

# QUICK UPDATE

## 8 TeV–13 TeV comparisons

G. Aad et. al. [Number 6](#), Number 1

University of Glasgow

2015-10-05



University  
of Glasgow | Experimental  
Particle Physics

# 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  $\eta$

# 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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poterat nisi in secessu, etiam  
in secessu, non poterat nisi  
in magna turba.*

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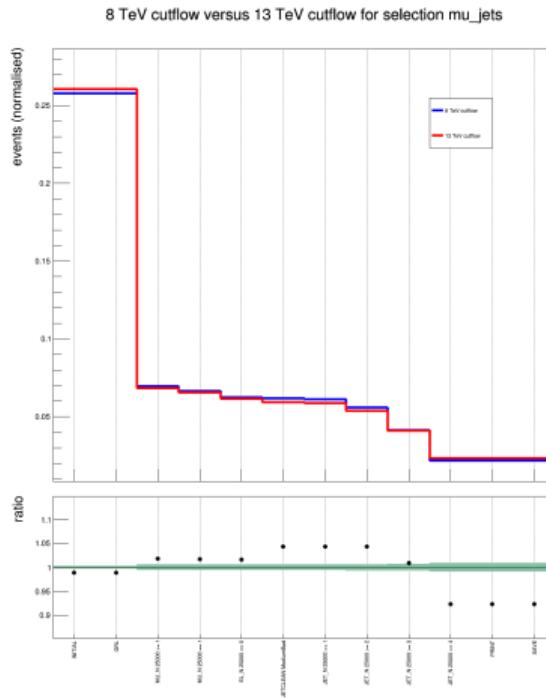
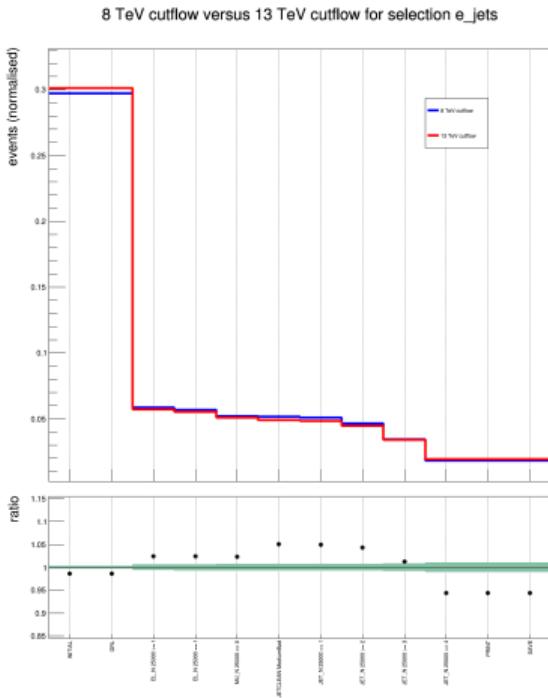
# multiple columns (4)

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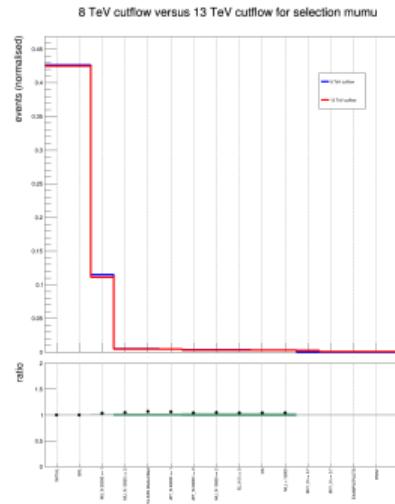
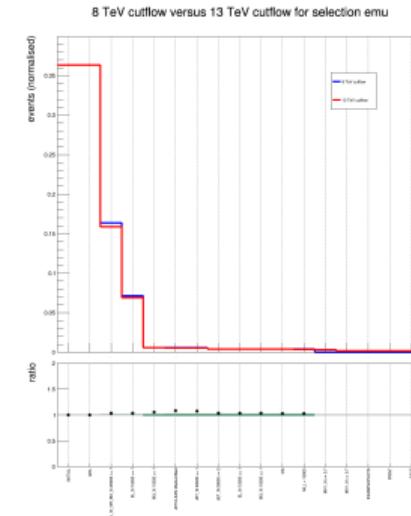
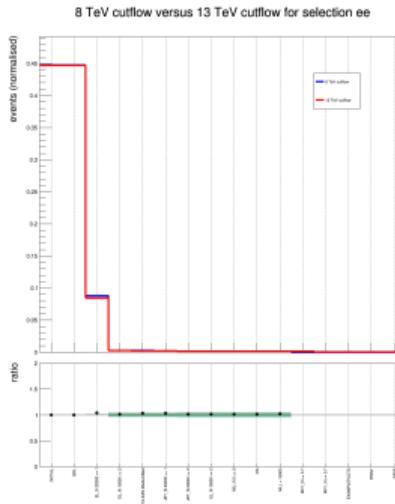
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arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo. Nullam dictum felis eu pede mollis pretium.

## 8 TeV vs. 13 TeV: cutflow for $l + \text{jets}$

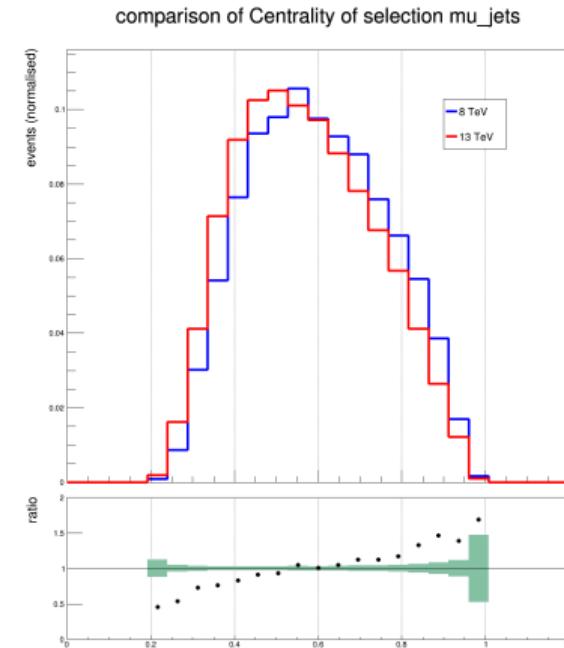
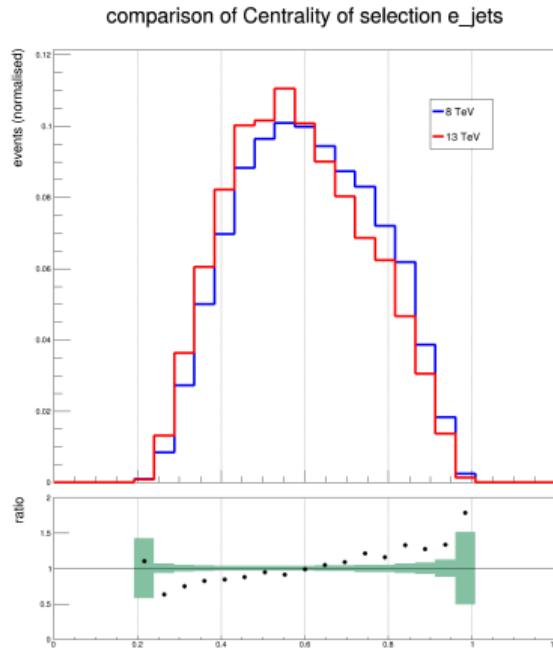


# 8 TeV vs. 13 TeV: cutflow for dilepton

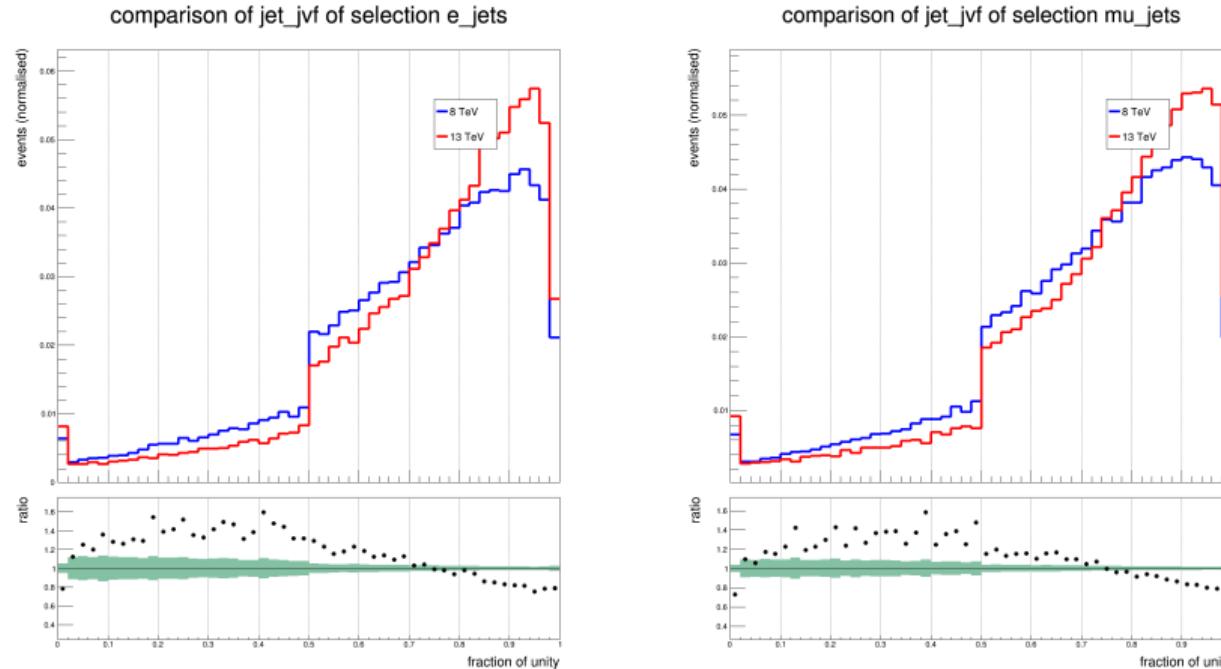


I3PD+SV1: <https://indico.cern.ch/event/387410/contribution/9/material/slides/0.pdf>

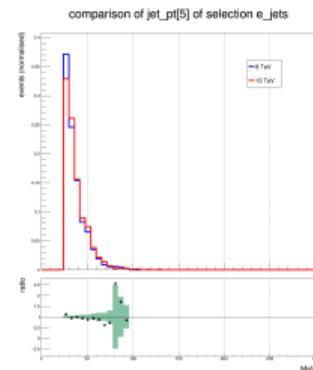
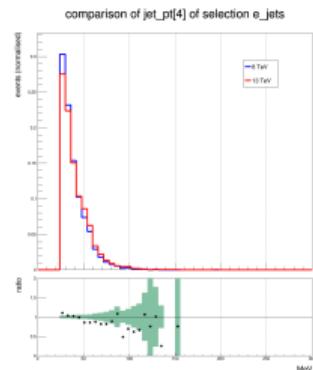
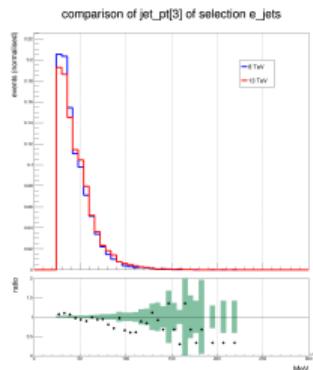
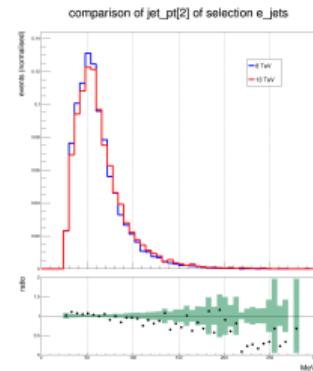
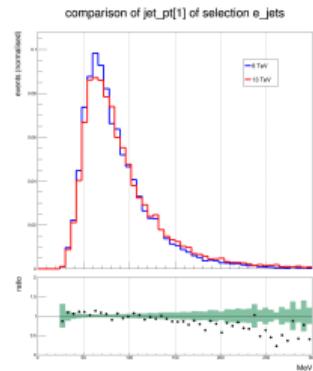
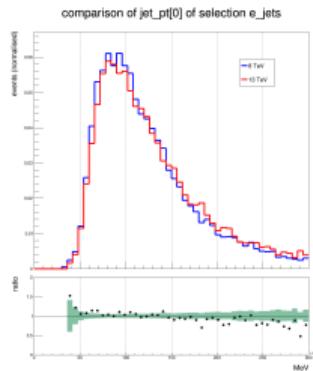
# 8 TeV vs. 13 TeV: centrality



# 8 TeV vs. 13 TeV: JVF

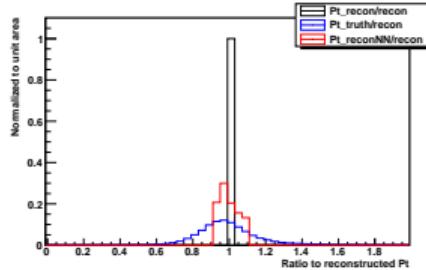


# 8 TeV vs. 13 TeV: subleading jets $p_T$ of $e$ selection

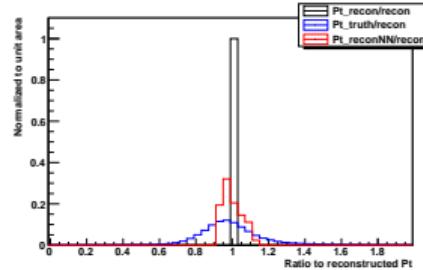


# $p_T$ ratio results for training with epochs of interest

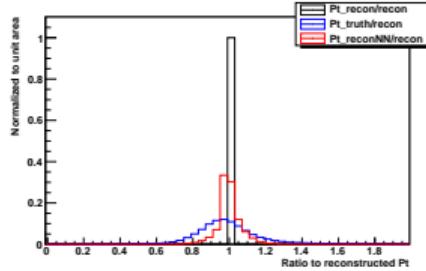
40 epochs:



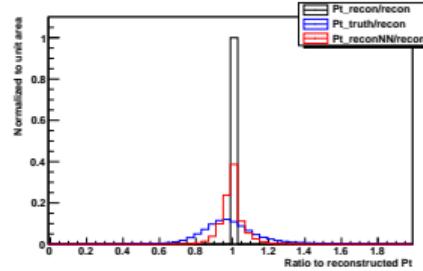
100 epochs:



145 epochs:



300 epochs:



# 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  $\mu$ -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	$E_t$ , SumPtTrk, Width
NN2	$E_t$ , SumPtTrk, Width, MET
NN3	$E_t$ , SumPtTrk, Width, MET, METPhi, JetPhi

# 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
$VH_{b\bar{b}} + \text{MET} < 100 \text{ GeV}$	22654	0.132	0.130	0.129	0.131
$VH_{b\bar{b}} + \text{MET} < 70 \text{ GeV}$	21094	0.131	0.128	0.129	0.129
$VH_{b\bar{b}} + \text{MET} < 40 \text{ GeV}$	15050	0.128	0.126	0.126	0.126
$VH_{b\bar{b}} + \text{MET} < 20 \text{ GeV}$	6174	0.130	0.127	0.126	0.127

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

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

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

subset		epochs			
		40	100	145	300
	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%

# embedded data

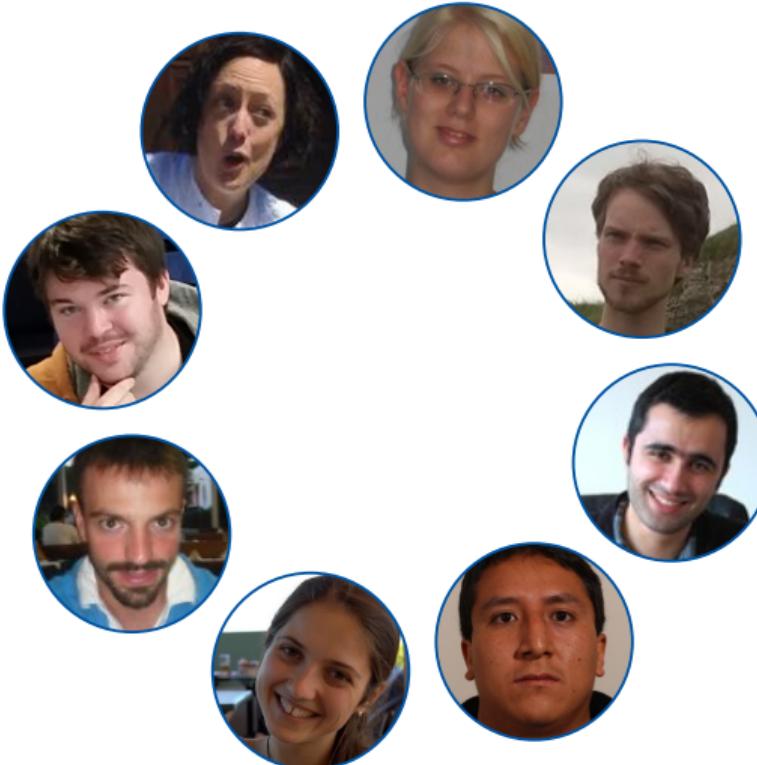
The following is an embedded data file:



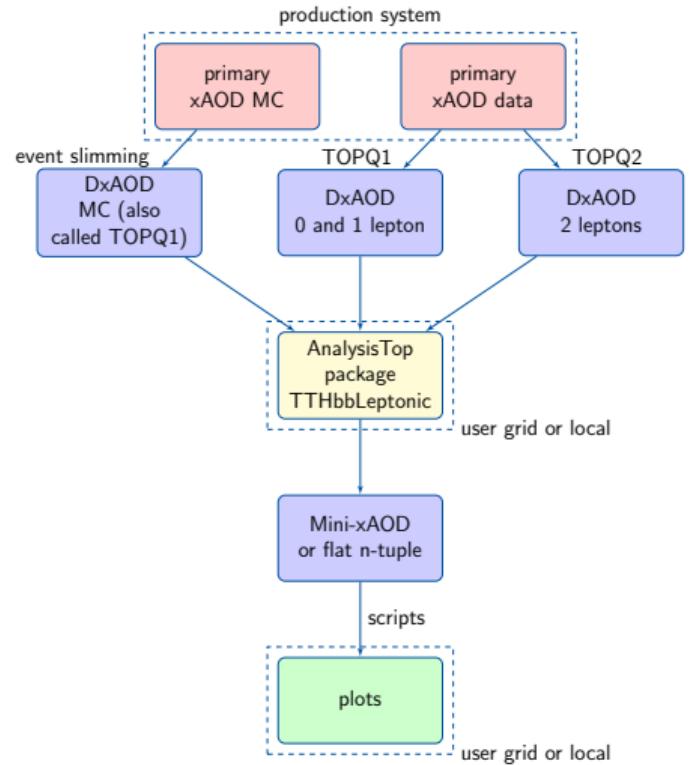
The following is an embedded sound file:



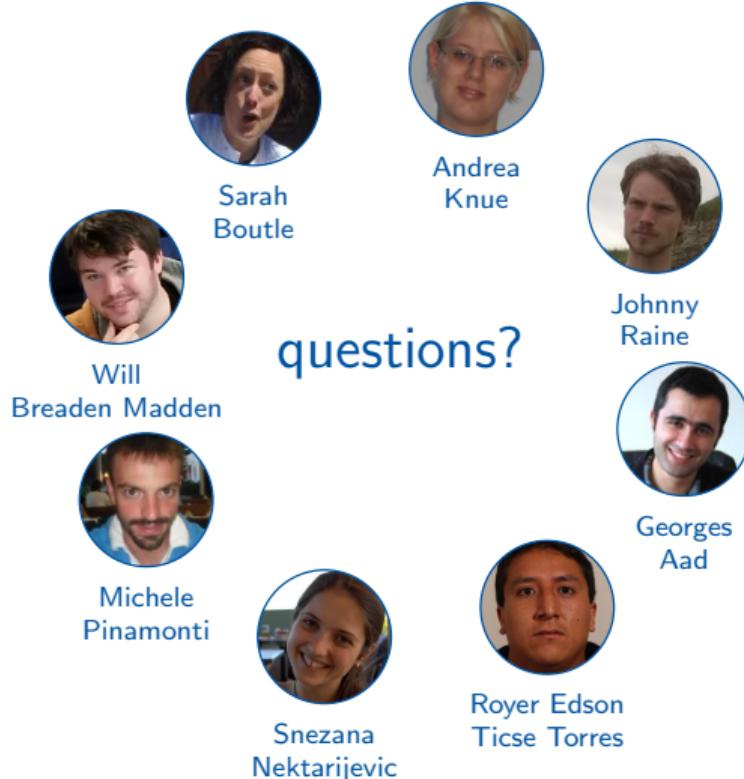
# TTHbbLeptonic development team



# analysis framework



# questions?



END