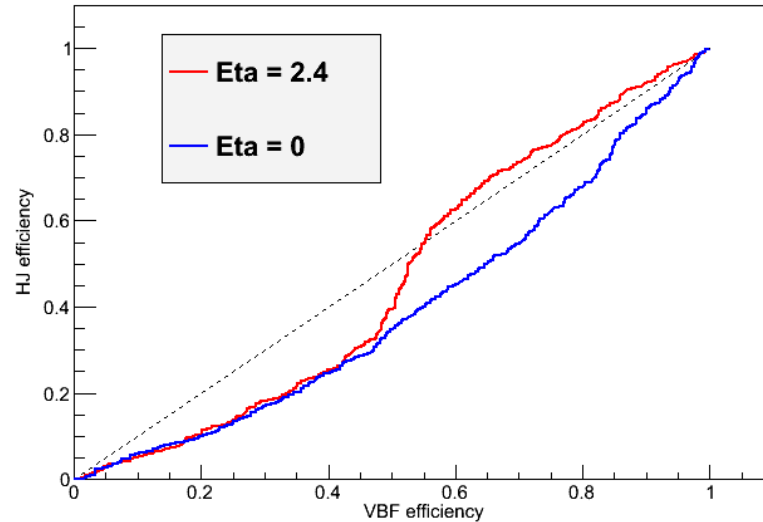
$$\frac{P_{vbf}}{P_{vbf} + P_{HJ}}$$



# Dependant on Fake Jet

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$$\eta = 0$$

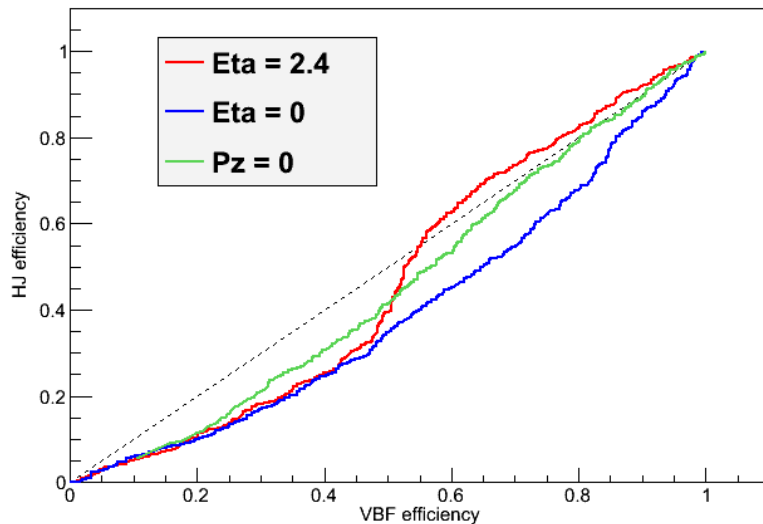




# Dependant on Fake Jet

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$$\eta = 0 \qquad P_z = 0$$



# Average

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$$\eta \in \{-5, -4.8, \dots, 5\}$$

$\theta$  from  $\sim 0.01$  to  $\sim 3.13$

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# Average

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$$\eta \in \{-5, -4.8, \dots, 5\}$$

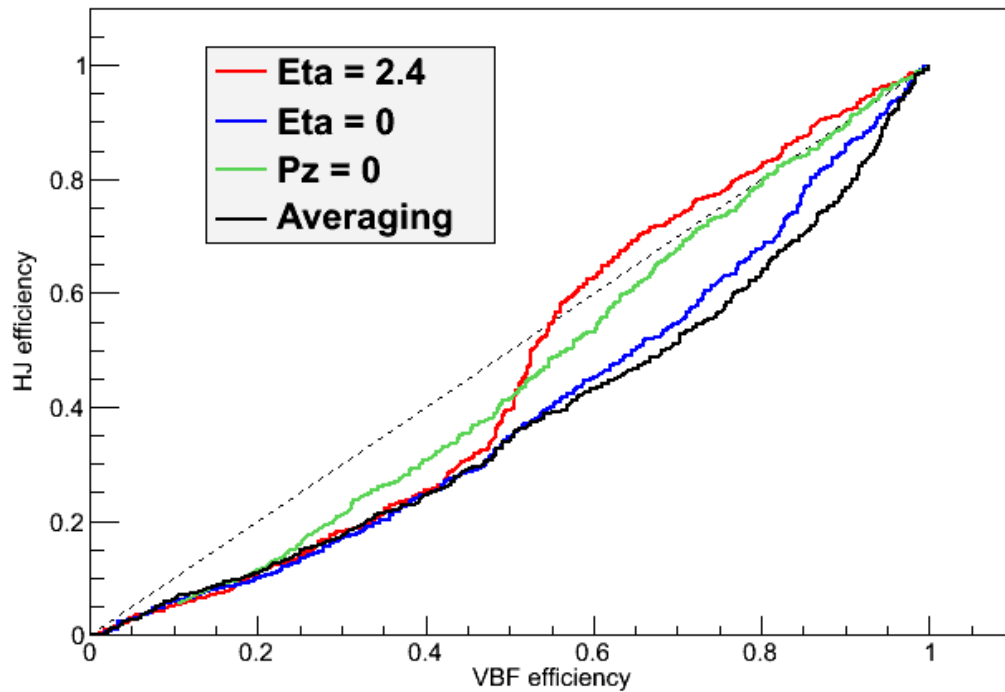
$\theta$  from  $\sim 0.01$  to  $\sim 3.13$

$$P_{vbf} = \frac{1}{N} \sum P_{vbf}(\eta)$$

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# Average

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# Integration

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$$P_z = 0$$

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# Integration

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$$P_z = 0 \quad \eta \quad P_{vbf}$$

# Integration

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$$P_z = 0 \quad \eta \quad P_{vbf}$$

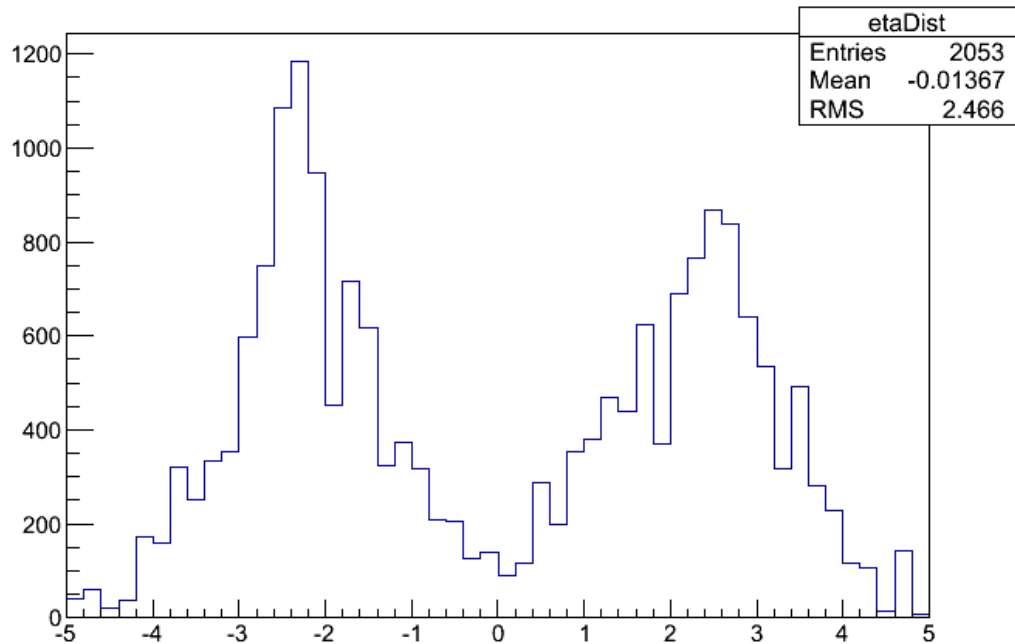
$$T(\eta = x) = \sum_{\text{events}} P_{vbf}(\eta = x)$$

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# Integration

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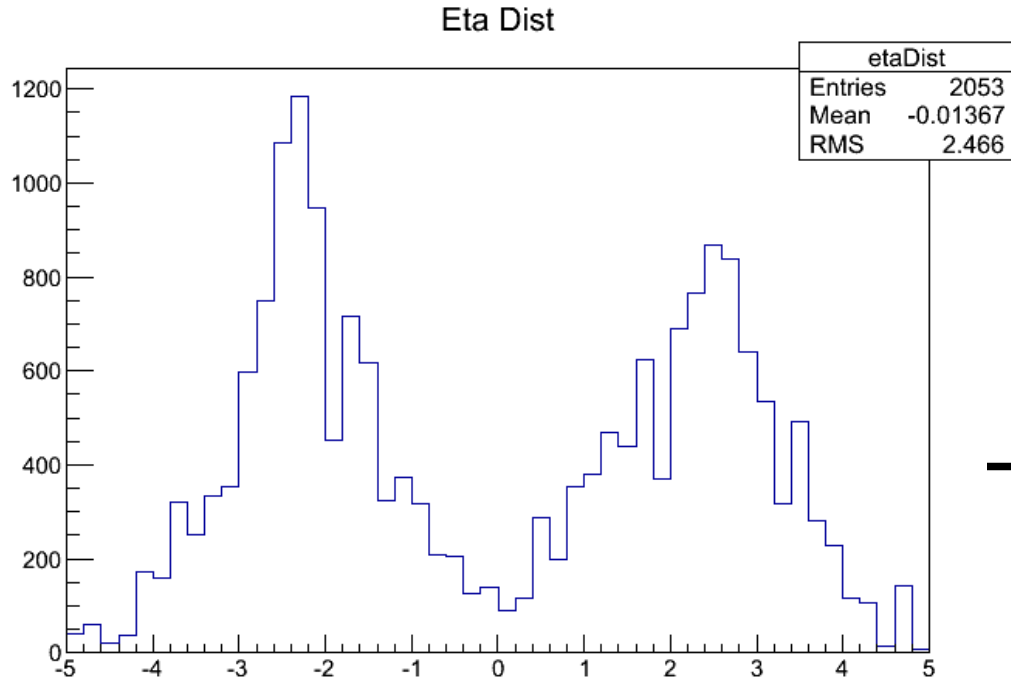
Eta Dist





# Integration

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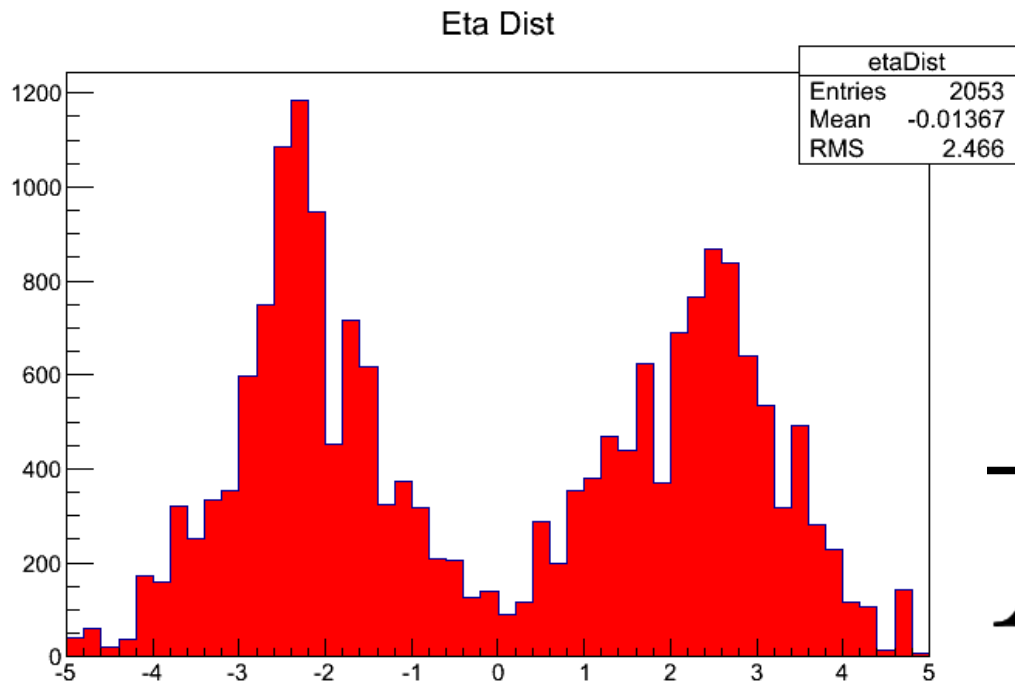


$$P_{vbf}^{int} = P_{vbf}$$

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# Integration

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$$P_{vbf}^{int} =$$

$$P_{vbf}$$

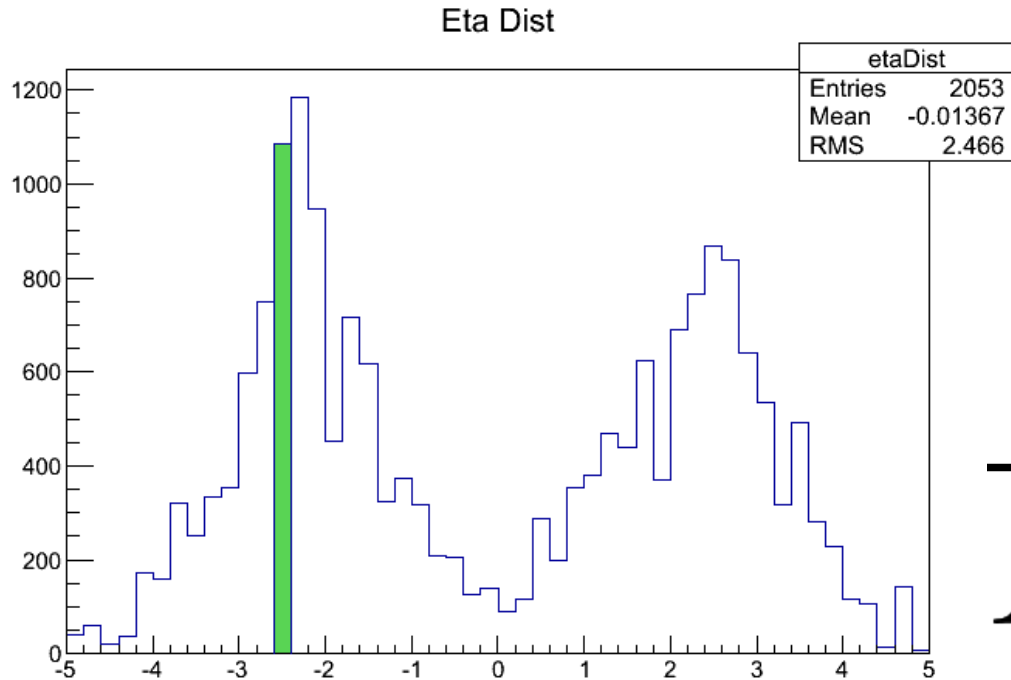
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$$A_{dist}$$

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# Integration

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$$P_{vbf}^{int} =$$

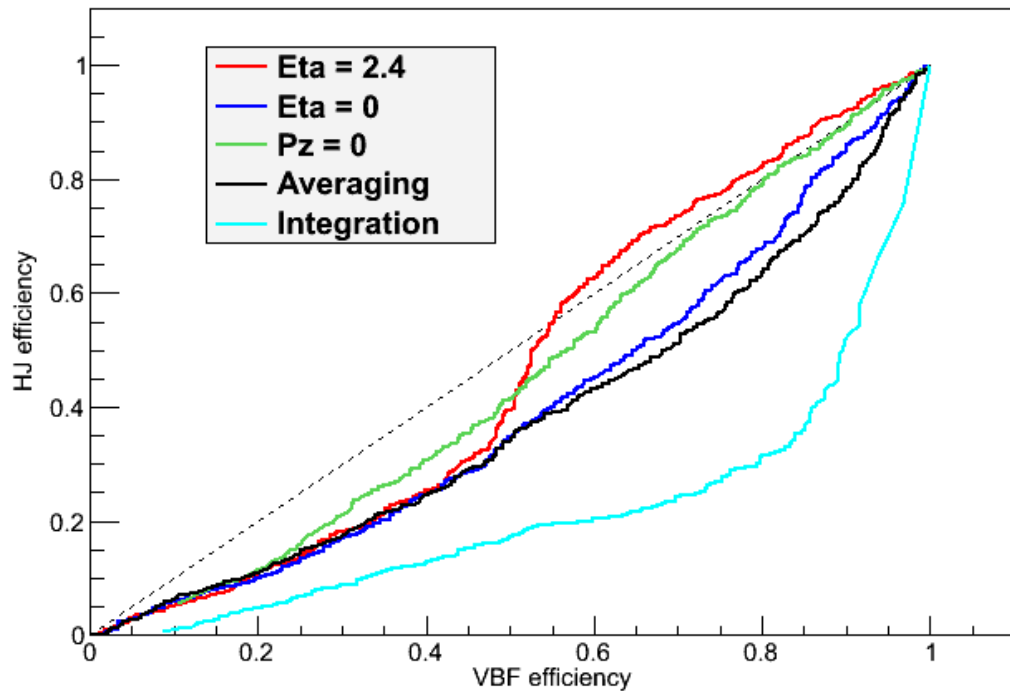
$$P_{vbf}$$

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$$A_{dist} \times A_{bin}$$

# Integration

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# Acknowledgements

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- Dr Andrei Gritsan, Dr Meng Xiao, Candice You



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- Prof Andrei Gritsan, Dr Meng Xiao, Candice You
- Dr Steven Goldfarb, Prof Jean Krisch, Prof Tom Schwarz, Prof Homer Neal



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  - Dr Steven Goldfarb, Prof Jean Krisch, Prof Tom Schwarz, Prof Homer Neal
  - The Lounsbery Foundation
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# Photos

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