

19.2 fb<sup>-1</sup> (8 TeV)

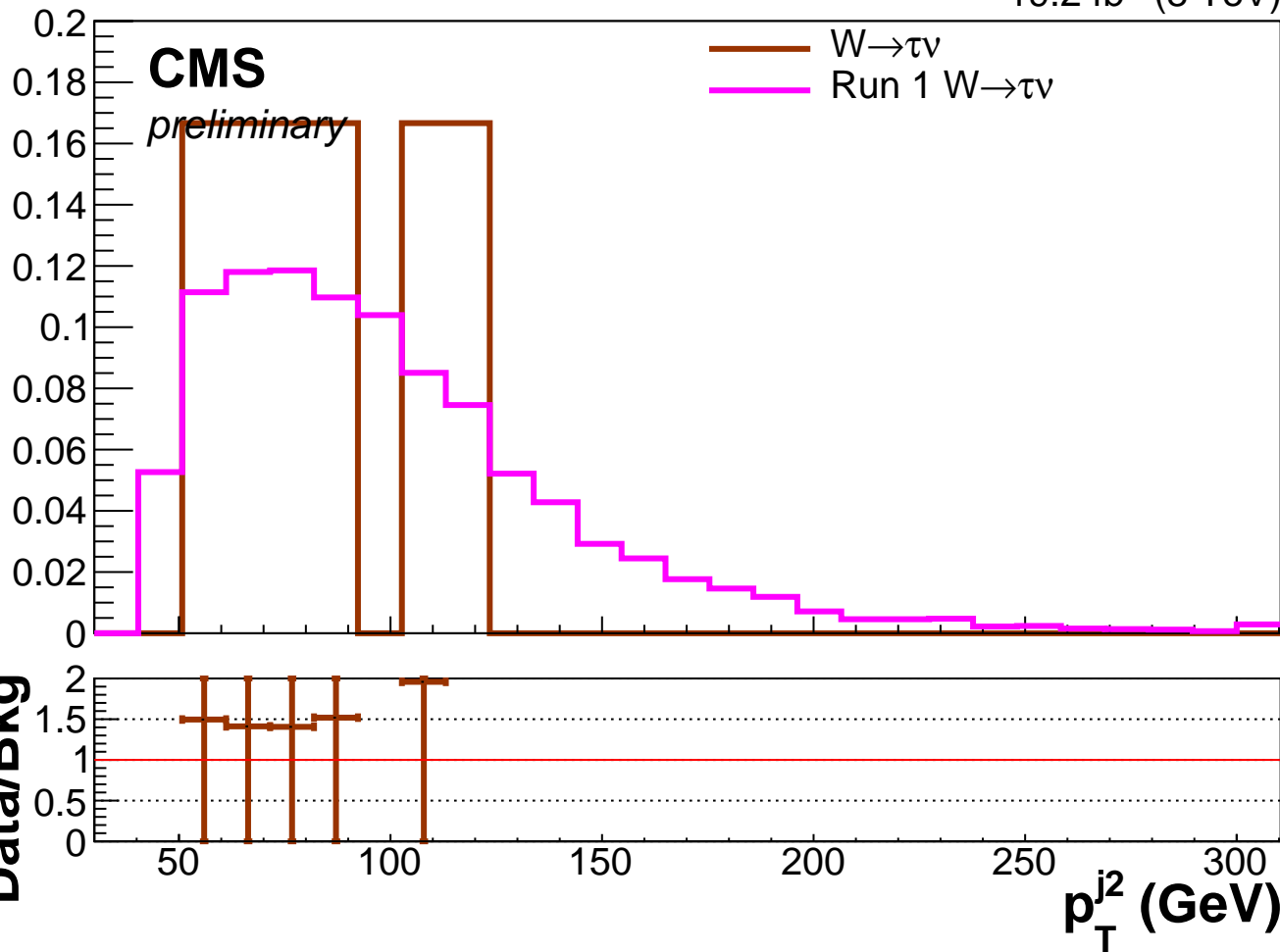
**CMS**

*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**$p_T^{j2}$  (GeV)**



19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

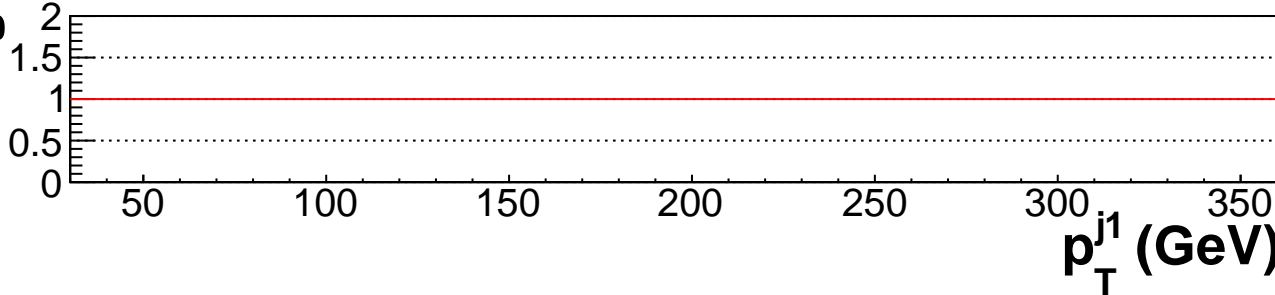
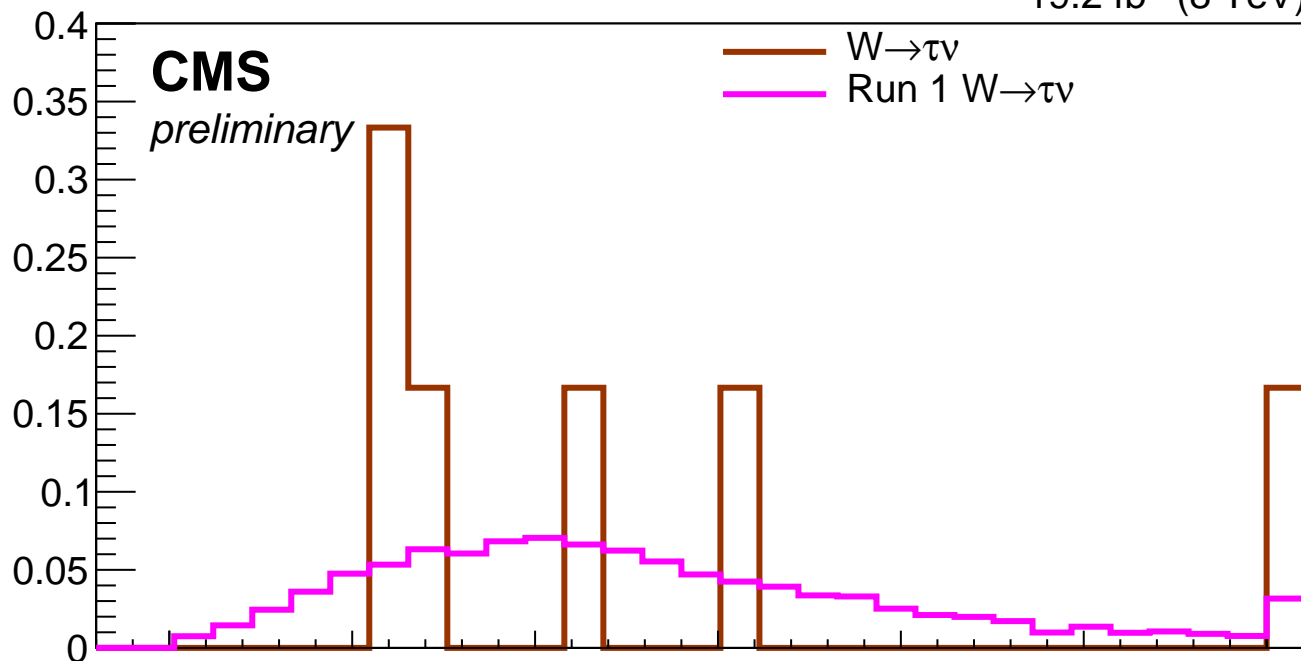
*preliminary*

—  $W \rightarrow \tau \nu$

— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**p<sub>T</sub><sup>j1</sup> (GeV)**



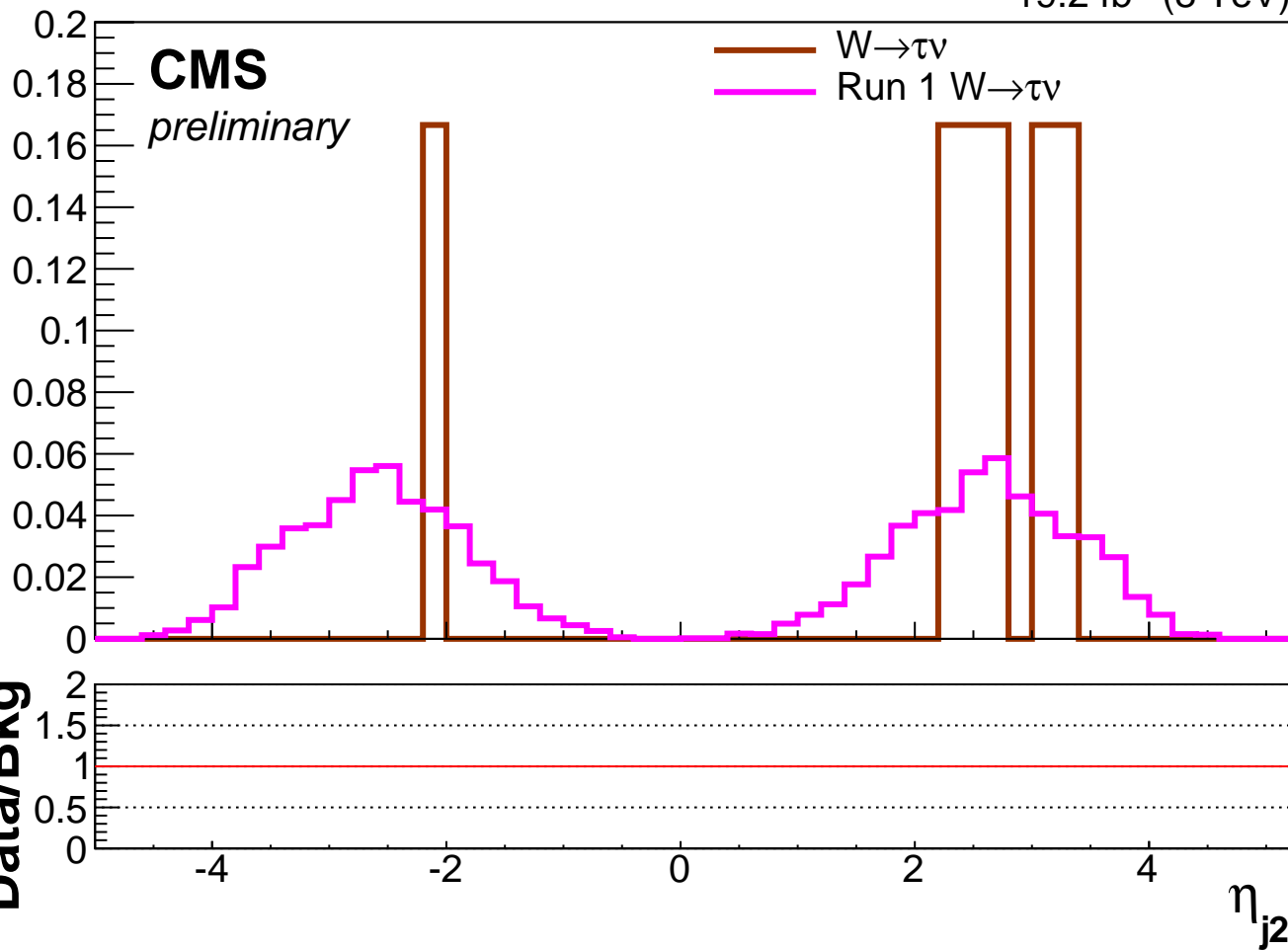
19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

$\eta_{j2}$



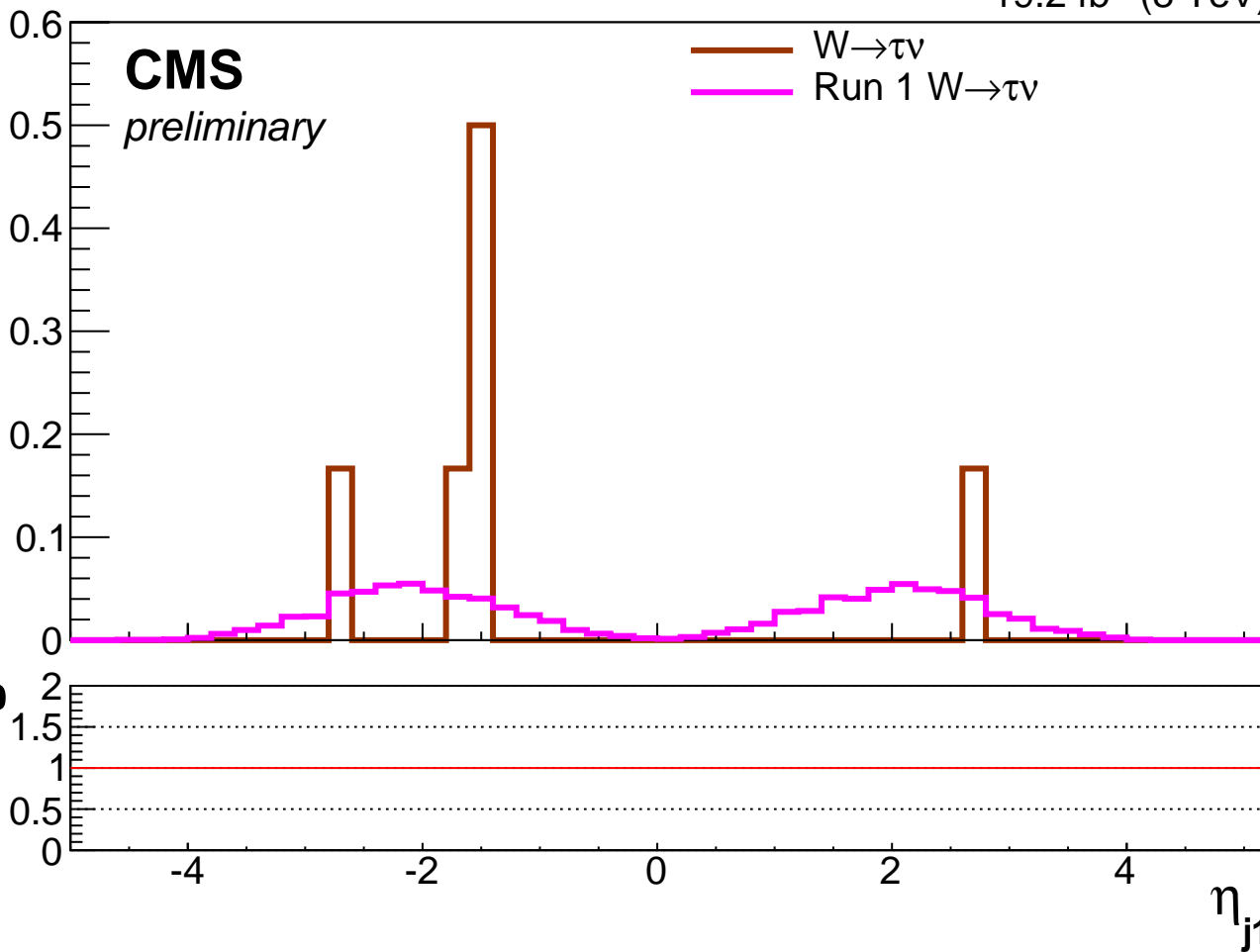
19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

Data/Bkg

$\eta_{j1}$

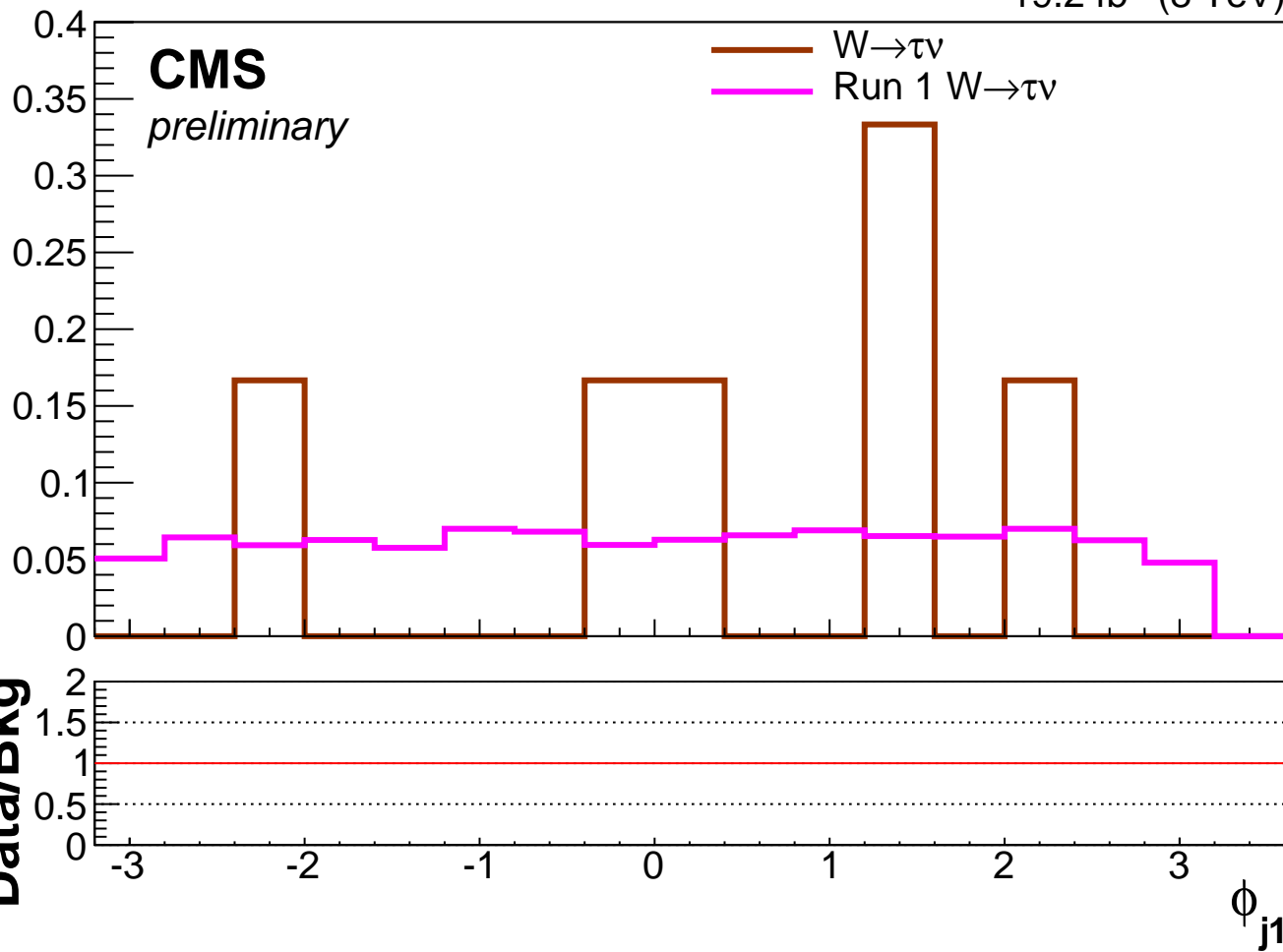


19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

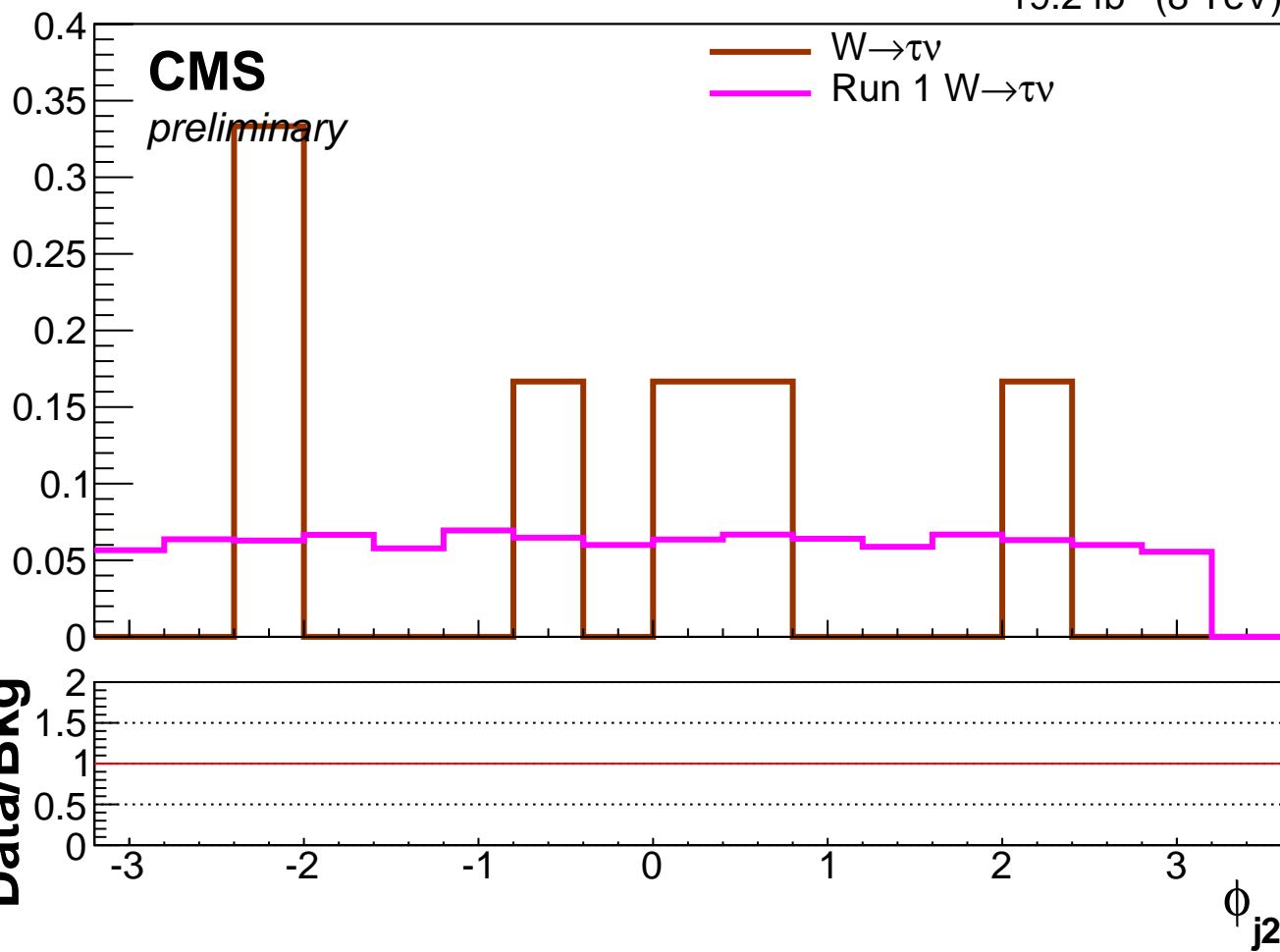


19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**



19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

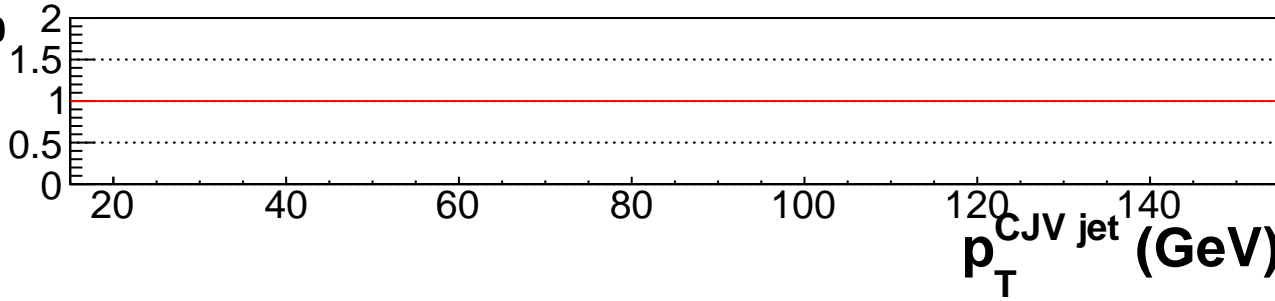
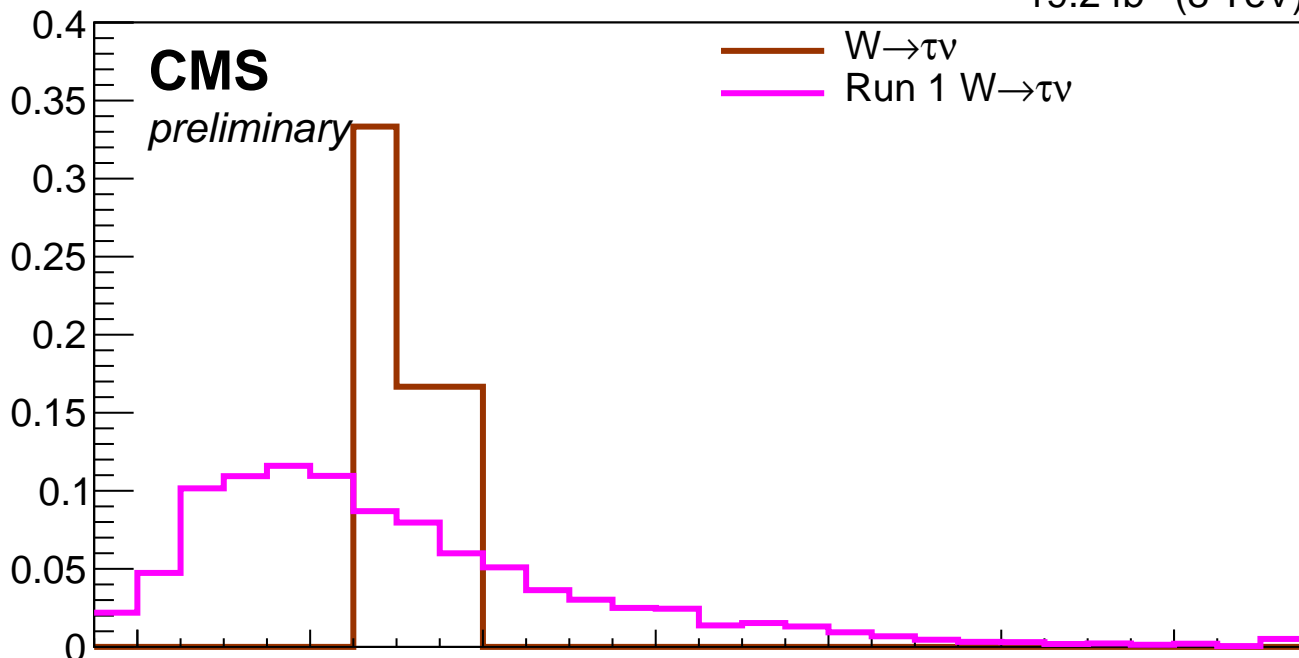
*preliminary*

—  $W \rightarrow \tau \nu$

— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**$p_T^{\text{CJV jet}}$  (GeV)**



19.2 fb<sup>-1</sup> (8 TeV)

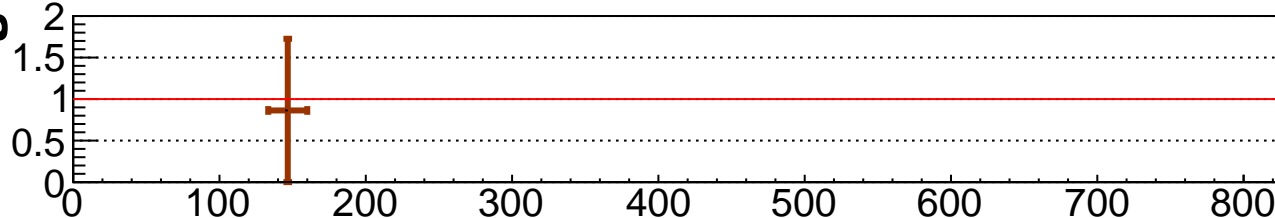
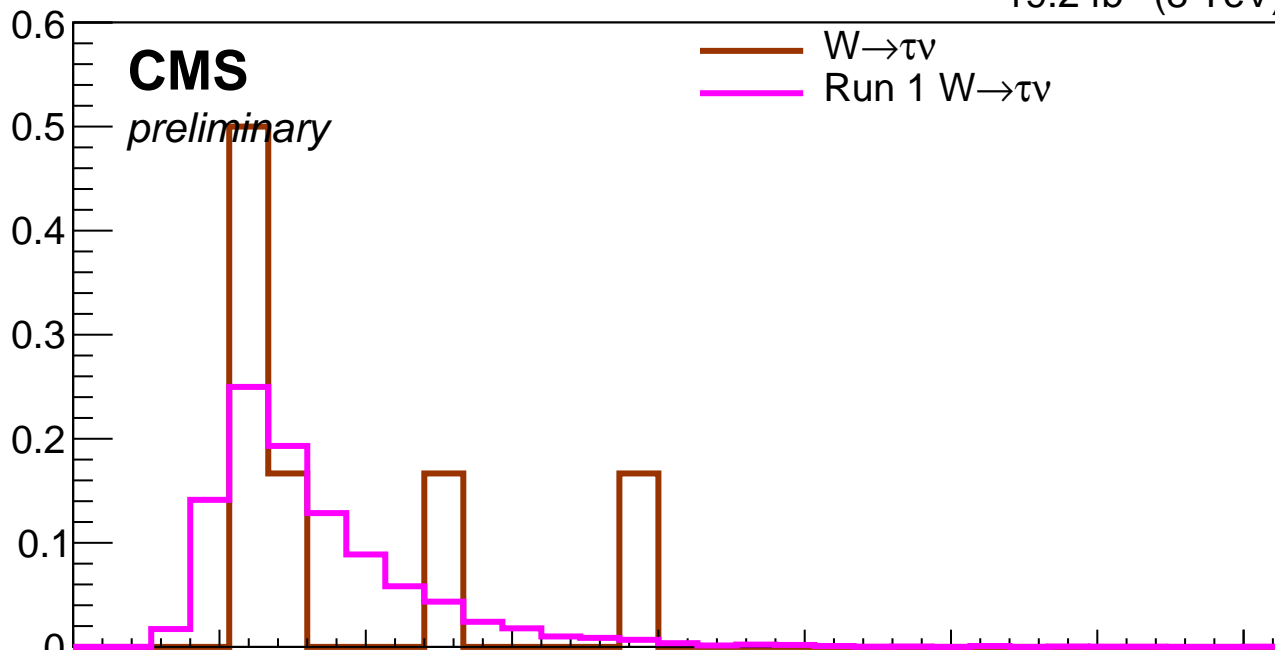
**CMS**

*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**Missing transverse energy (GeV)**





19.2 fb<sup>-1</sup> (8 TeV)

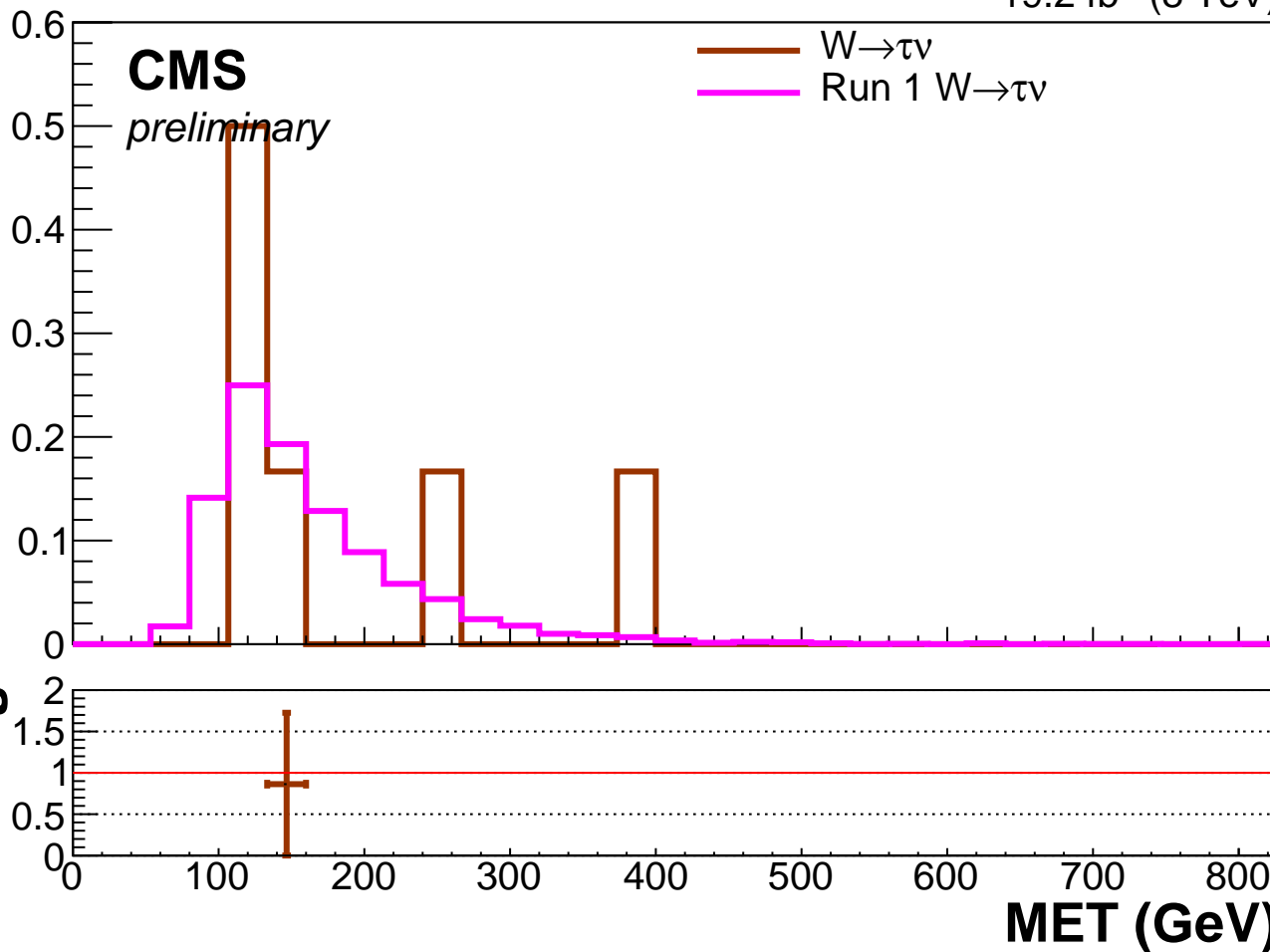
**CMS**

*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**MET (GeV)**

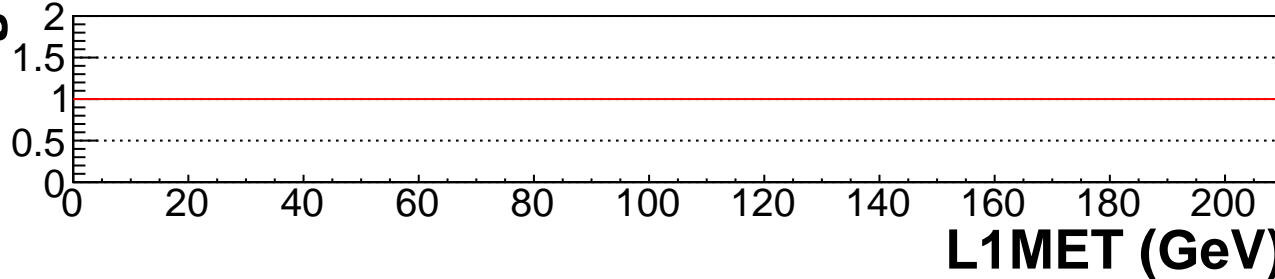
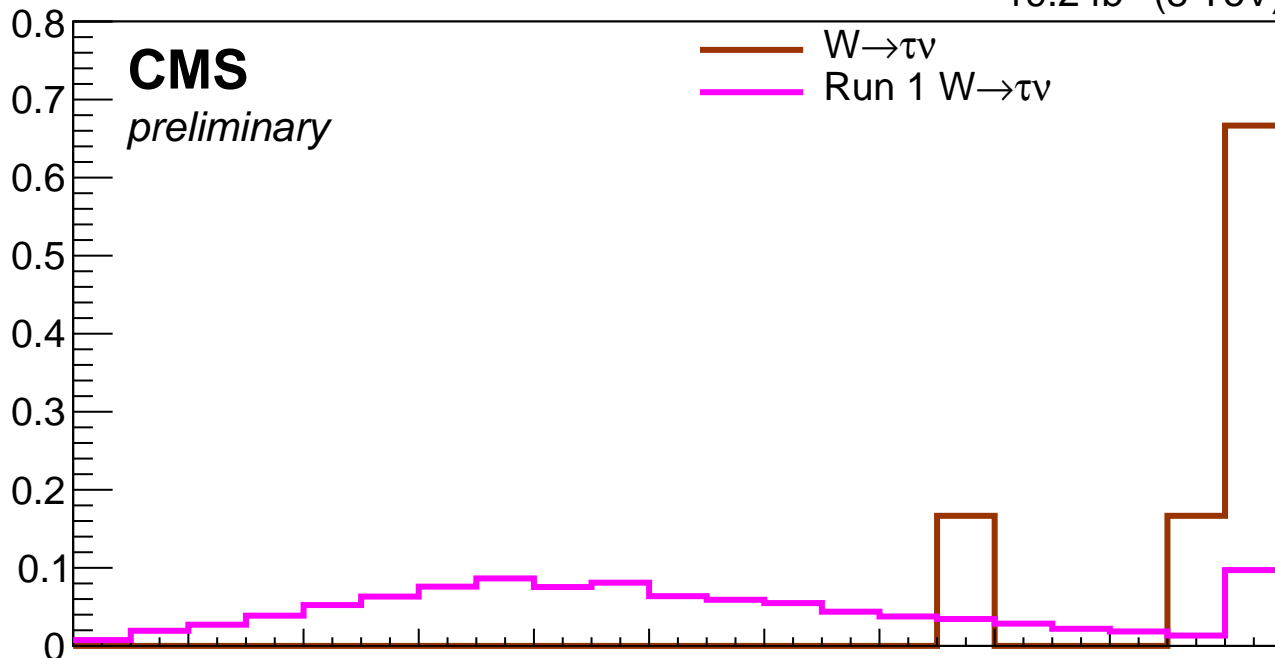


19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**



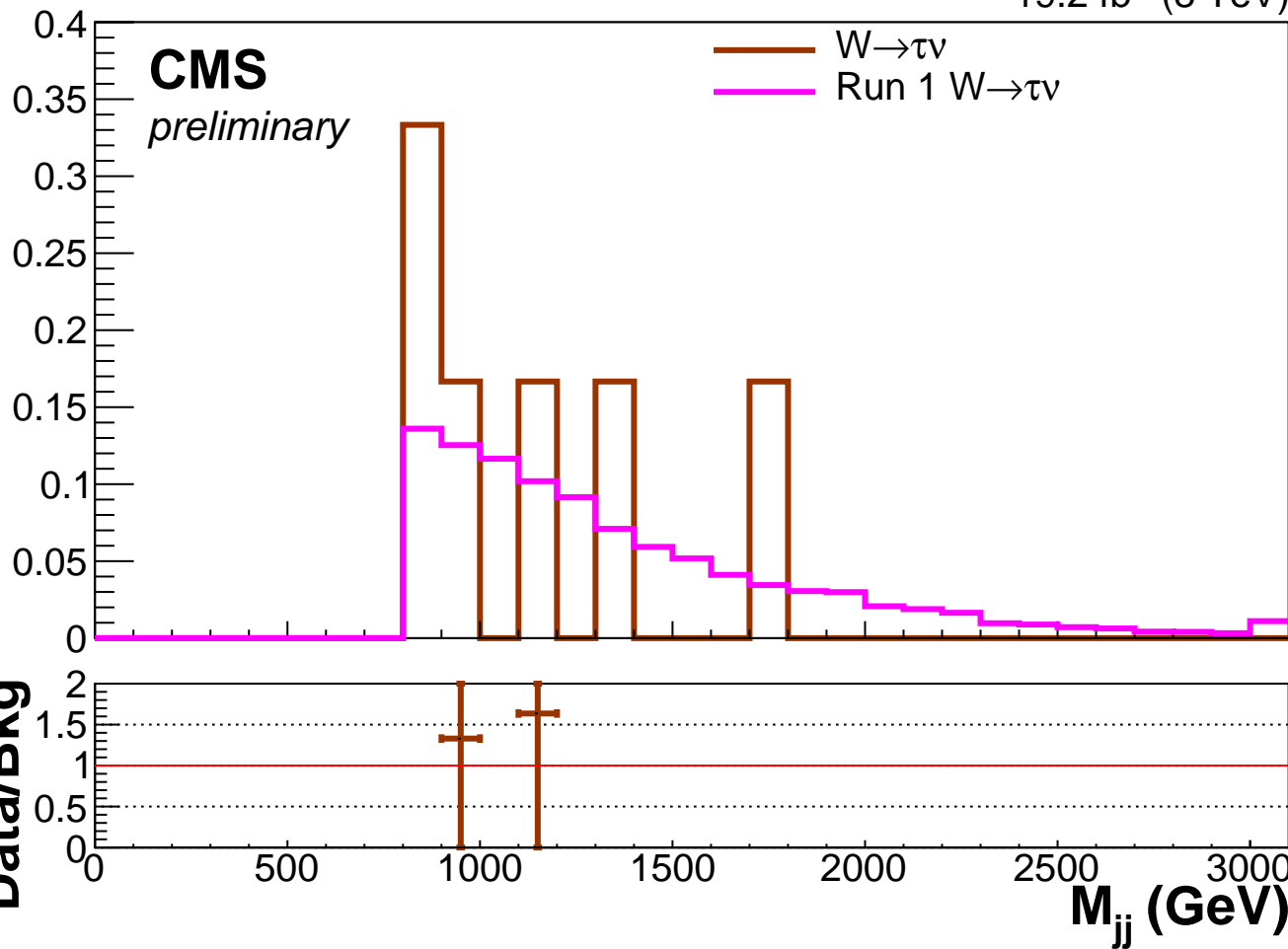
19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**$M_{jj}$  (GeV)**

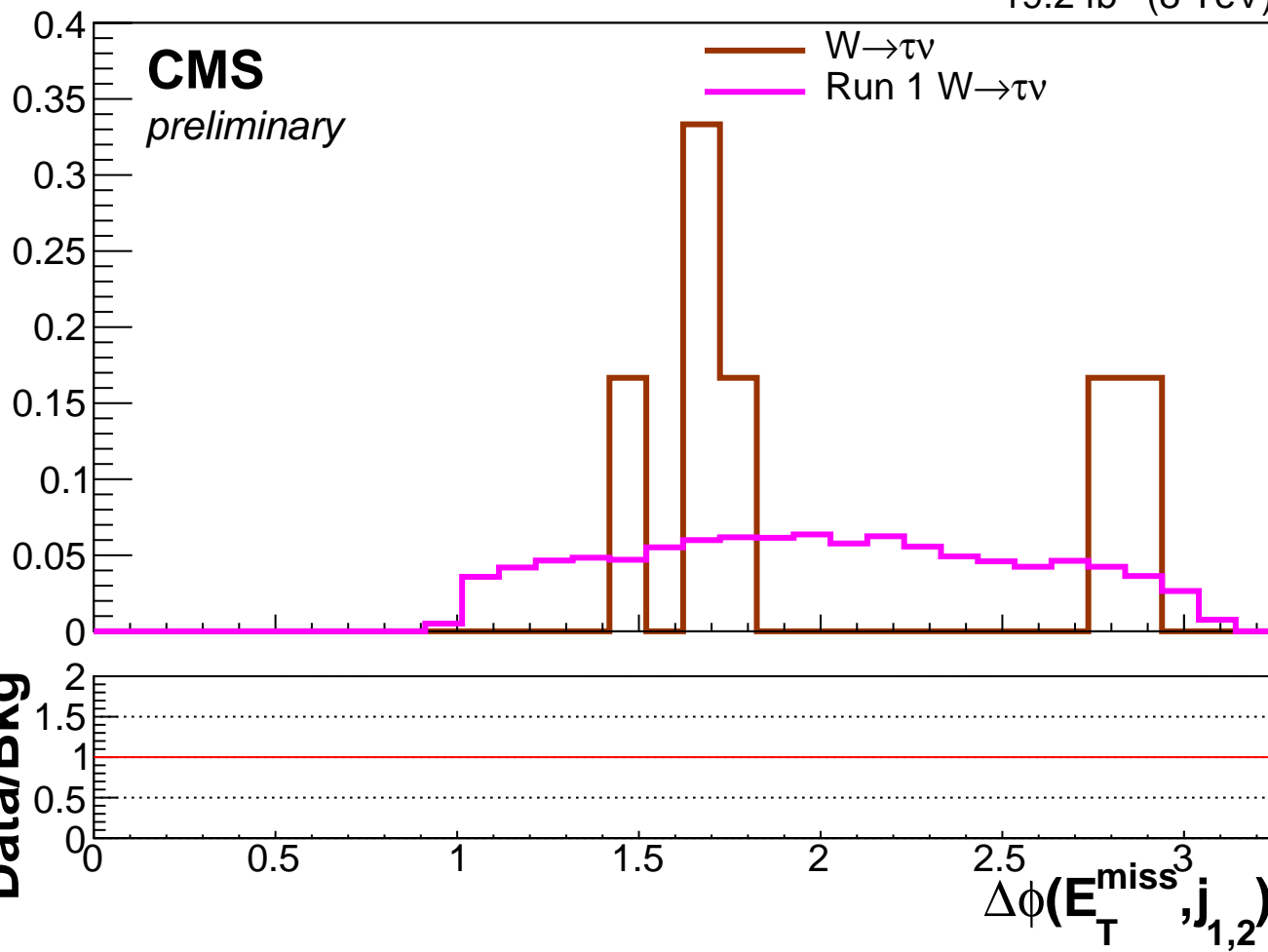


19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

Data/Bkg

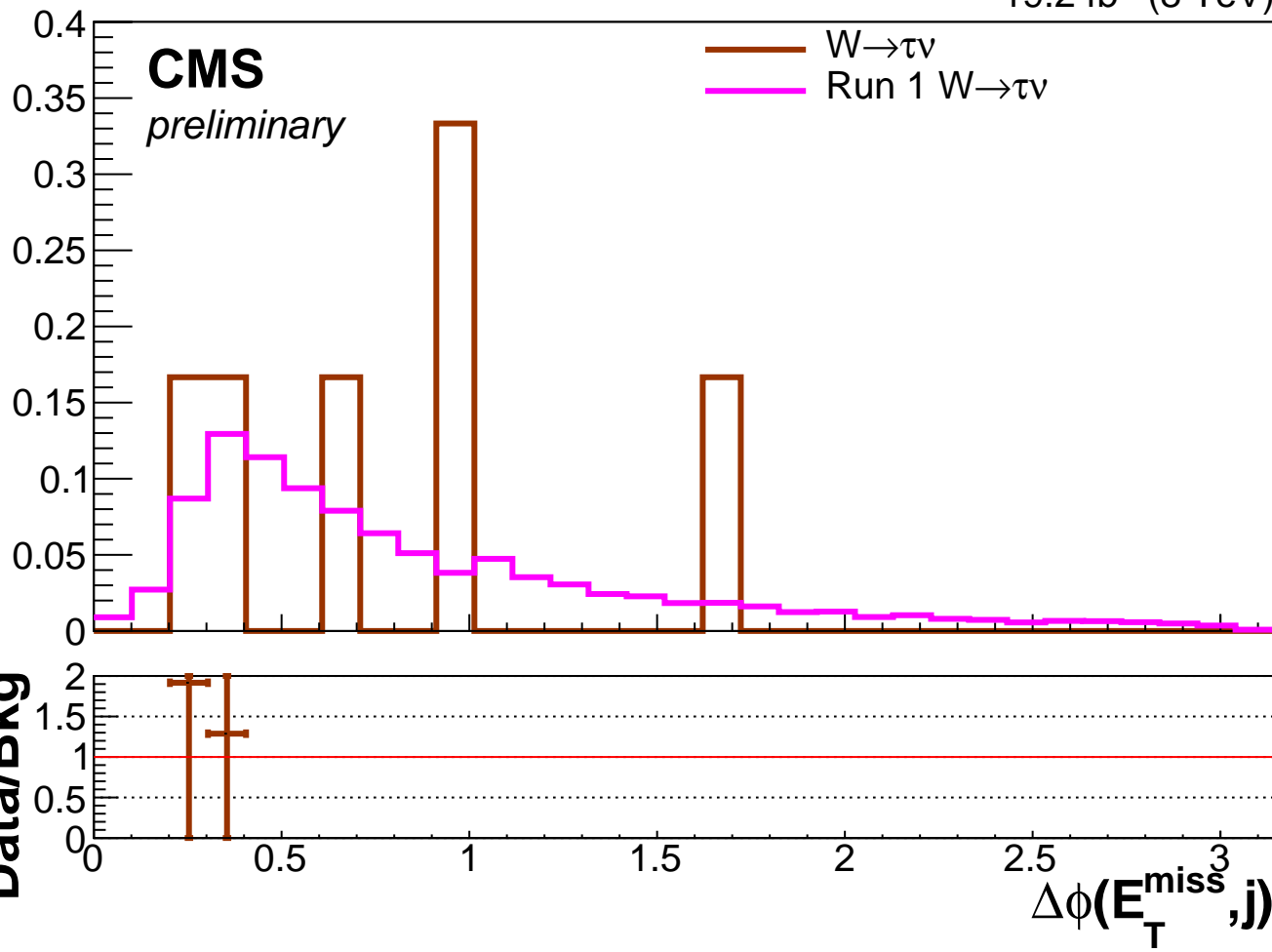


19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

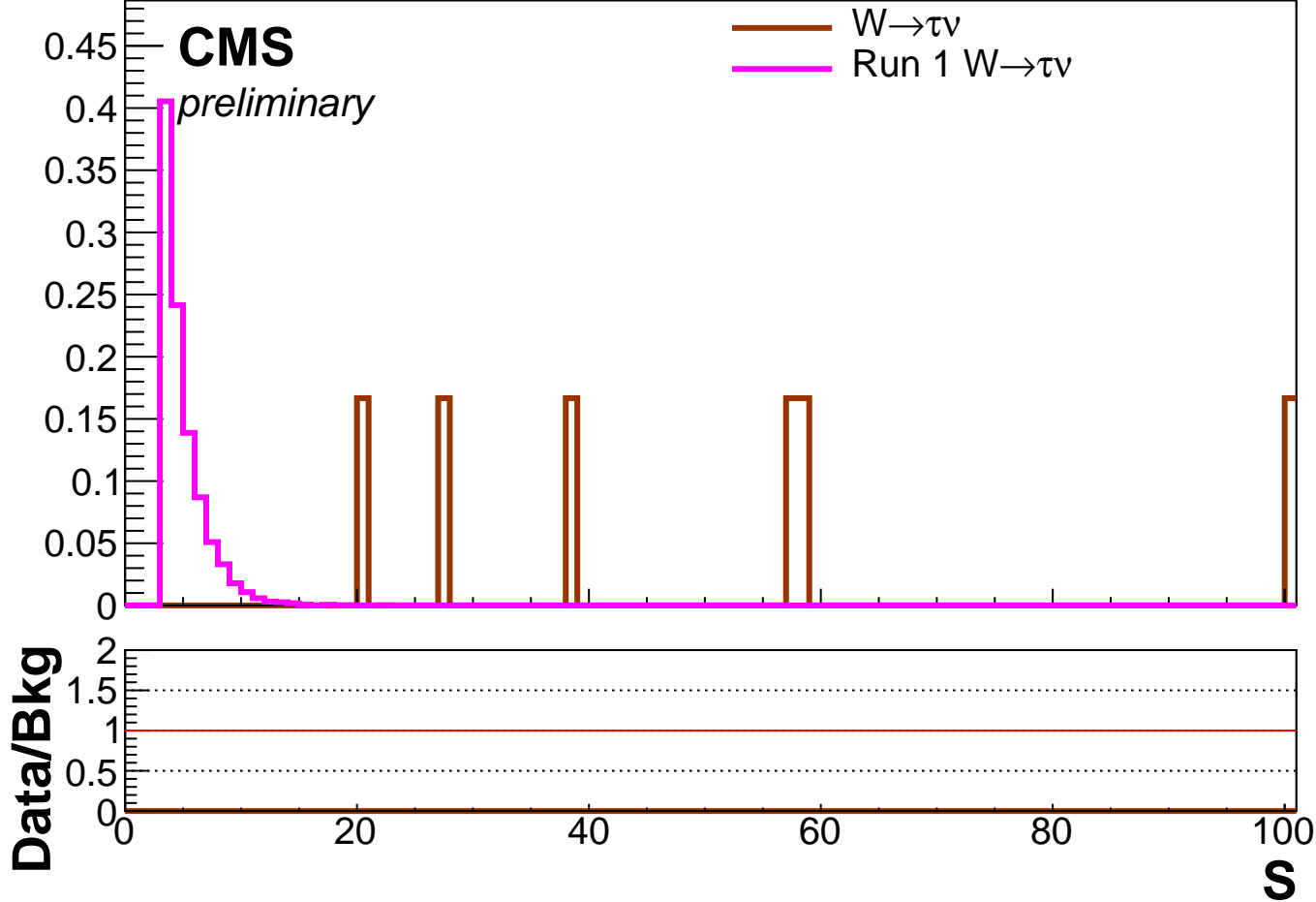


19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

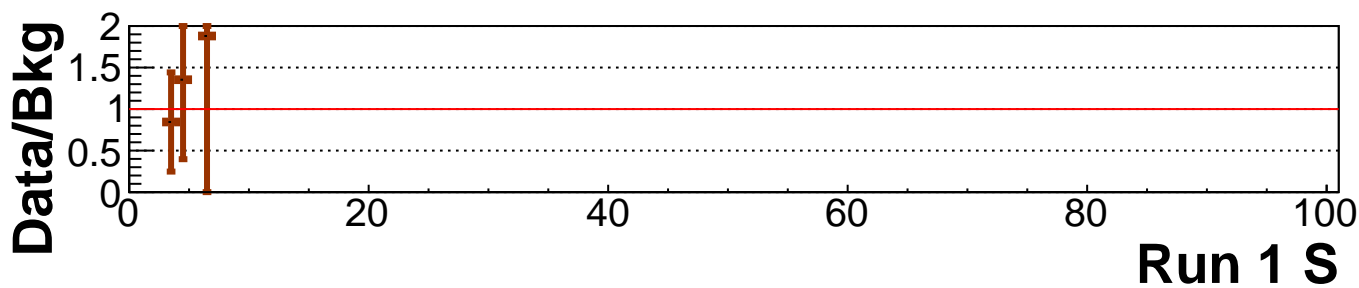


19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$



19.2 fb<sup>-1</sup> (8 TeV)

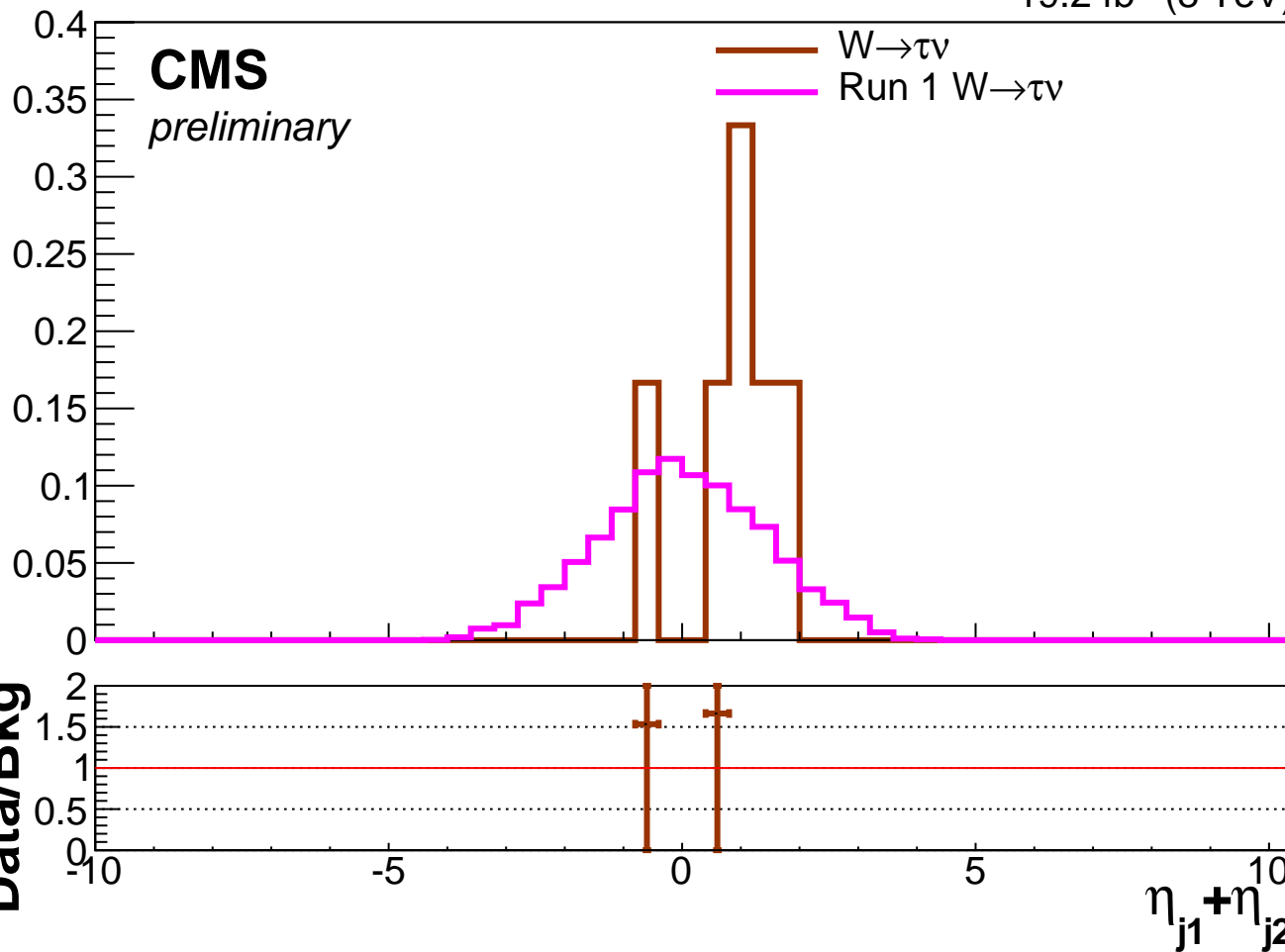
**CMS**  
*preliminary*

W→τν

Run 1 W→τν

**Data/Bkg**

$\eta_{j1} + \eta_{j2}$





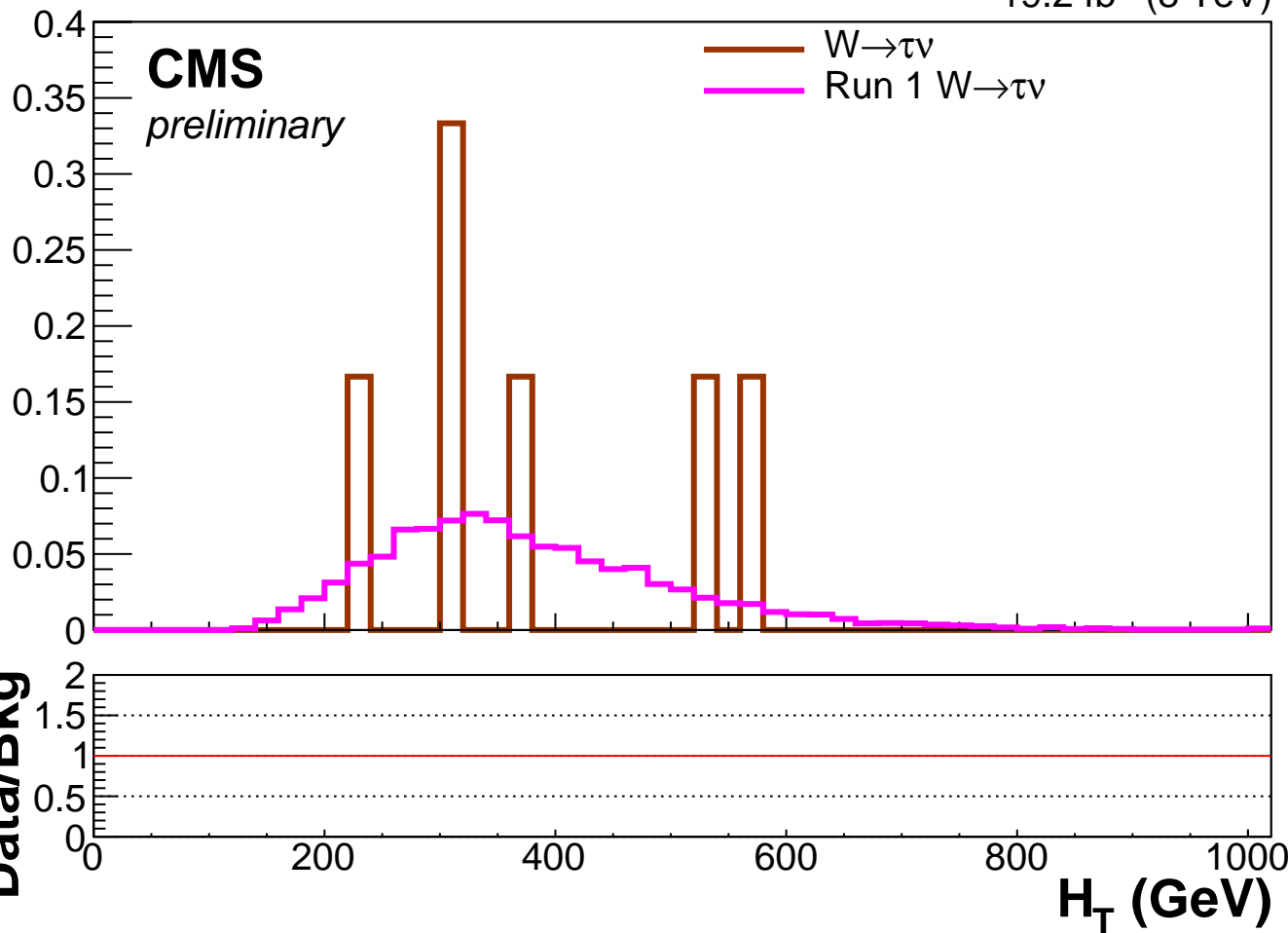
19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

Data/Bkg

$H_T$  (GeV)



19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

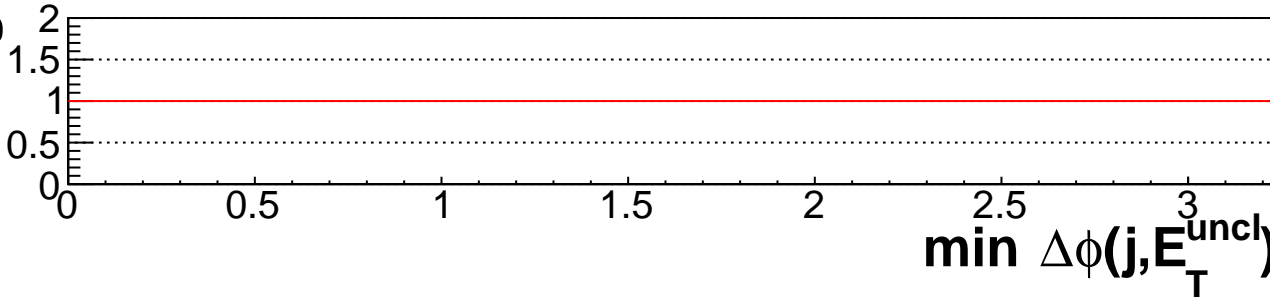
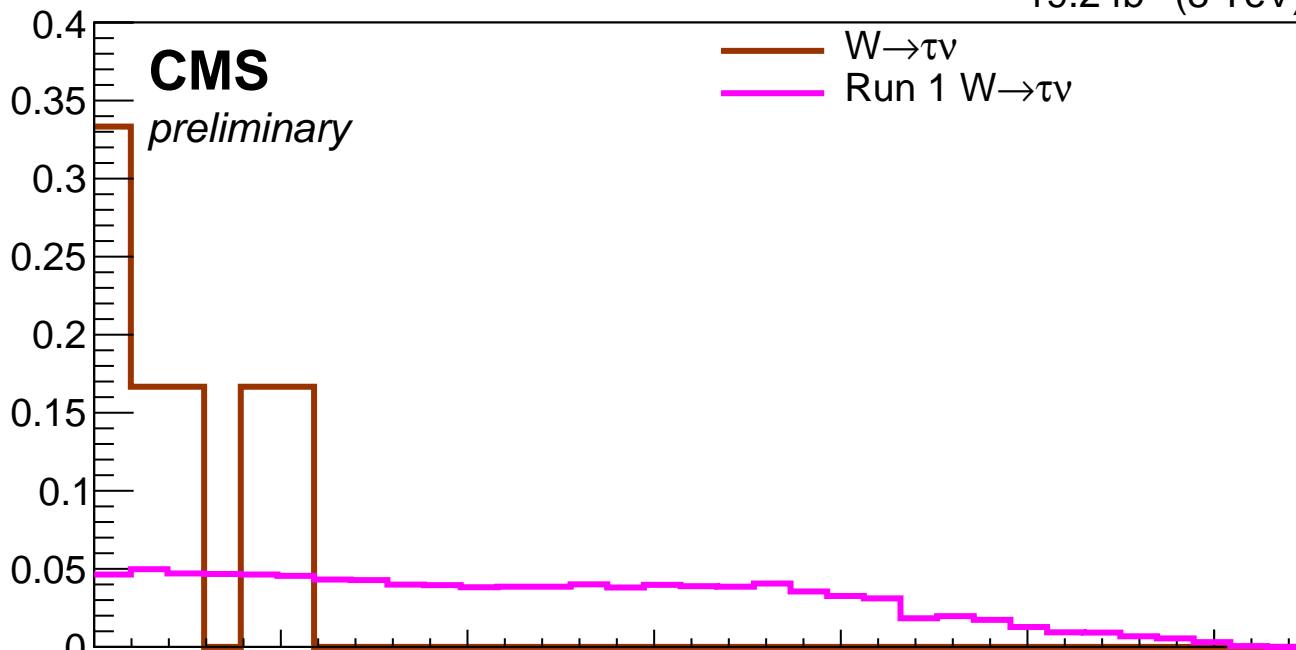
*preliminary*

—  $W \rightarrow \tau \nu$

— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**min  $\Delta\phi(j, E_T^{\text{uncl}})$**

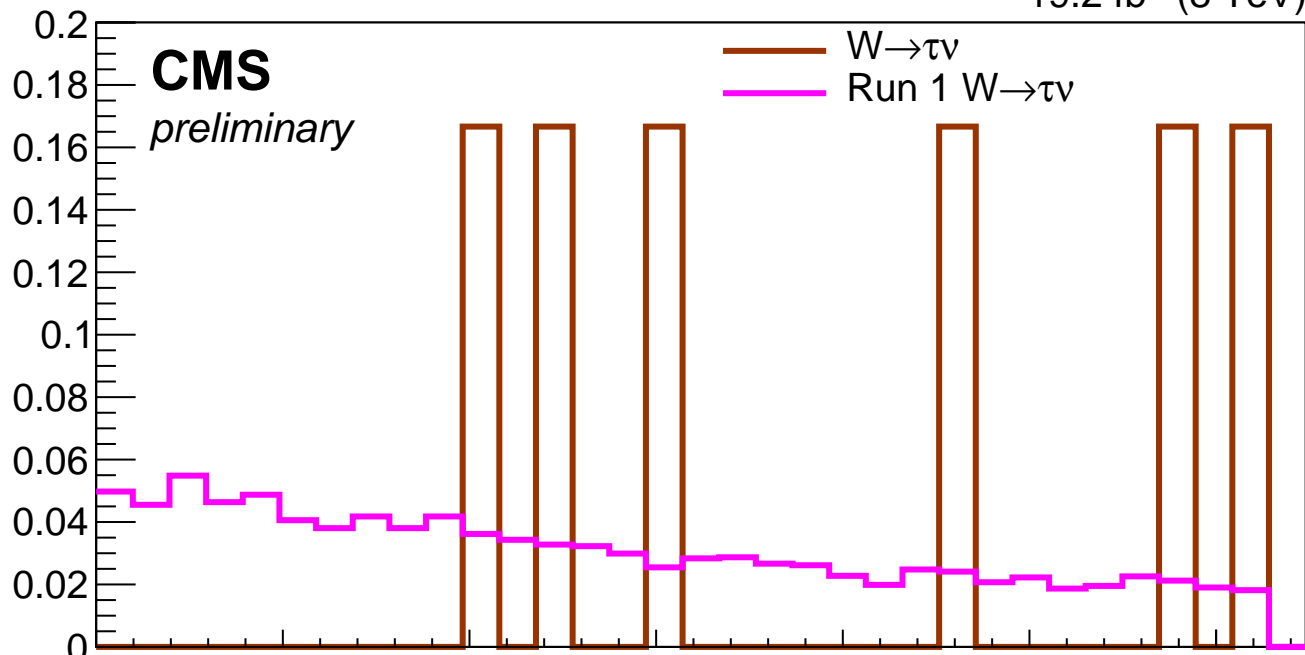


19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

Data/Bkg



$\Delta\phi(\text{MET no Mu}, E_T^{\text{uncl}})$

19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

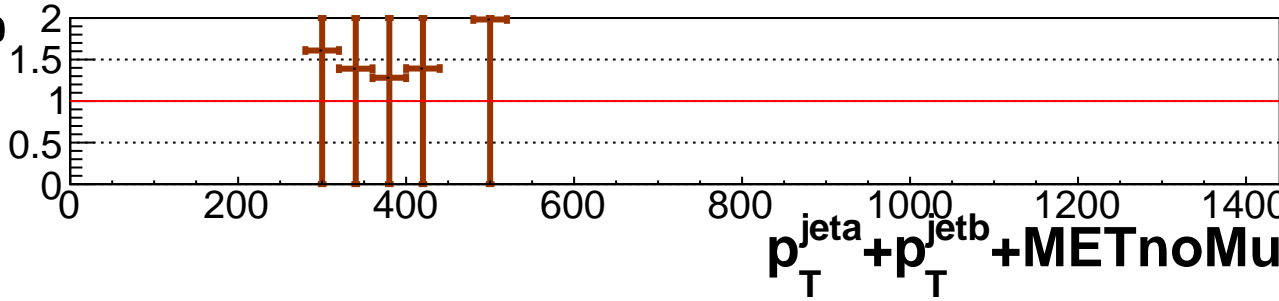
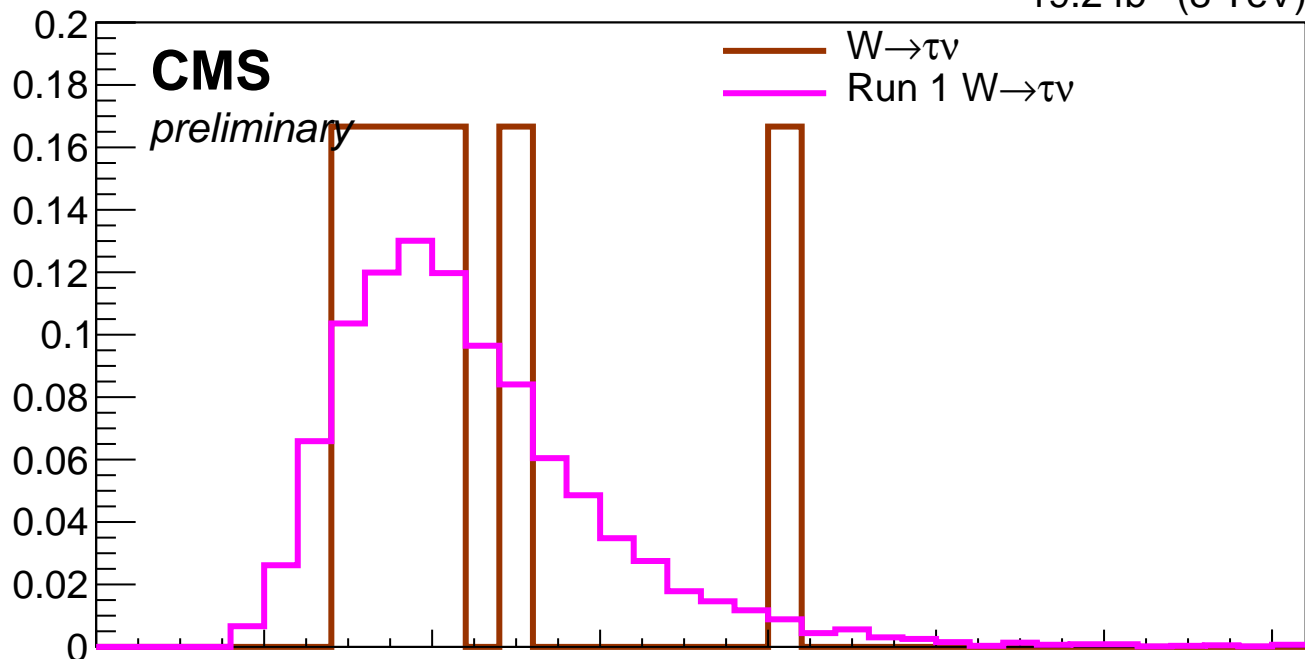
*preliminary*

—  $W \rightarrow \tau \nu$

— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**$p_T^{\text{jeta}} + p_T^{\text{jeta}} + \text{METnoMu}$**



19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

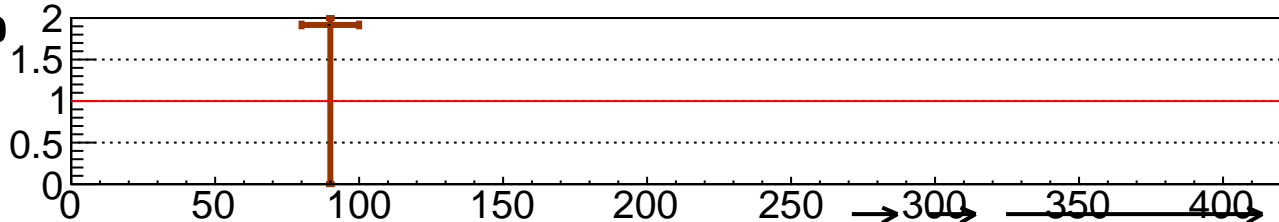
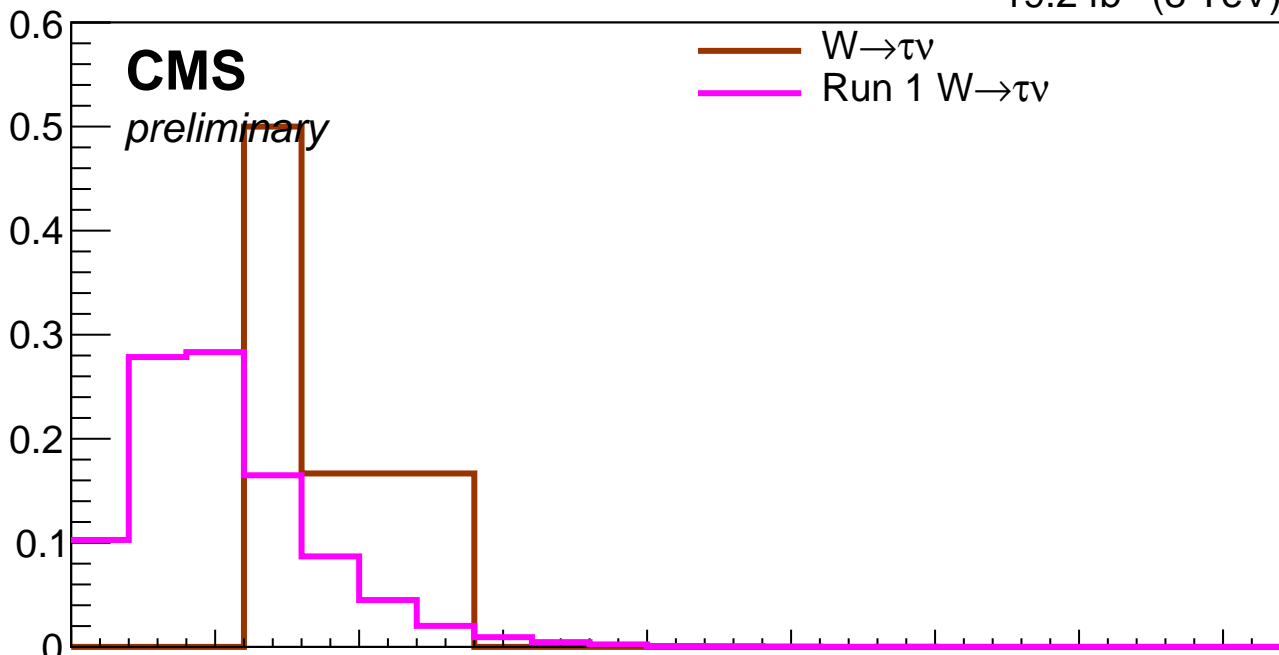
*preliminary*

—  $W \rightarrow \tau \nu$

— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**$p_T(ja+jb+METnoMu)$**



19.2 fb<sup>-1</sup> (8 TeV)

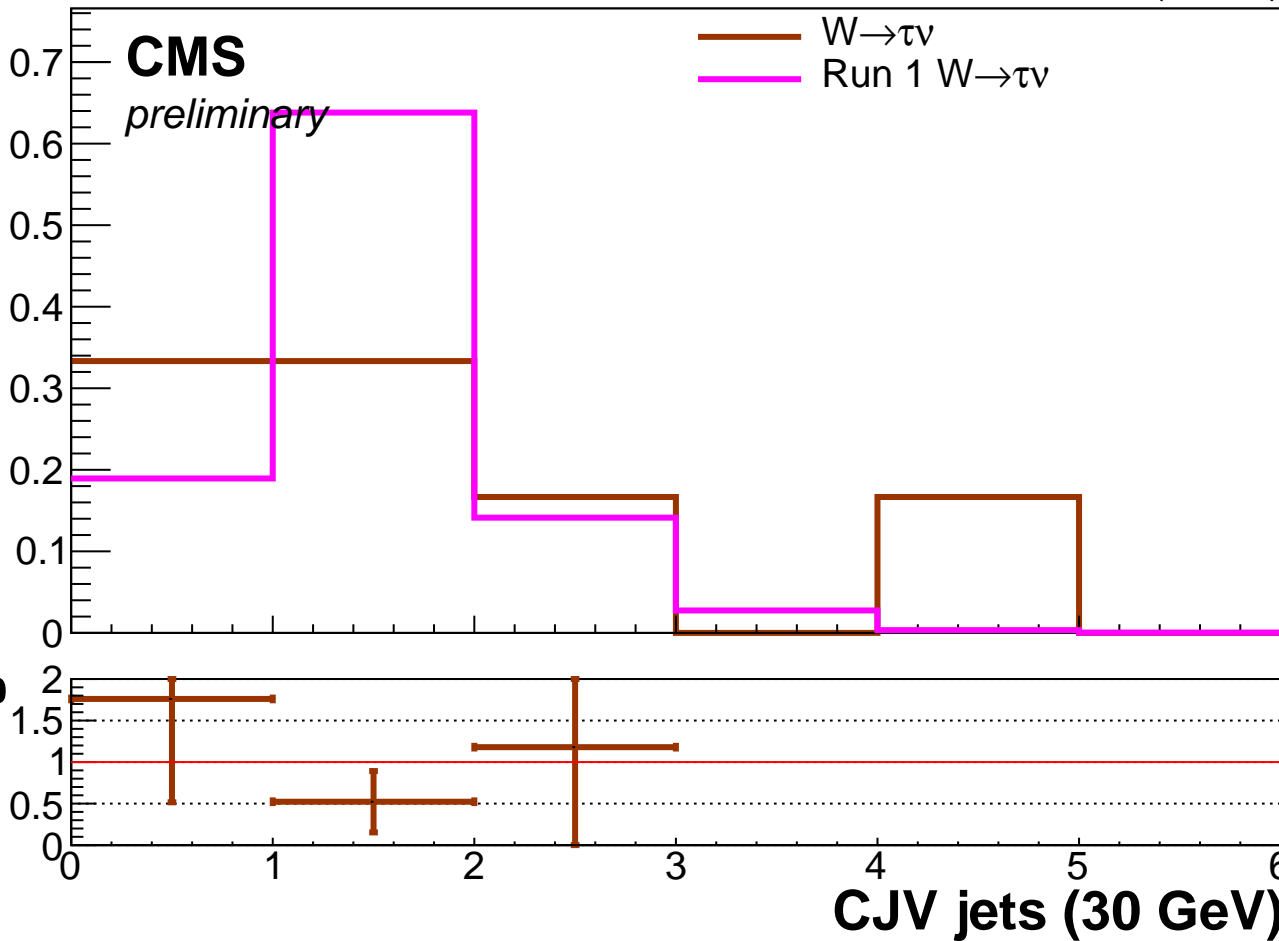
**CMS**

*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**CJV jets (30 GeV)**



19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

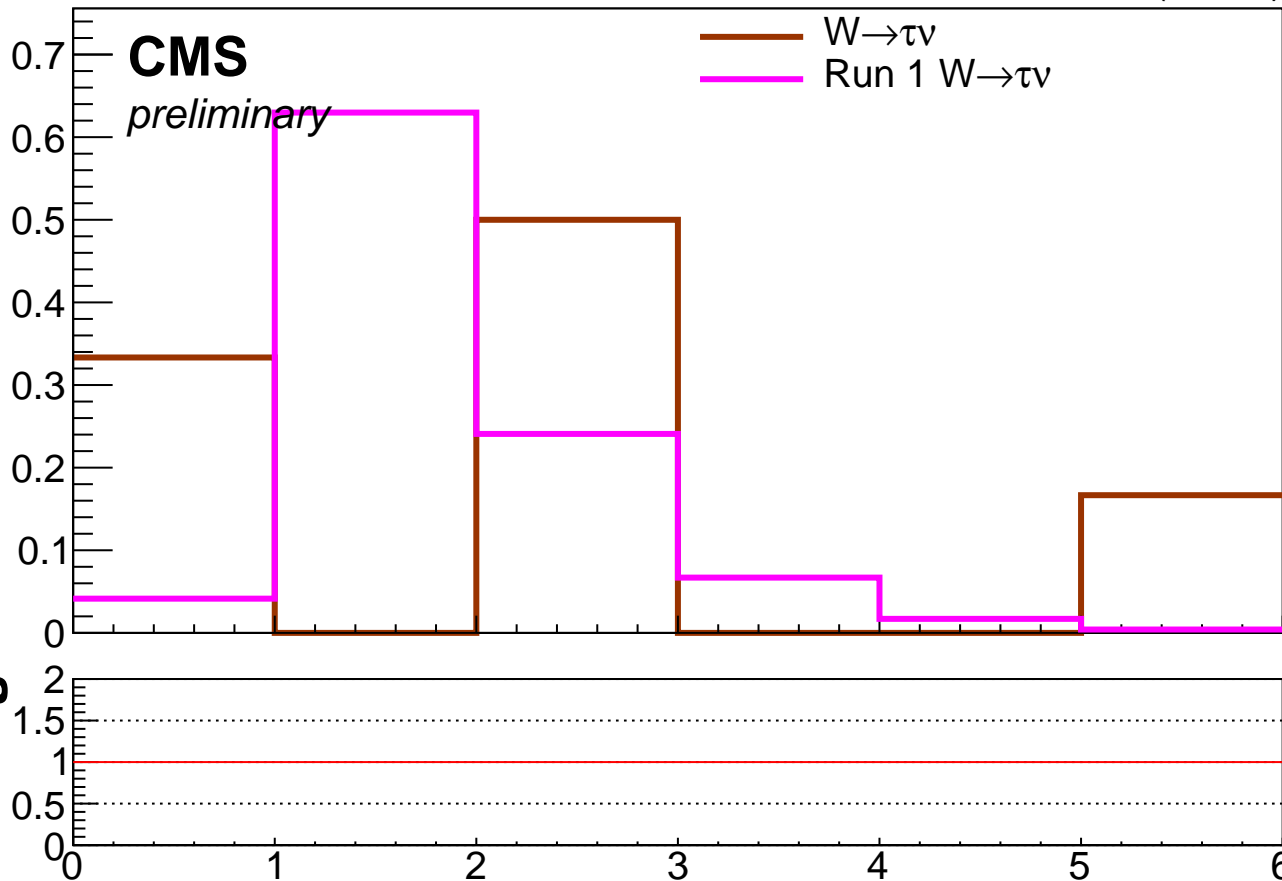
*preliminary*

W→τν

Run 1 W→τν

Data/Bkg

CJV jets (20 GeV EB, 30 GeV EE)



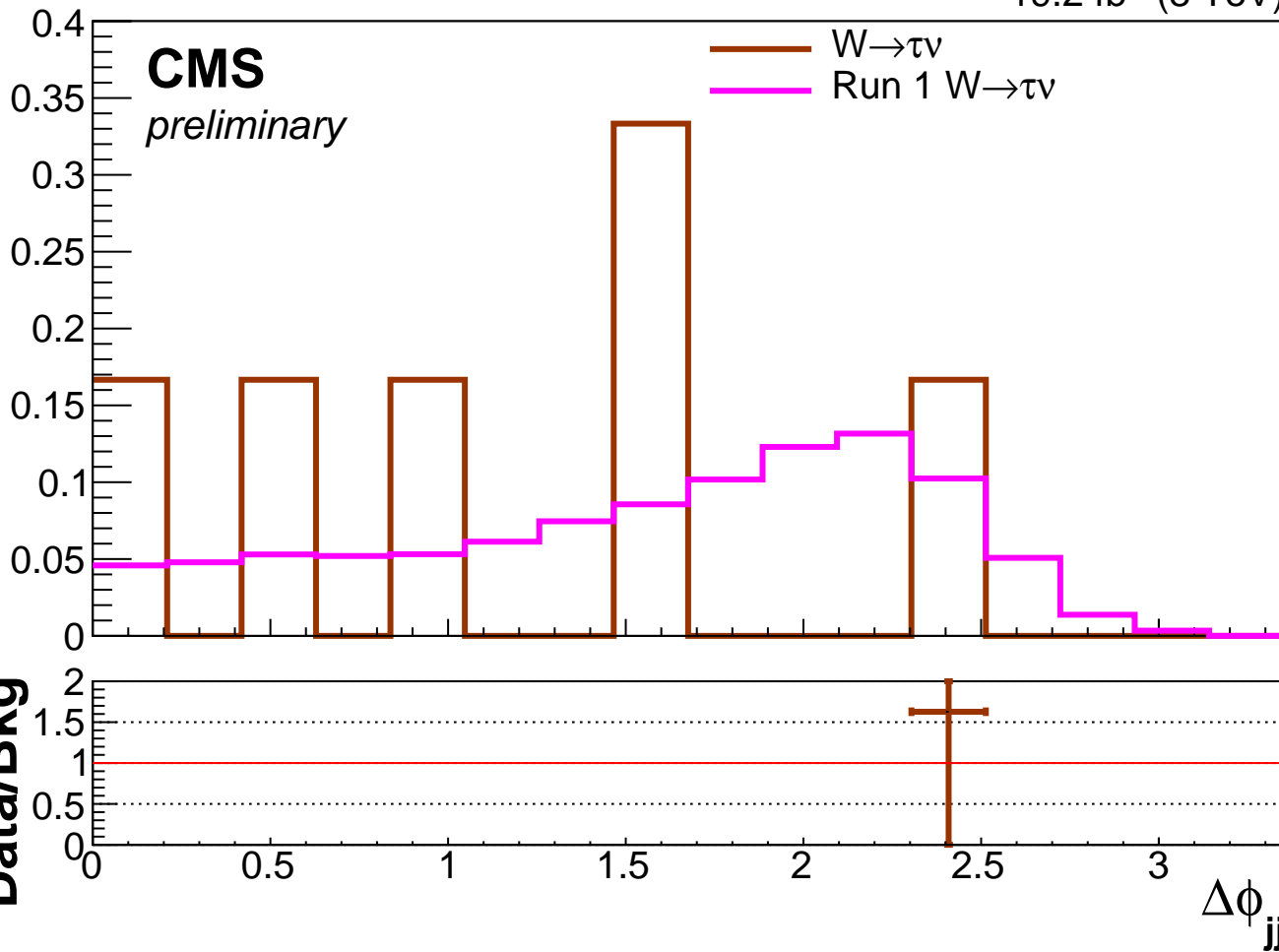
19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

$\Delta\phi_{jj}$





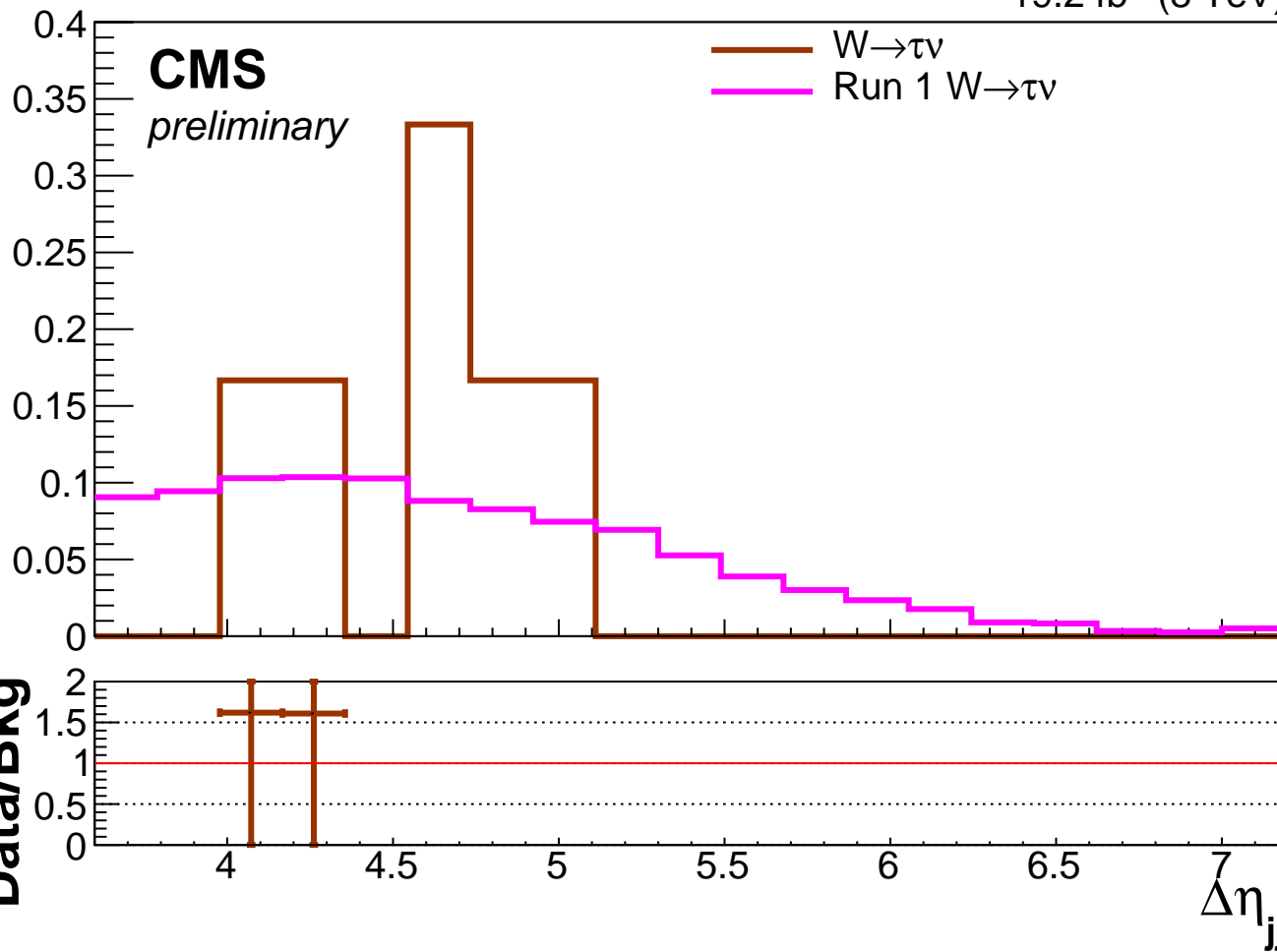
19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

Data/Bkg

$\Delta\eta_{jj}$



19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

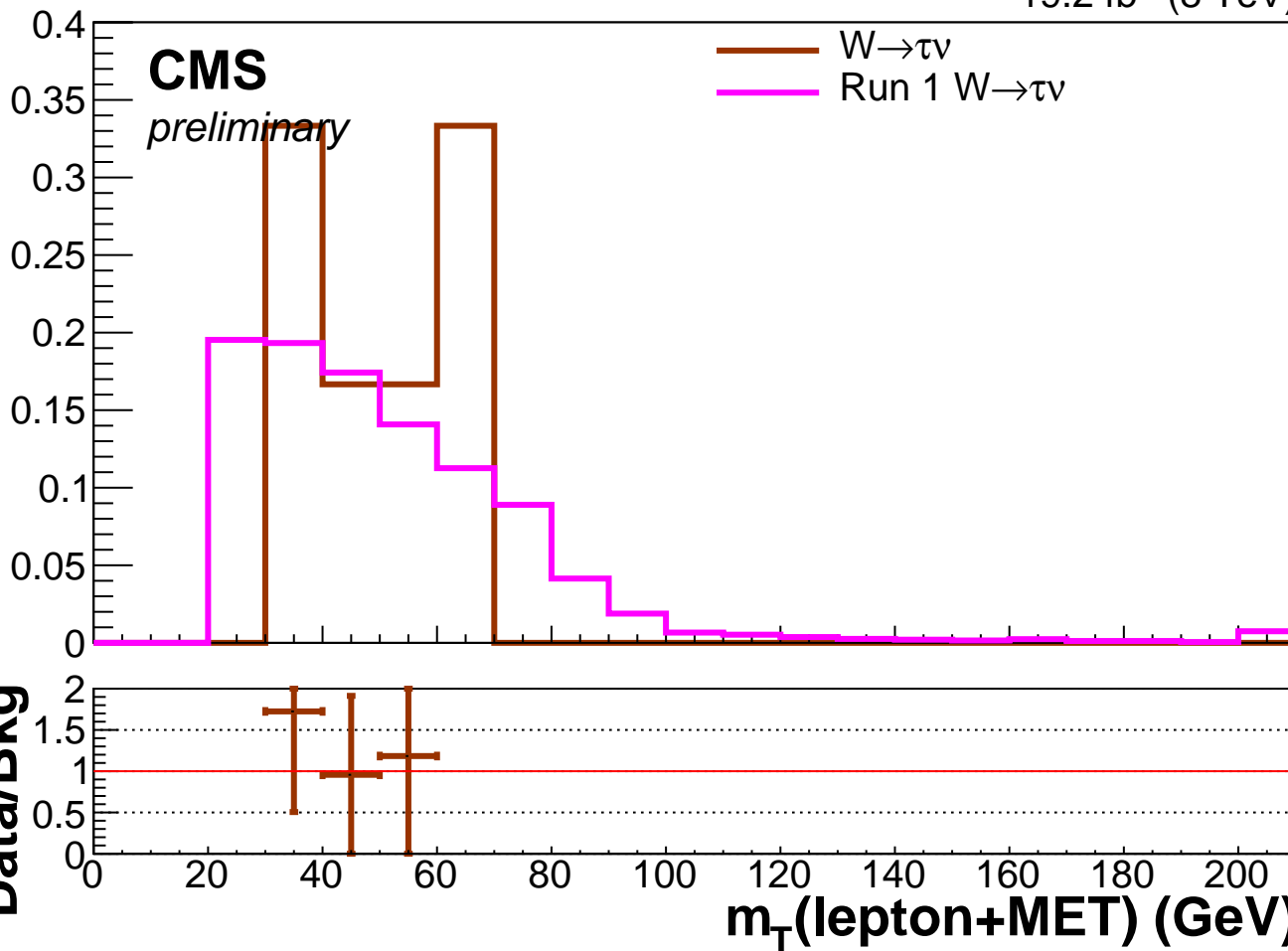
*preliminary*

—  $W \rightarrow \tau \nu$

— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**$m_T(\text{lepton}+\text{MET})$  (GeV)**



19.2 fb<sup>-1</sup> (8 TeV)

**CMS**

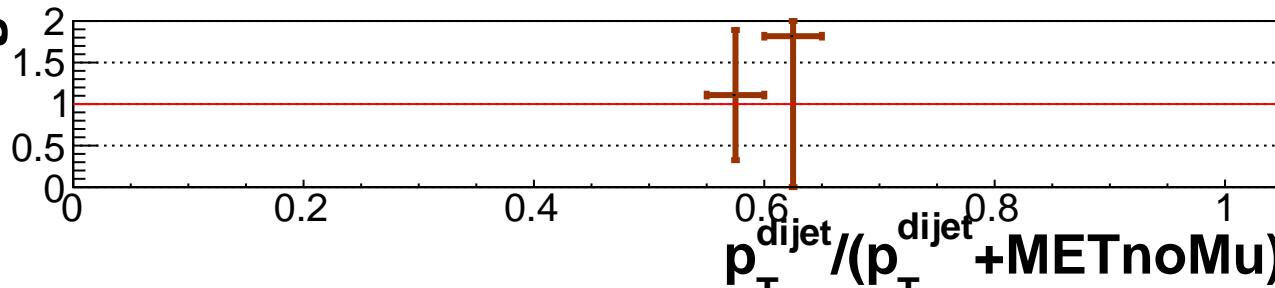
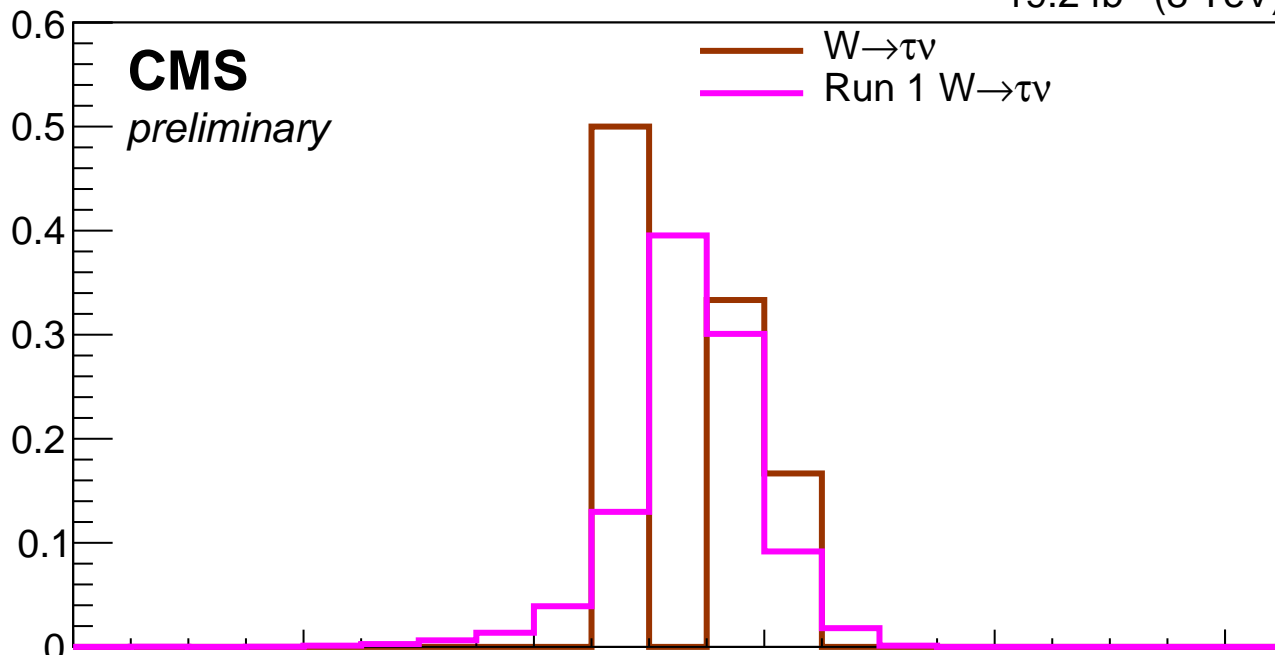
*preliminary*

—  $W \rightarrow \tau \nu$

— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

$p_T^{\text{dijet}} / (p_T^{\text{dijet}} + \text{MET}_{\text{noMu}})$



19.2 fb<sup>-1</sup> (8 TeV)

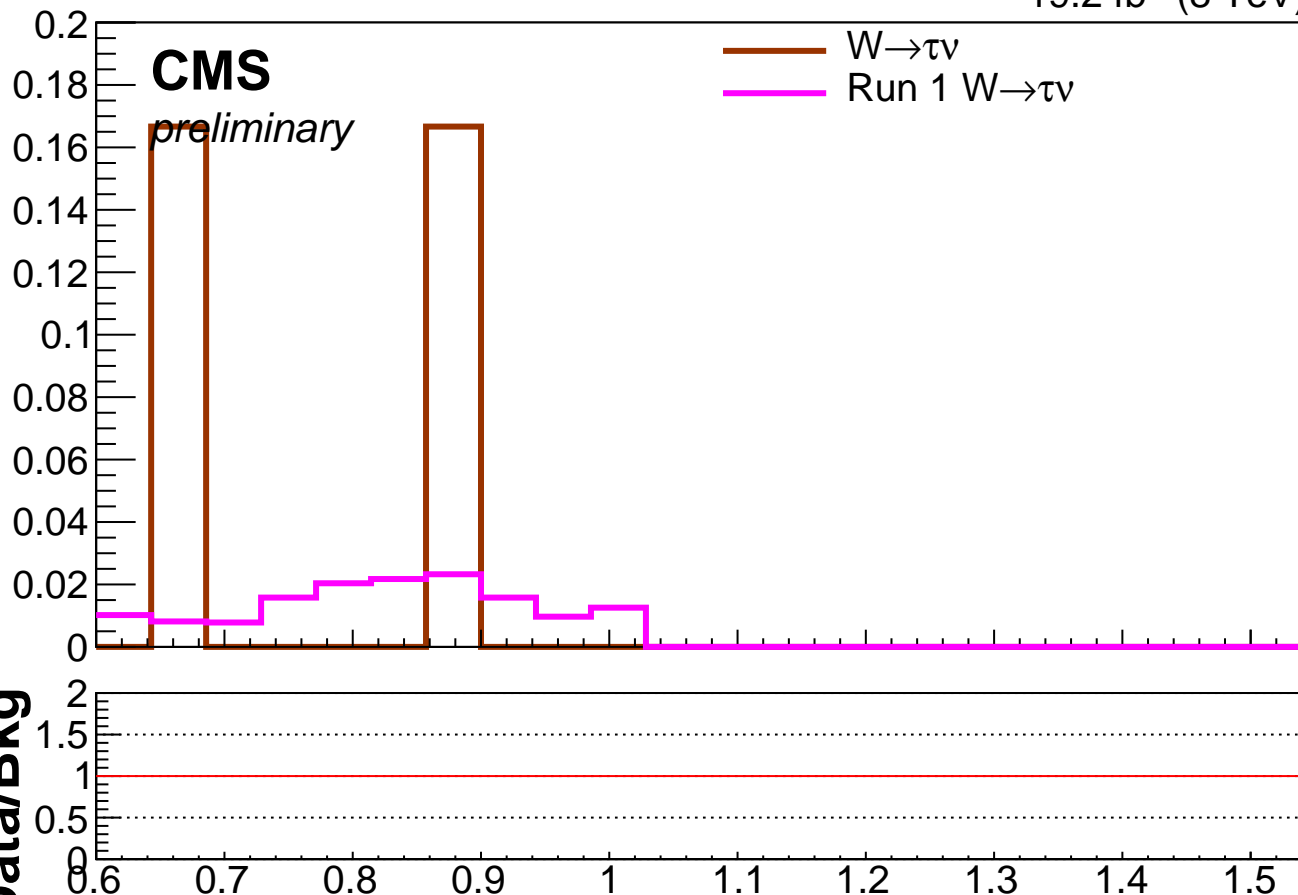
**CMS**

*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**Jet 1 CSV**

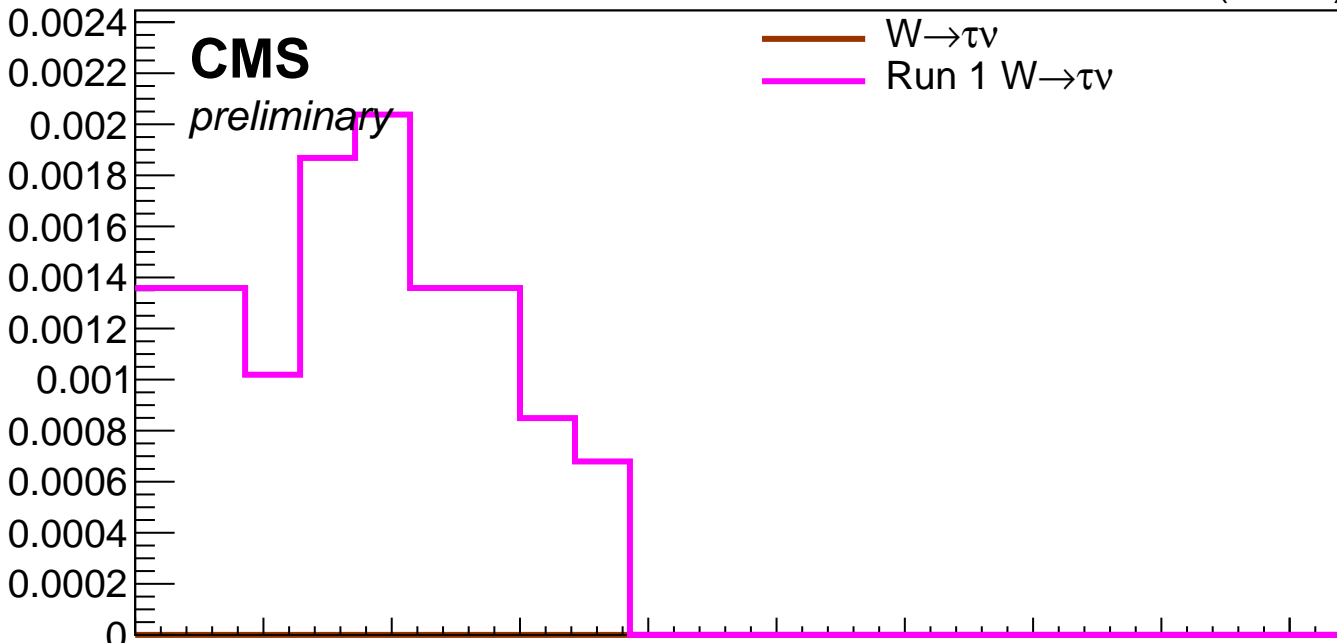


19.2 fb<sup>-1</sup> (8 TeV)

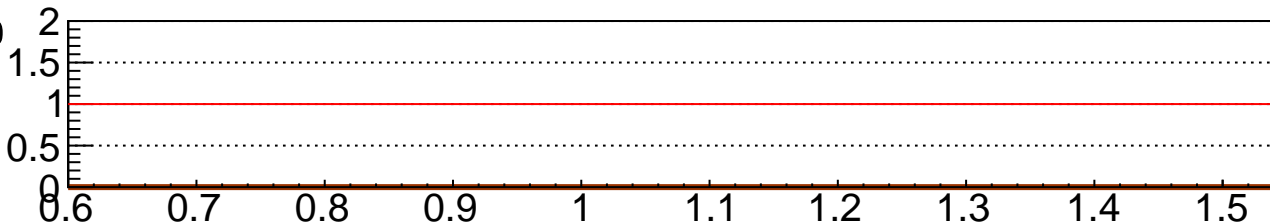
**CMS**

*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$



**Data/Bkg**

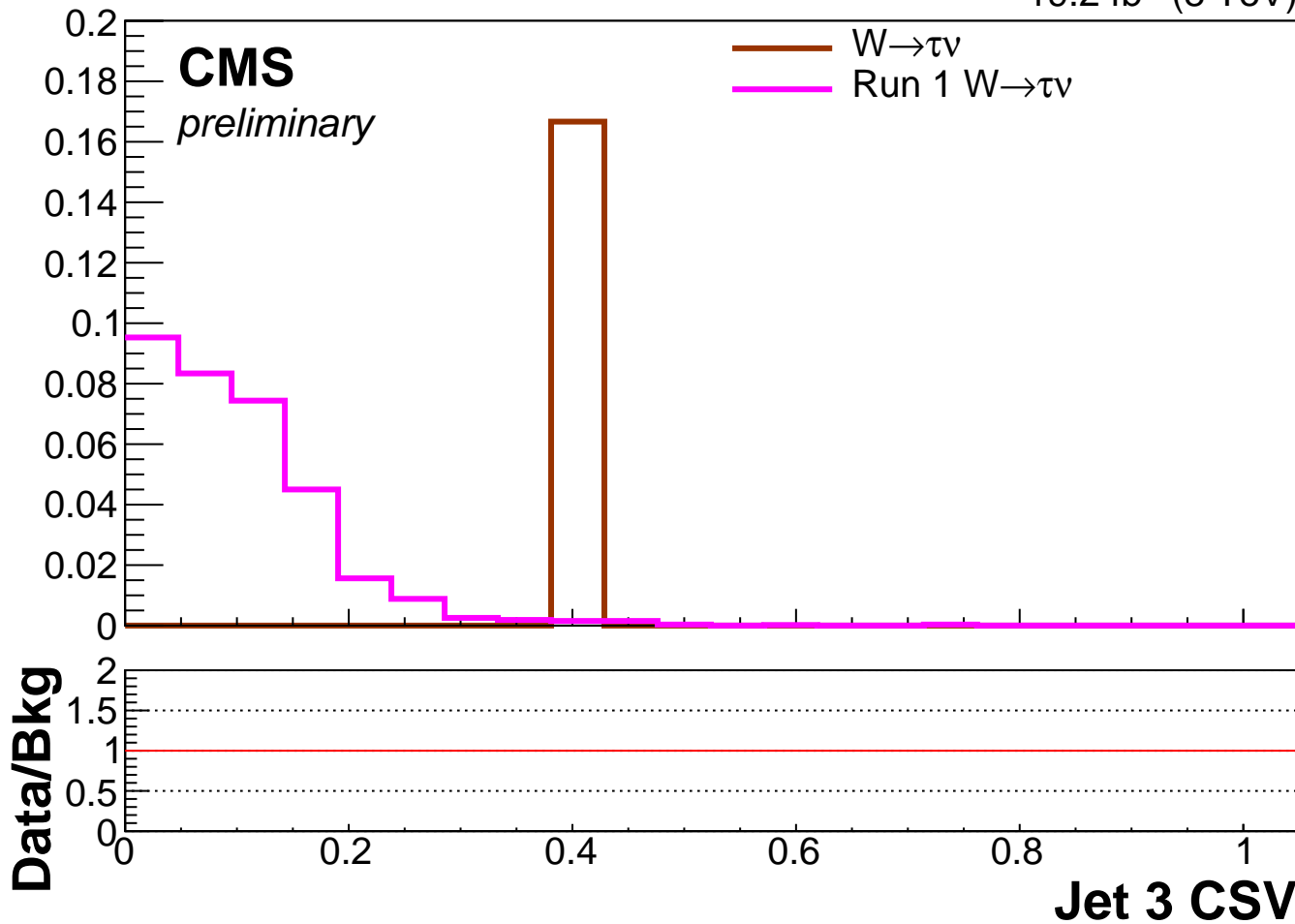


**Jet 2 CSV**

19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$



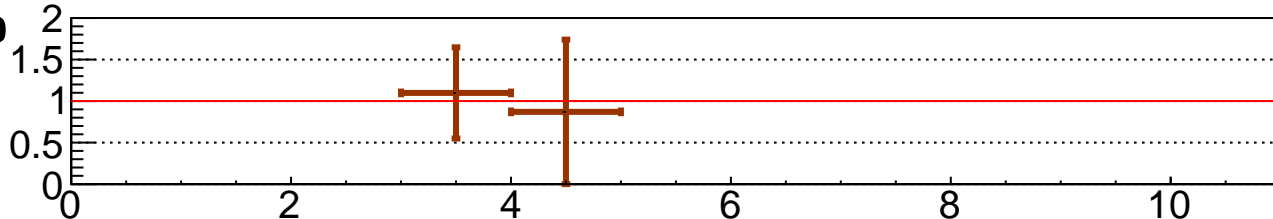
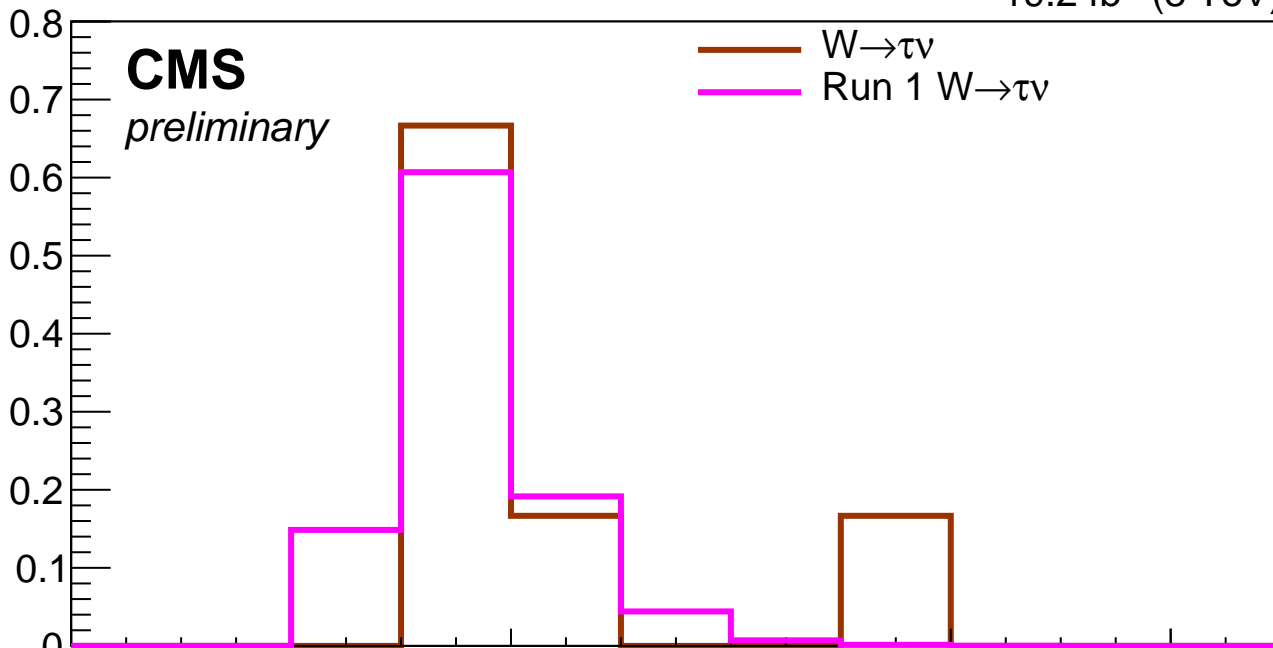
19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

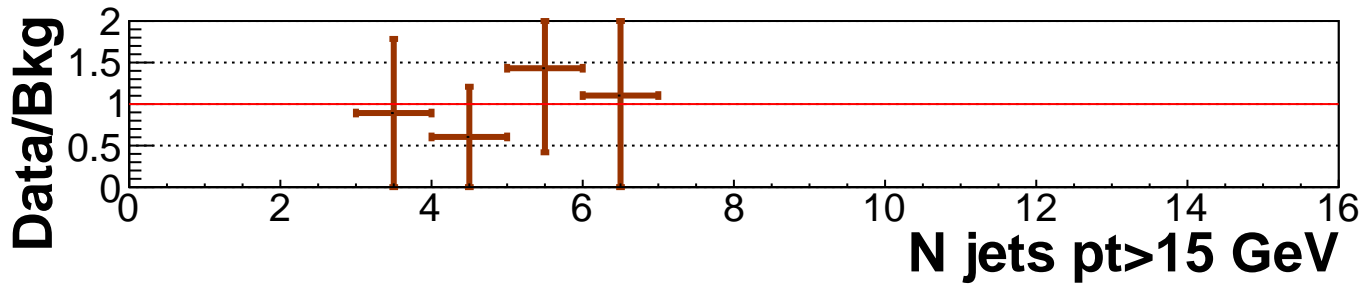
**N jets pt>30 GeV**



19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$





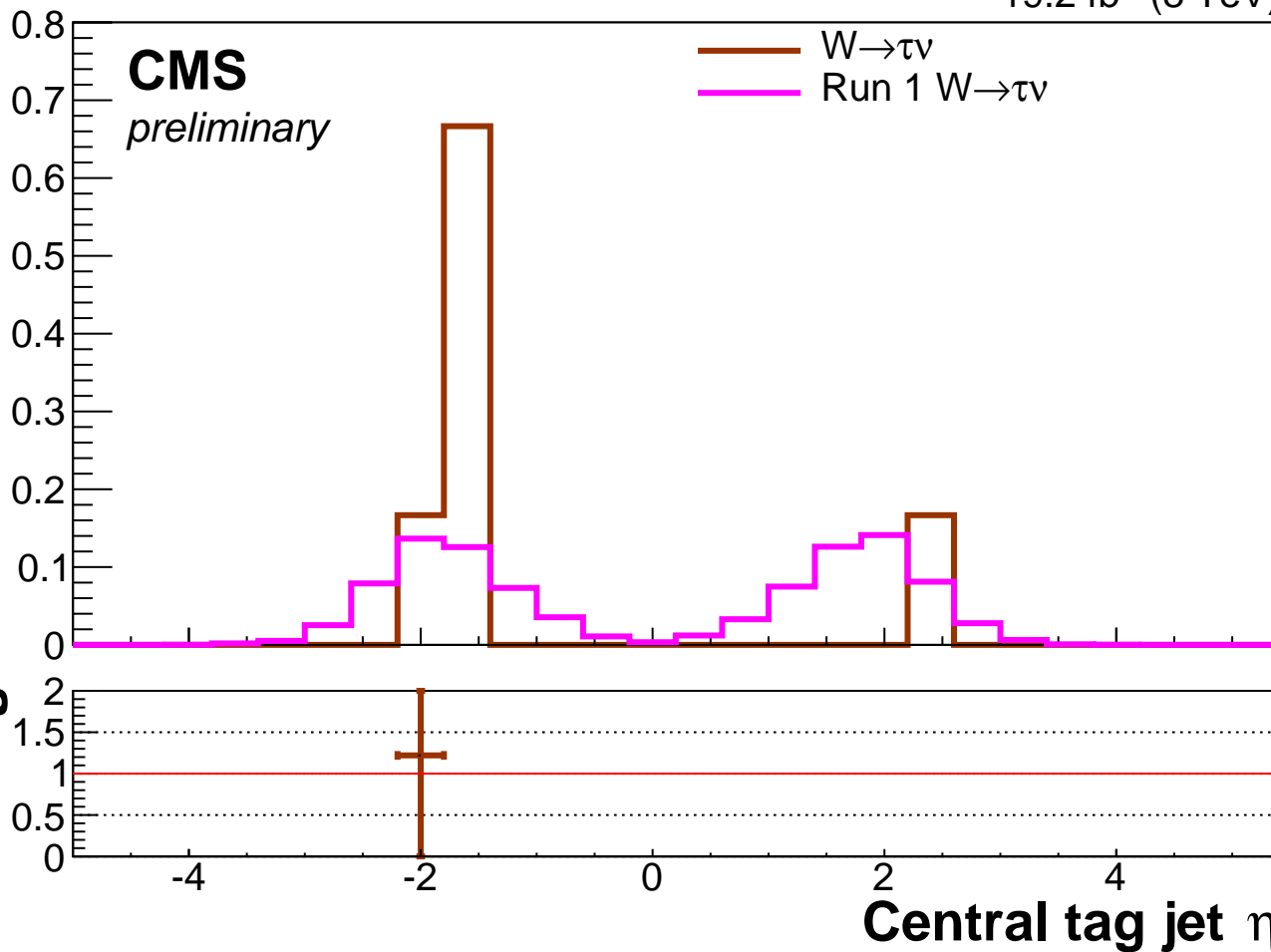
19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**Central tag jet  $\eta$**



19.2 fb<sup>-1</sup> (8 TeV)

**CMS**  
*preliminary*

—  $W \rightarrow \tau \nu$   
— Run 1  $W \rightarrow \tau \nu$

**Data/Bkg**

**Forward tag jet  $\eta$**

