Processes

Processes:

- Signal: $ZH \rightarrow aa \rightarrow 4b$
- Background: Drell-Yan 4 jets $\rightarrow ll$

- Signal: $WH \rightarrow aa \rightarrow 4b$
- Background: $t\,t(bar) \rightarrow$ Hadronic

Object Configuration

- **Leptons**:
  - Kinematics:
    - $p_t \geq 20\,GeV$
    - $\eta \leq 2.4$
  - Pass id & isolation
- **Jets**:
  - Kinematics:
    - $p_t \geq 20\,GeV$
    - $\eta \leq 2.5$
  - Check overlap with leptons
- **Fat jets**
  - Kinematics:
    - $p_t \geq 30\,GeV$
    - $\eta \leq 2.5$
- **Secondary Vertices**
  - # of associated tracks > 2
  - Geometric requirements

Cuts

Cuts after configuration:

- Non-zero # of leptons
- # jets $\geq$ 1
- # fjets $\geq$ 2

$ZH \rightarrow aa \rightarrow 4b$

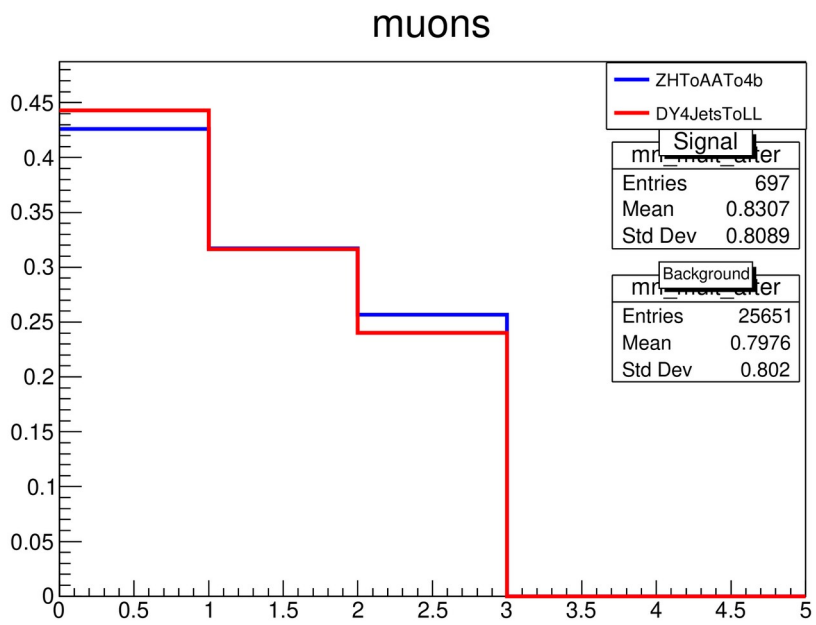
DY 4 jets $\rightarrow ll$

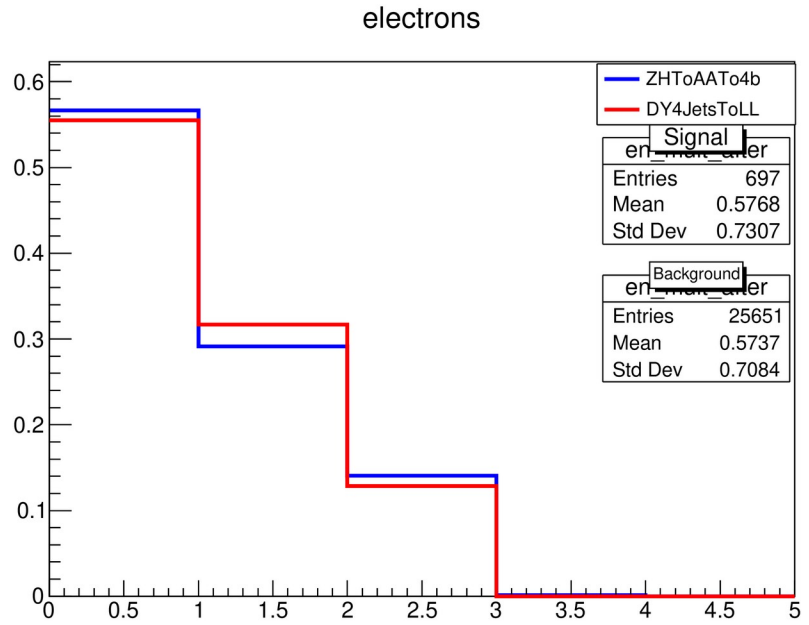
Cut Flow

$ZH \rightarrow aa \rightarrow 4b$		
Requirements	No of Events	Efficiency
Raw	11053	100%
#leptons >0	747	6.75%
# jet $\geq$ 1	741	6.70%
# fjet $\geq$2	697	6.31%

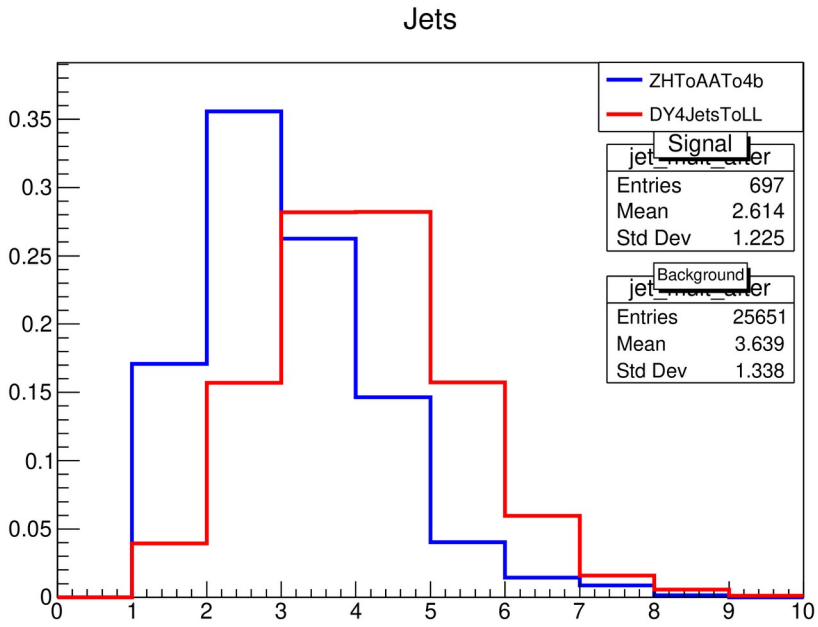
DY 4 jets $\rightarrow ll$		
Requirements	No of Events	Efficiency
Raw	49092	100%
#leptons >0	26305	53.58%
# jet $\geq$ 1	26227	53.42%
# fjet $\geq$ 2	25651	52.26%

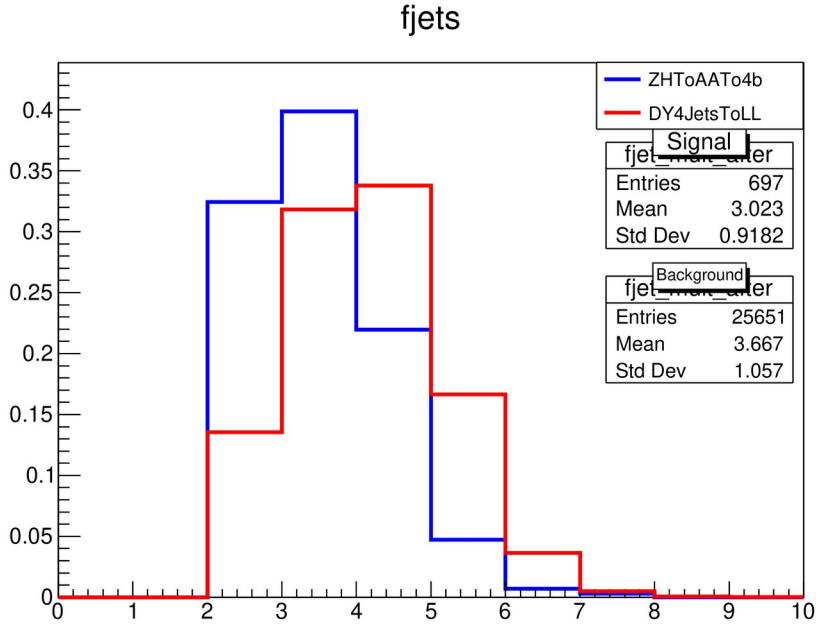
Multiplicities



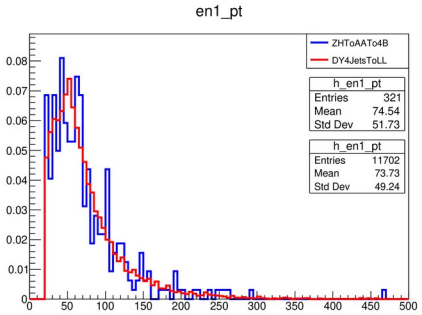


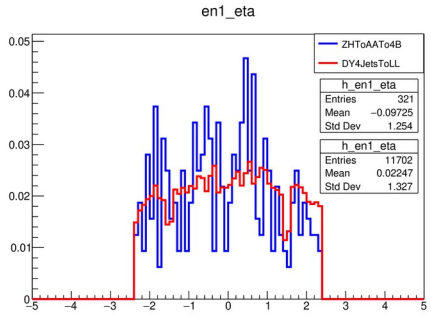
Multiplicities

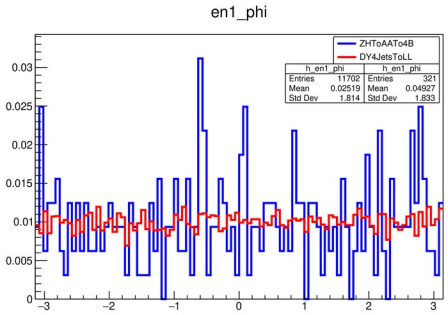


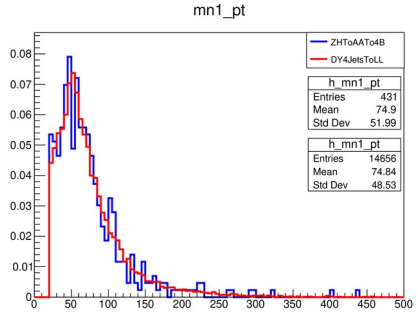


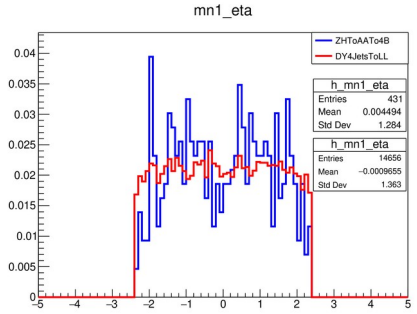
Kinematics – leading leptons

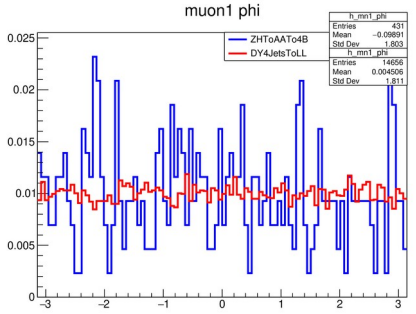




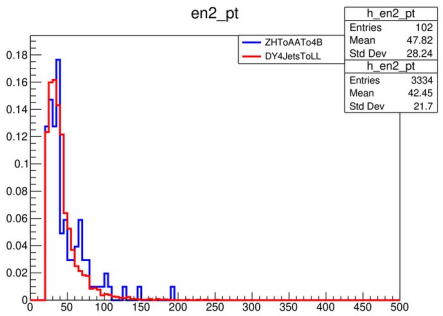


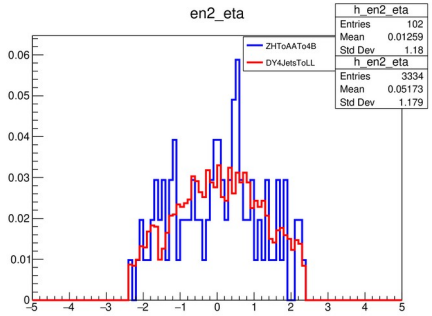


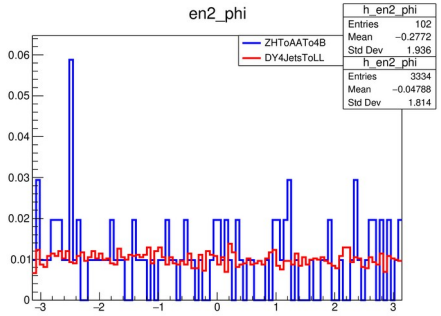


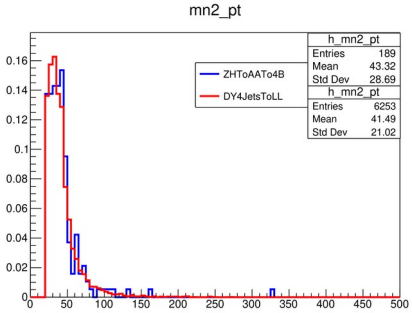


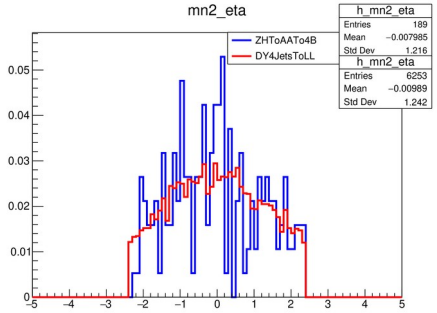
Kinematics – sub-leading (?) leptons

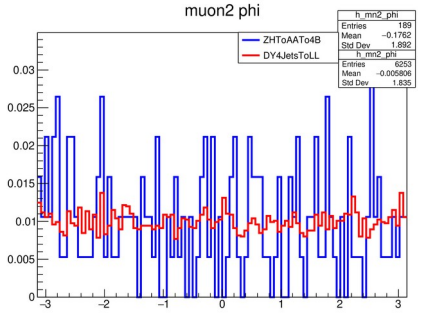




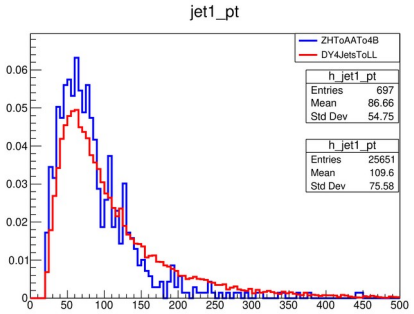


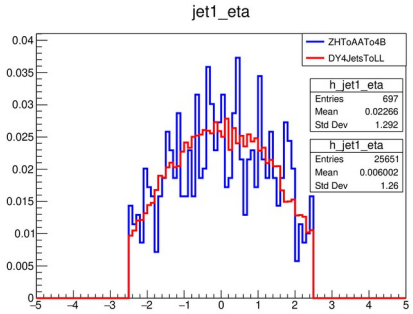


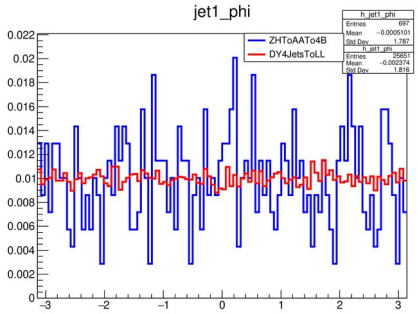


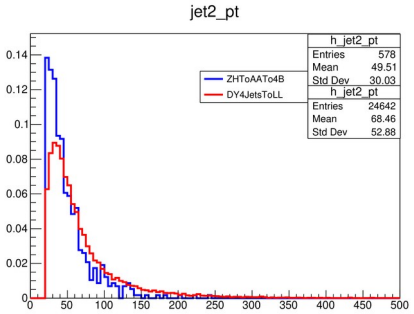


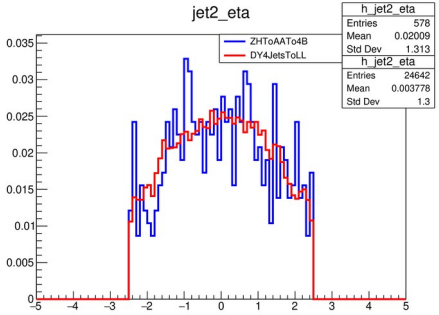
Kinematics – jets 1, 2

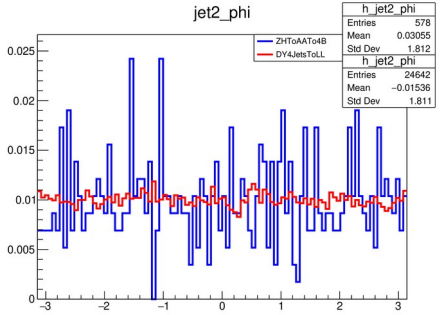




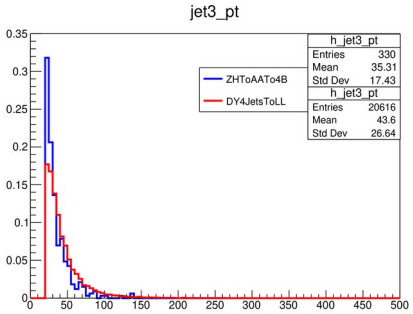


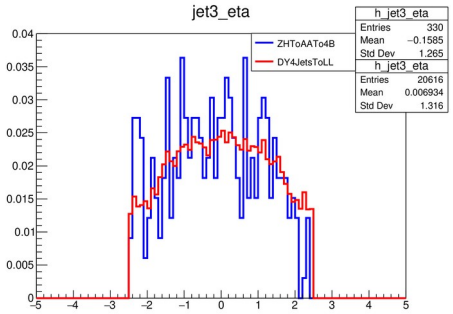


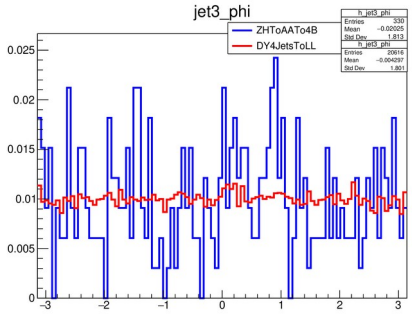


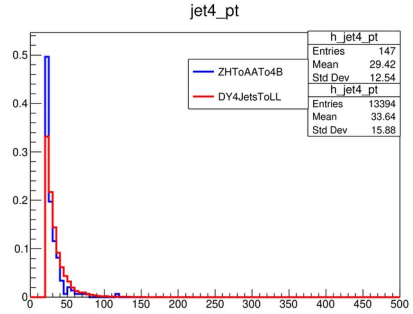


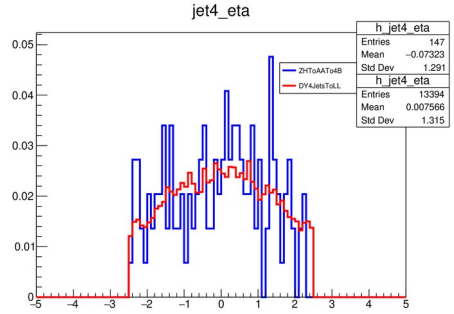
Kinematics – jets 3, 4

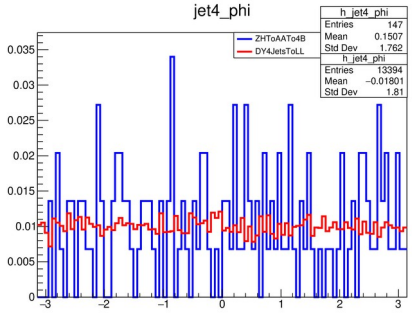




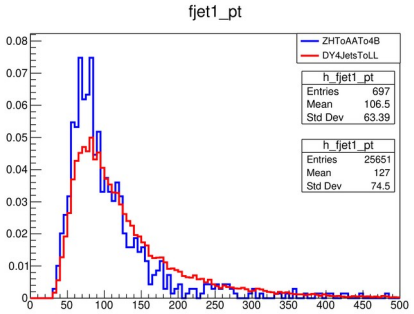


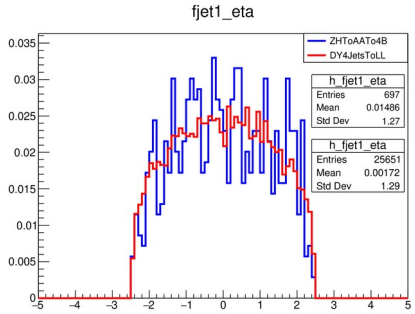


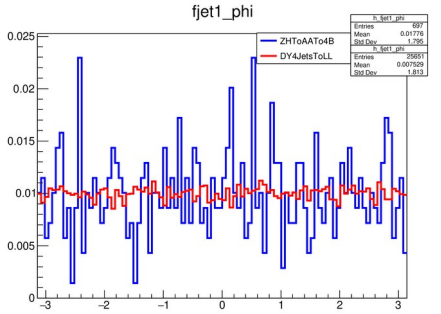


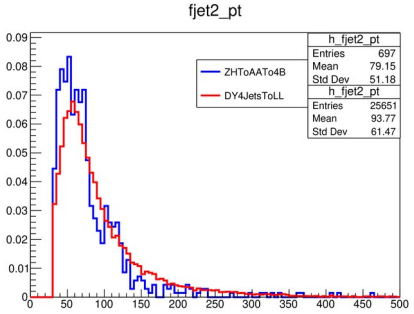


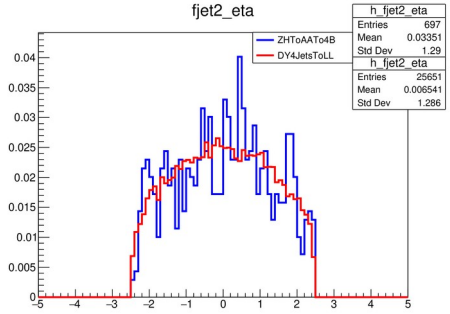
Kinematics - fjets

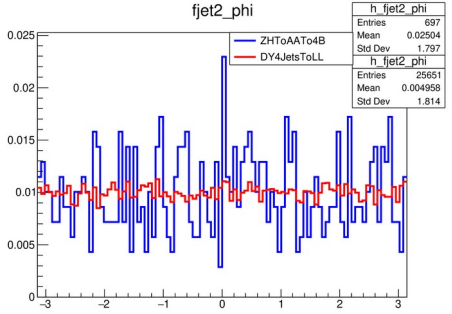












$WH \rightarrow aa \rightarrow 4b$

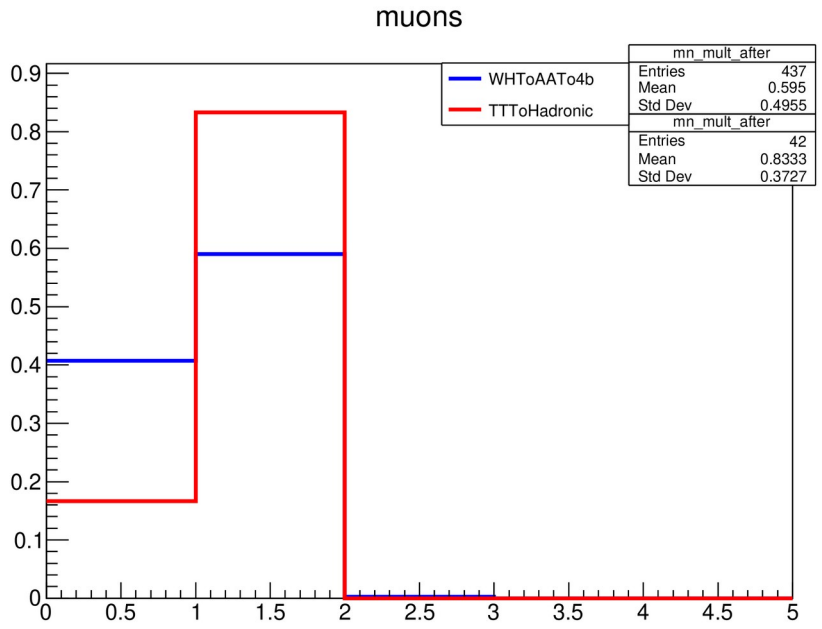
$t\,t\text{-}bar \rightarrow$ Hadronic

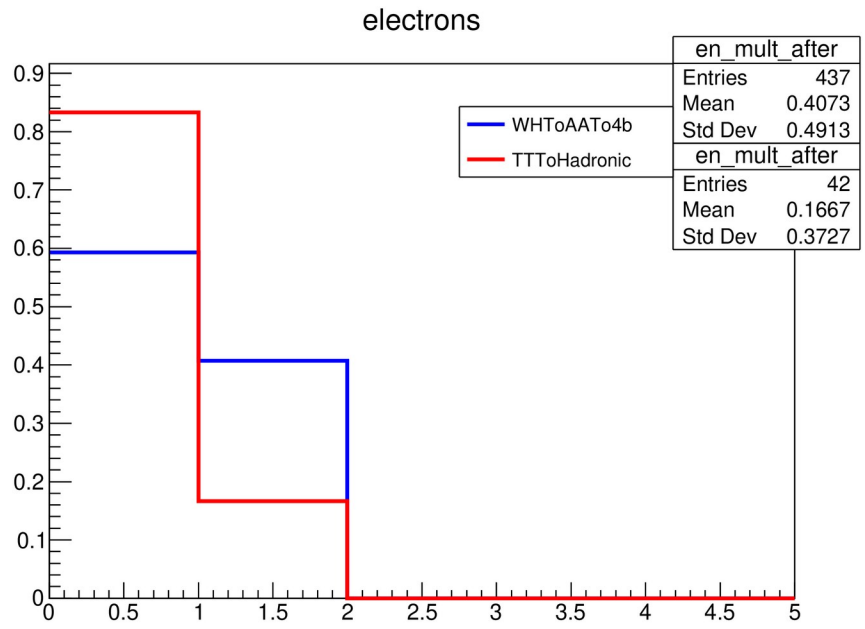
Cut Flow

$WH \rightarrow aa \rightarrow 4b$		
Requirements	No of Events	Efficiency
Raw	3542	100%
#leptons >0	502	14.17%
# jet $\geq$ 1	502	14.17%
# fjet $\geq$2	437	12.34%

$t\,t\text{-}bar \rightarrow$ Hadronic		
Requirements	No of Events	Efficiency
Raw	16952	100%
#leptons >0	42	0.25%
# jet $\geq$ 1	42	0.25%
# fjet $\geq$2	42	0.25%

Multiplicities





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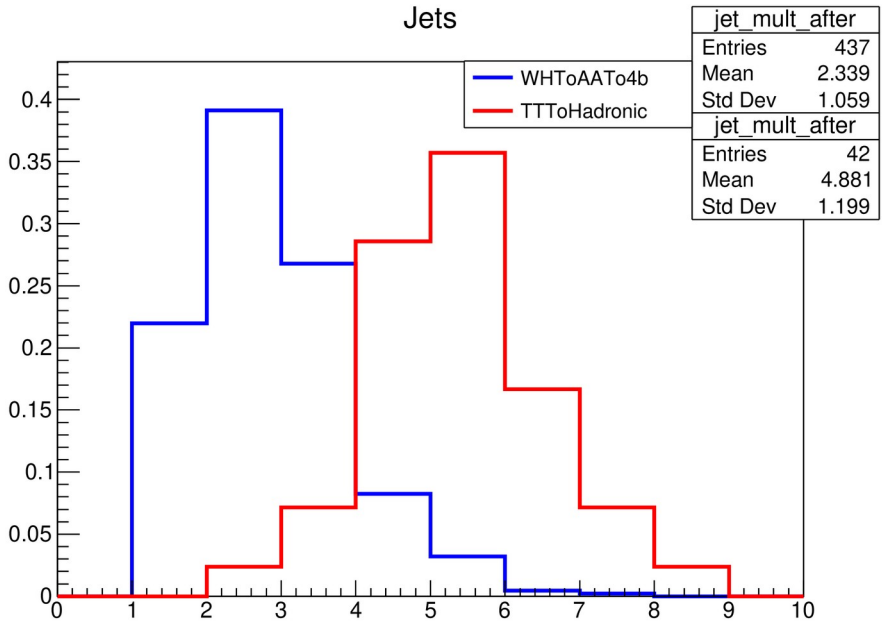
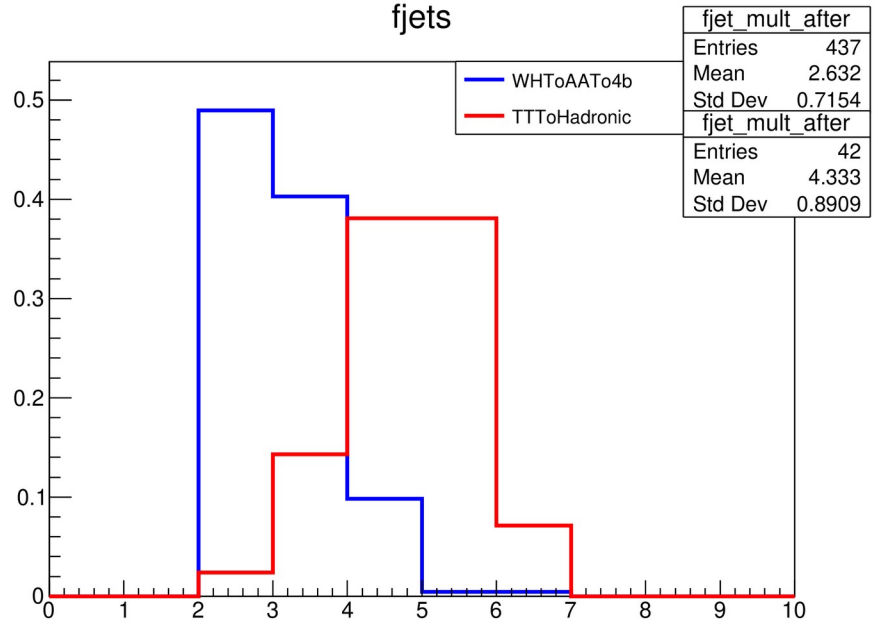
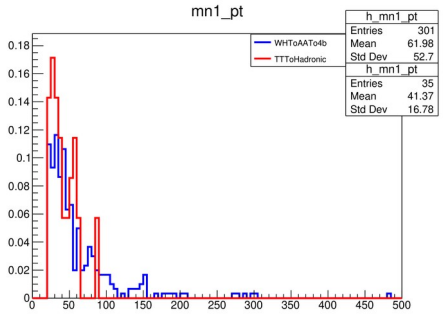
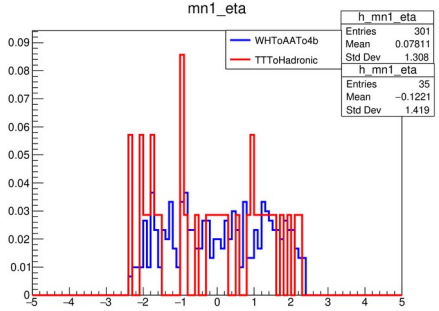
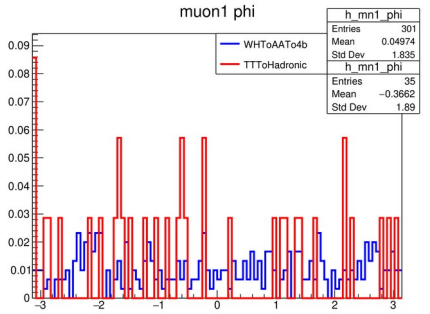


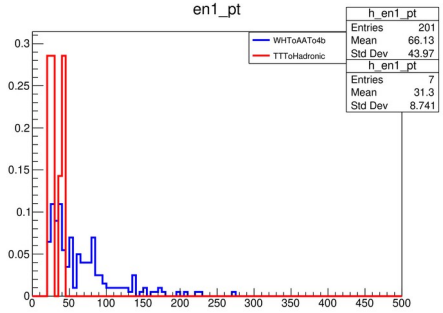


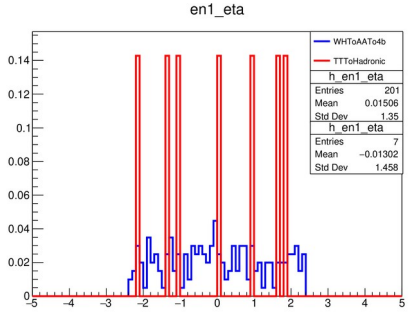
Lepton kinematics

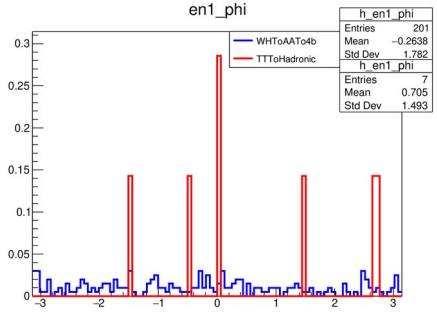




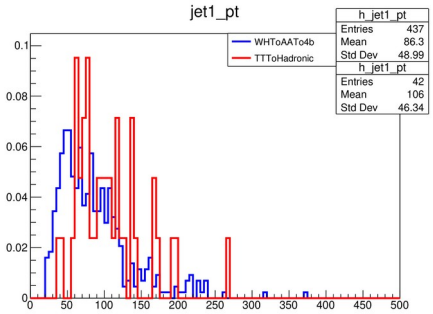


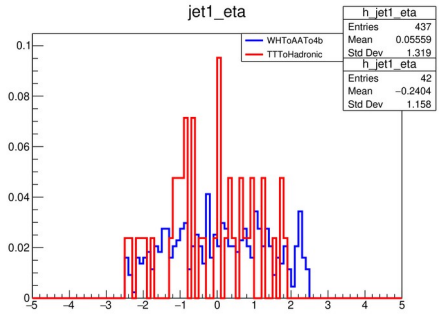


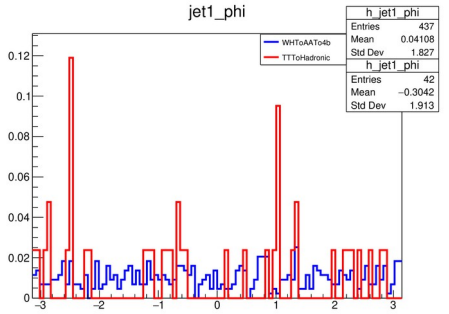


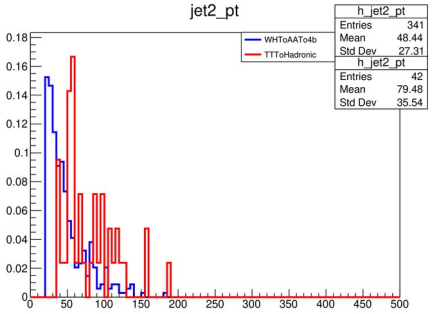


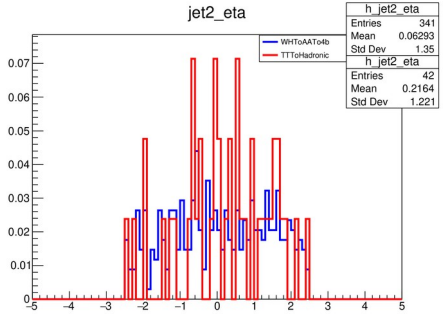
Kinematics – jets 1, 2

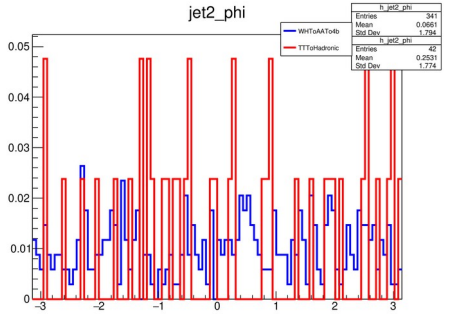




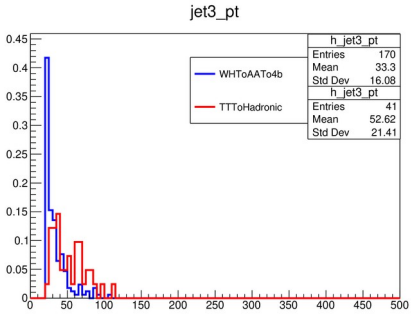


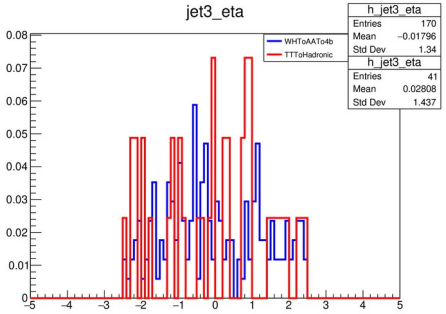


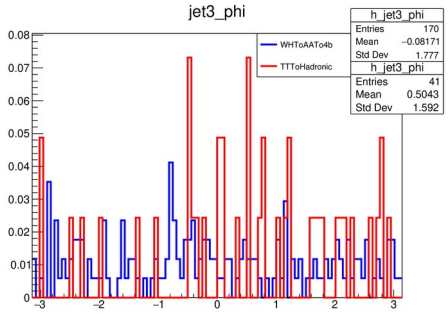


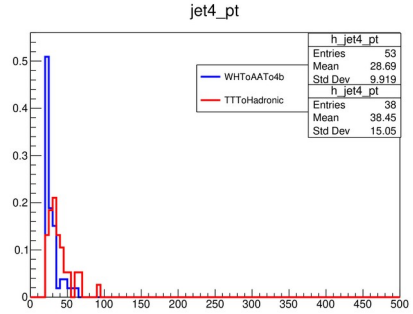


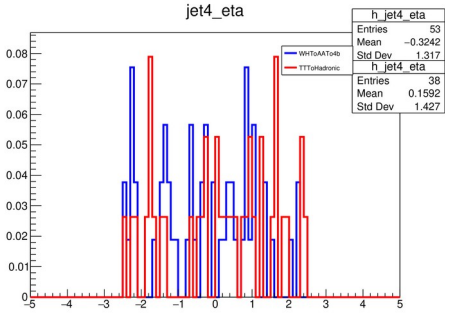
Kinematics – jets 3, 4

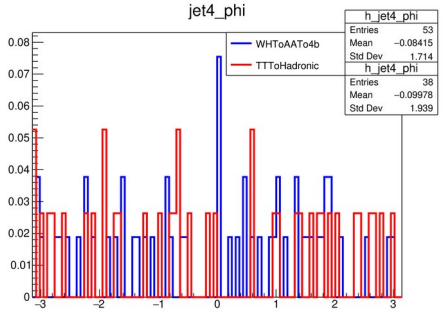
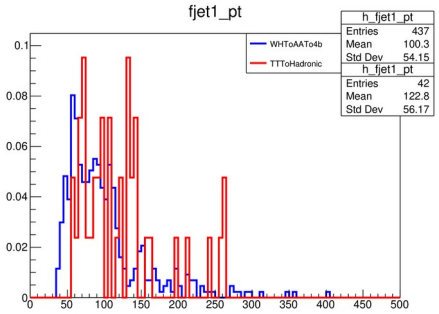
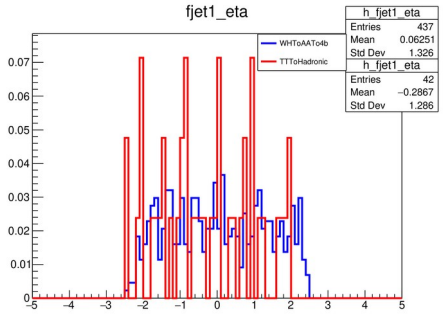
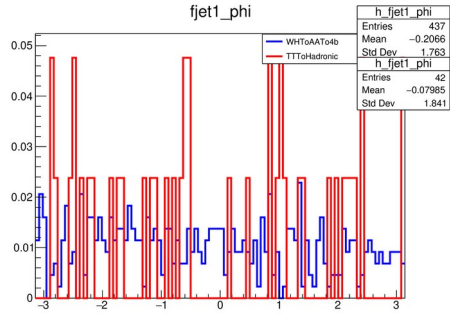
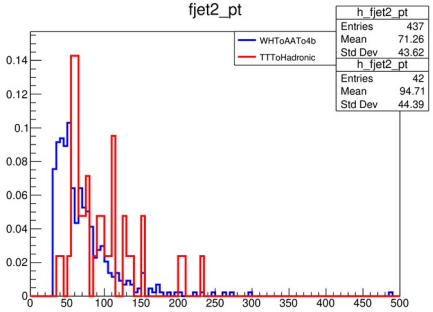
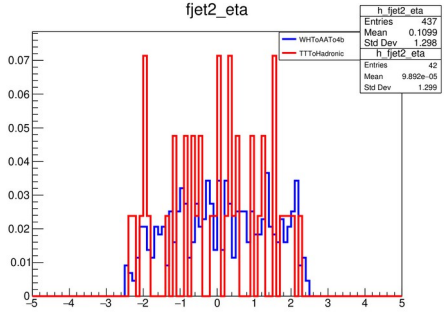
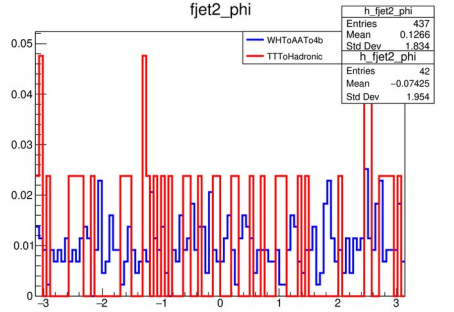








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