QUICK UPDATE

8 TeV–13 TeV comparisons

~~G. Aad et. al.~~ Number 6, Number 1

University of Glasgow

2016-05-18

a single, big image

an animated image (compatible with Adobe Reader)

a video (compatible with Okular)

itemized list

- item
- item
  - subitem
  - subitem
    - subitem
- item
- item

enumerate list

1. item
2. item
   1. subitem
   2. subitem
      1. subitem
3. item
4. item

description list

A item

B item

- A subitem
- B subitem
  - A subitem

C item

D item

description list with checkmarks

- ✓ item
- ✓ item
  - ✓ subitem
  - subitem
    - subitem
- ✓ item
- ✗ item

links

- URL: `http://info.cern.ch/hypertext/WWW/TheProject.html`
- hyperlink: TheProject
- hyperlink: ATL-COM-PHYS-2014-1471

mathematics

- $H^+ \rightarrow tb$
- lepton p_T and η

emoticons

- smiley: 
- frownie: 
- neutralie: 

centered text

some centered text

some more centered text

blocks

block 1

- item
- item

block 2

- item
- item

columns (2)

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multiple columns (2)

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multiple columns (4)

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positioning by textblock

- item 1
- item 2
- item 3

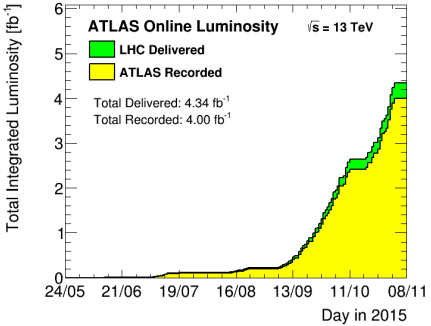
- item 1
- item 2
- item 3

- item 1
- item 2
- item 3

- item 1
- item 2
- item 3

positioning by textblock

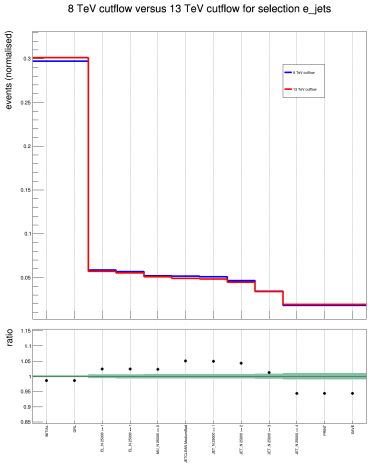
- suppressed with respect to other Higgs modes
- $H \to b\bar{b}$ has the largest branching ratio (0.577 for m_H 125 GeV)
- irreducible background from $t\bar{t}b\bar{b}$
- other backgrounds: $t\bar{t}$ production in association with light quarks (u, d, s) or gluon jets
  (called $t\bar{t}$ + light), and $t\bar{t} + c\bar{c}$

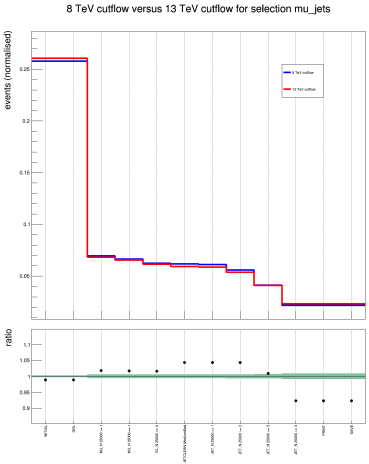


$\sqrt{s}$ (TeV)	7	8	13	14
$t\bar{t}H$ ($m_H = 125$ GeV) (pb)	0.086	0.130	0.5085	0.611
$t\bar{t}$ (pb)	177	253	832	950
$S/\sqrt{B}$	0.00646	0.0082	0.0176	0.0198

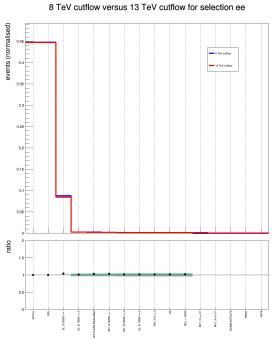
7 TeV $\to$ 13/14 TeV: $S/\sqrt{B}$ changes by factor of $\simeq$3

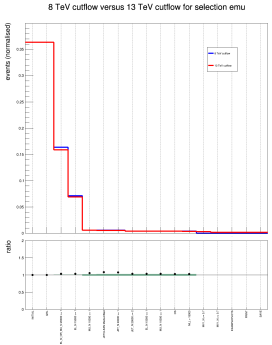
8 TeV vs. 13 TeV: cutflow for l + jets

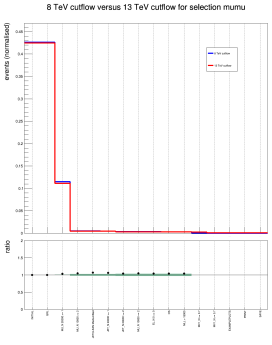




8 TeV vs. 13 TeV: cutflow for dilepton

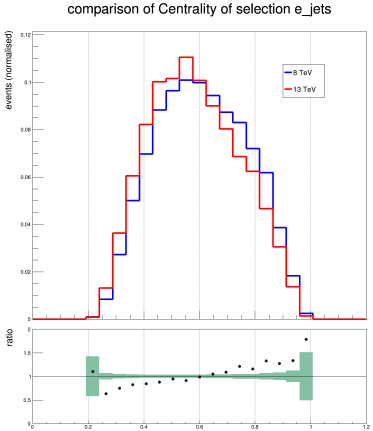


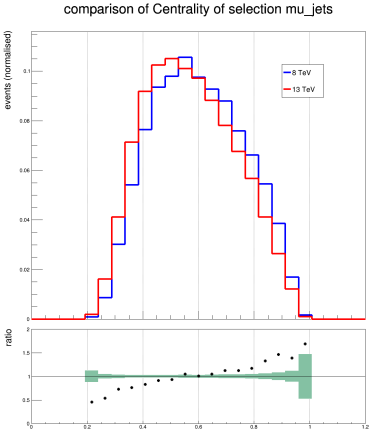




I3PD+SV1: https://indico.cern.ch/event/387410/contribution/9/material/slides/0.pdf

8 TeV vs. 13 TeV: centrality





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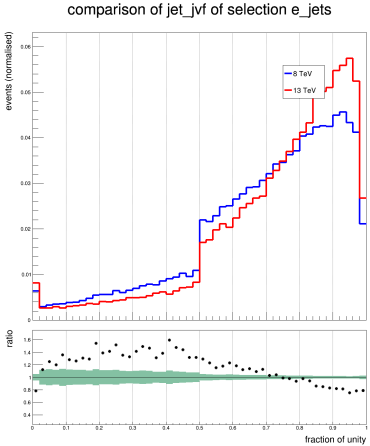
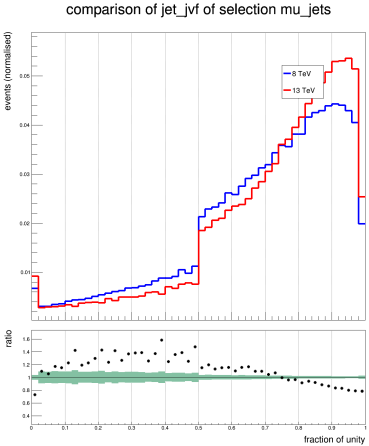
8 TeV vs. 13 TeV: JVF





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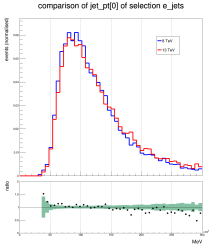
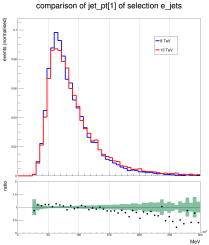
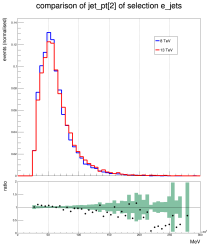
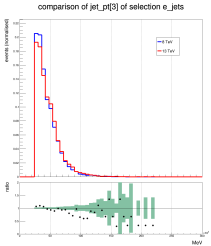
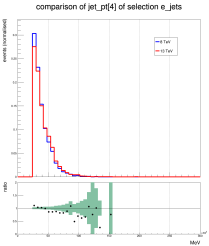
8 TeV vs. 13 TeV: subleading jets p_T of e selection

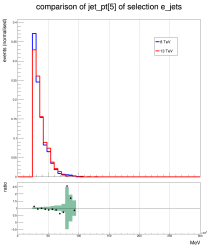












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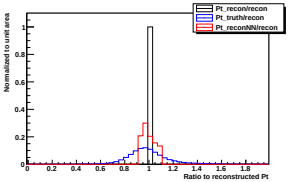
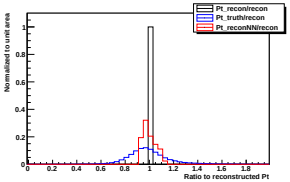
p_T ratio results for training with epochs of interest

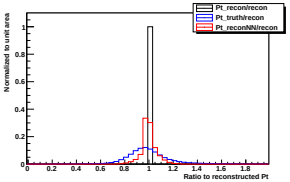
40 epochs:



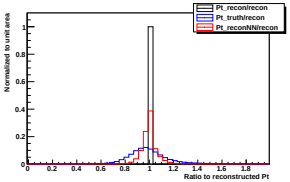
100 epochs:



145 epochs:



300 epochs:



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neural networks and input variables

Four neural networks with progressively increasing input information were defined, all trained through 250 epochs (training cycles). NN0 comprises only the μ-in-jet and p_T-only NN corrections, as opposed to further NN corrections.

neural network designation	input variables
NN0	no new neural network applied
NN1	Et, SumPtTrk, Width
NN2	Et, SumPtTrk, Width, MET
NN3	Et, SumPtTrk, Width, MET, METPhi, JetPhi

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per-event $M_{b\bar{b}}$ resolutions with use of MET direction

$M_{b\bar{b}}$ resolutions for $VH_{b\bar{b}}$ for progressively decreasing MET energy cut requirements for various neural networks, shown to 3 significant figures:

selection	events	NN0	NN1	NN2	NN3
$VH_{b\bar{b}}$	23686	0.133	0.129	0.131	0.131
$VH_{b\bar{b}} + \mathrm{MET} < 100\ \mathrm{GeV}$	22654	0.132	0.130	0.129	0.131
$VH_{b\bar{b}} + \mathrm{MET} < 70\ \mathrm{GeV}$	21094	0.131	0.128	0.129	0.129
$VH_{b\bar{b}} + \mathrm{MET} < 40\ \mathrm{GeV}$	15050	0.128	0.126	0.126	0.126
$VH_{b\bar{b}} + \mathrm{MET} < 20\ \mathrm{GeV}$	6174	0.130	0.127	0.126	0.127

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per event $M_{b\bar{b}}$ resolutions with use of MET direction

Here, the physical processes are ranked according to the effectiveness of the corresponding behaviour they induce in NN3, where a greater effectiveness is taken to mean a smaller resolution value. *Caveat:* Systematic uncertainties are not given their due consideration.

selection	events	NN0	NN1	NN2	NN3
$VH_{b\bar{b}} + \mathrm{MET} > 100\ \mathrm{GeV}$	1032	0.121542	0.129038	0.13072	0.116975
$VH_{b\bar{b}} + \mathrm{MET} < 40\ \mathrm{GeV}$	15050	0.128387	0.125939	0.125637	0.125963
$VH_{b\bar{b}} + \mathrm{MET} < 20\ \mathrm{GeV}$	6174	0.129539	0.127454	0.126029	0.127043
$VH_{b\bar{b}} + \mathrm{MET} < 70\ \mathrm{GeV}$	21094	0.131248	0.128119	0.128908	0.128825
$VH_{b\bar{b}} + \mathrm{MET} < 100\ \mathrm{GeV}$	22654	0.132004	0.129924	0.129095	0.130467
$VH_{b\bar{b}}$	23686	0.132823	0.129032	0.131202	0.131303
$VH_{b\bar{b}} + \mathrm{MET} > 20\ \mathrm{GeV}$	17512	0.135974	0.13137	0.13366	0.132341
$VH_{b\bar{b}} + \mathrm{MET} > 40\ \mathrm{GeV}$	8636	0.140116	0.135415	0.140013	0.140551
$VH_{b\bar{b}} + \mathrm{MET} > 70\ \mathrm{GeV}$	2592	0.143505	0.15228	0.151469	0.155914

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$m_{b\bar{b}}$ value results for training with epochs of interest

$m_{b\bar{b}}$ resolution results (Gaussian fit) for training with epochs of interest:

		epochs			
		40	100	145	300
subset	training	0.137	0.138	0.138	0.138
	training test	0.139	0.139	0.139	0.139

$m_{b\bar{b}}$ resolutions with and without MET

comparison of $m_{b\bar{b}}$ resolutions for various channels both excluding and including the MET variable with various epochs:

number of epochs		$l\nu bb$	$llbb$	$\nu\nu bb$	all
50	without MET	0.135159	0.138616	0.135159	0.137488
	with MET	0.130047	0.137266	0.136842	0.138516
	change	-3.78%	-0.97%	+1.24%	+0.75%
100	without MET	0.134537	0.138781	0.13656	0.13743
	with MET	0.129719	0.137265	0.136247	0.138948
	change	-3.58%	-1.09%	-0.22%	+1.1%
150	without MET	0.13676	0.138464	0.137943	0.13747
	with MET	0.138292	0.137261	0.137344	0.138948
	change	+1.12%	-0.87%	-0.43%	+1.07%
500	without MET	0.139041	0.139451	0.13849	0.13827
	with MET	0.139225	0.137261	0.136398	0.138948
	change	+0.13%	+1.6%	-1.51%	-0.48%

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embedded data

The following is an embedded data file:

↓ data.root

The following is an embedded sound file:

Omnichord.wav

TTHbbLeptonic development team

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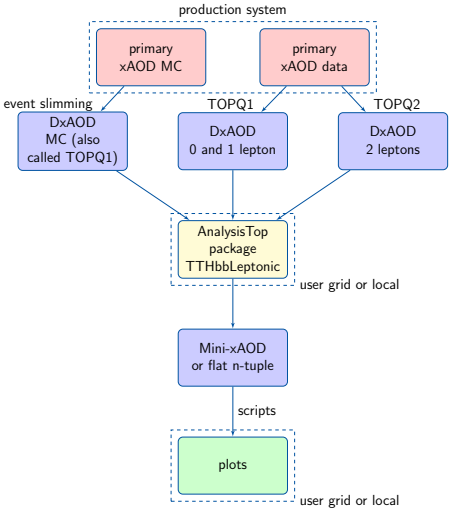
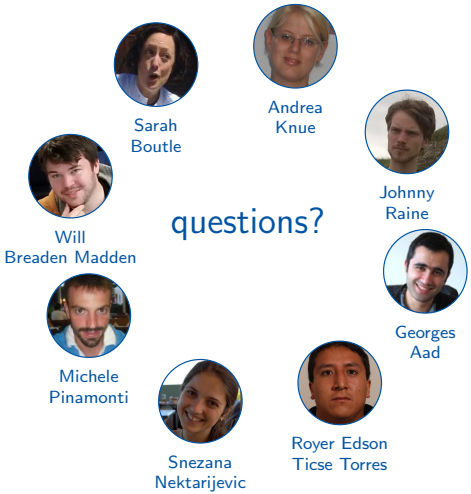
analysis framework



questions?



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