



Interference studies for FCNC tZu and tZc

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MadGraph details

- **Version:** 2.6.1
- **Shower:** Pythia8
- **Detector:** Delphes with ATLAS card
- **UFO Model:** TopFCNC with the restriction for just utZ anomalous coupling
Parameters consider the limit of the branching ratio of 2.2×10^{-4}
- **50000** events per process
- All samples generated with **MadSpin, Pythia8 and Delphes**.
- All the events were analysed after **Pythia8** and not after Delphes.

up quark

Monte Carlo details

Production

- $\sigma = (0.3397 \pm 6.1 \times 10^{-3}) \text{ pb}$
- generate $p p \rightarrow t z \bar{t} + \text{anti-particle process}$
- add process $p p \rightarrow t z u \bar{t} + \text{anti-particle process}$
- 46 diagrams (22 independent)

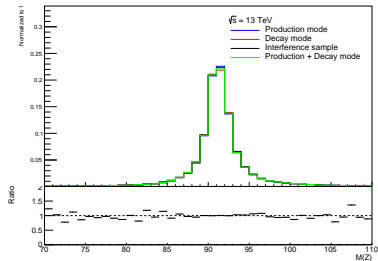
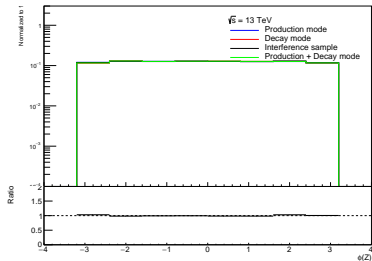
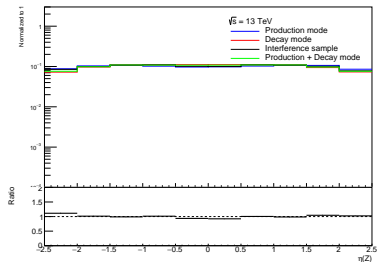
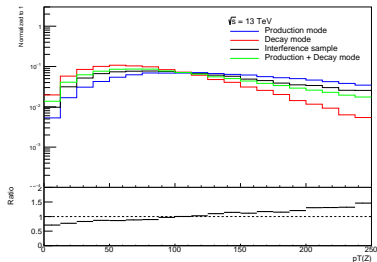
Decay

- $\sigma = (0.1892 \pm 3.4 \times 10^{-3}) \text{ pb}$
- generate $p p \rightarrow t \bar{t} \rightarrow b w^+ z u \bar{t} + \text{anti-particle process}$
- 26 diagrams (8 independent)

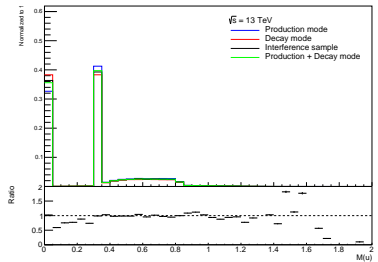
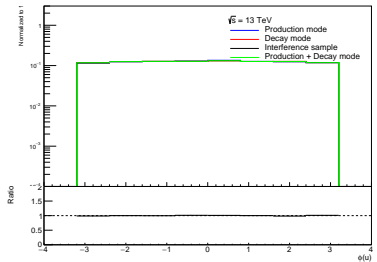
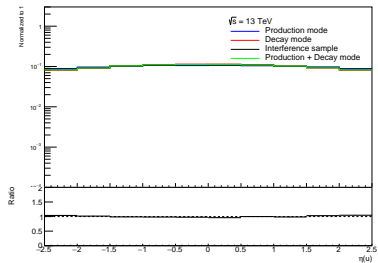
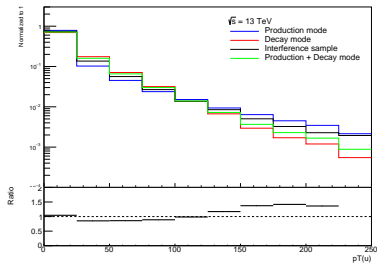
Interference

- $\sigma = (0.5470 \pm 9.8 \times 10^{-3}) \text{ pb}$
- generate $p p \rightarrow t z + \text{anti-particle process}$
- add process $p p \rightarrow t u \bar{t} z + \text{anti-particle process}$
- 72 diagrams (32 independent)
- The ratio is between the Interference sample and the Production + Decay mode

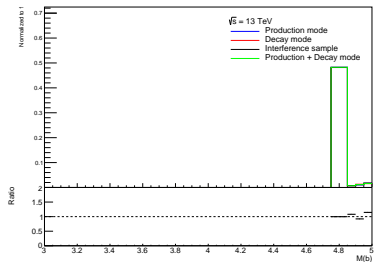
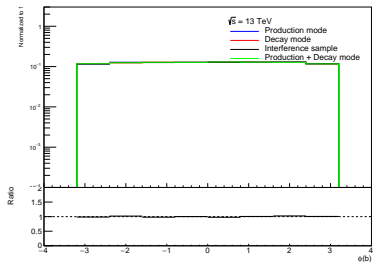
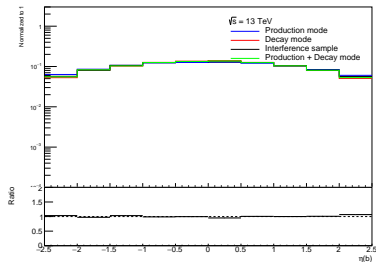
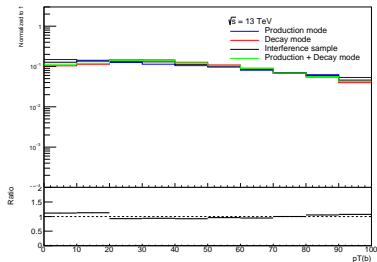
Z boson



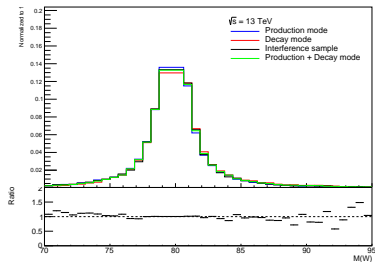
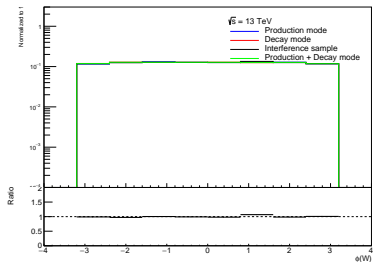
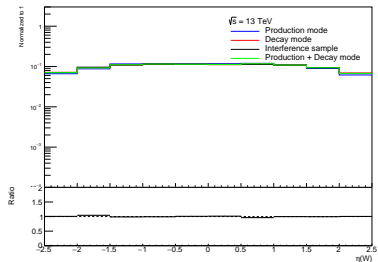
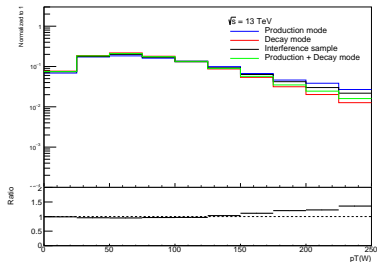
u quark



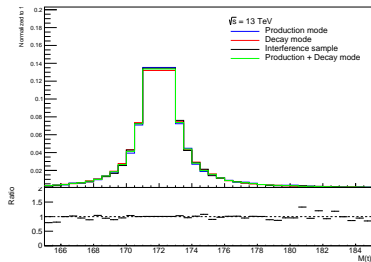
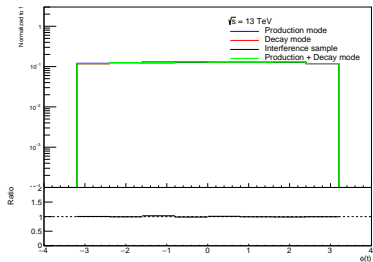
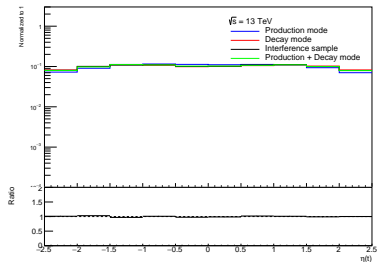
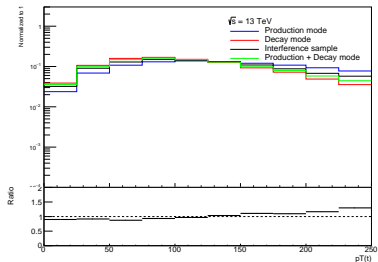
b quark

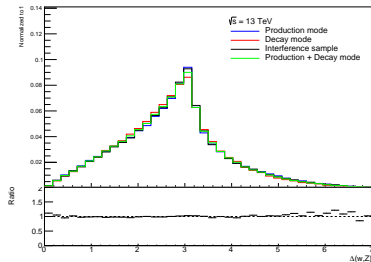
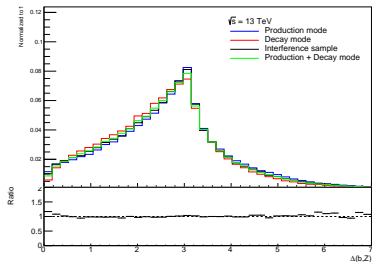
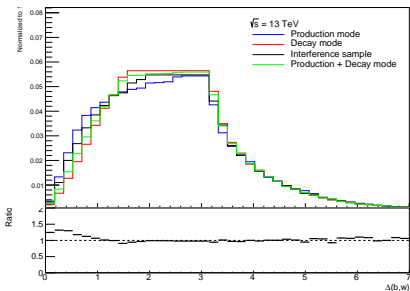
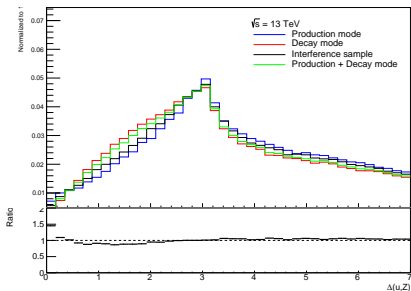


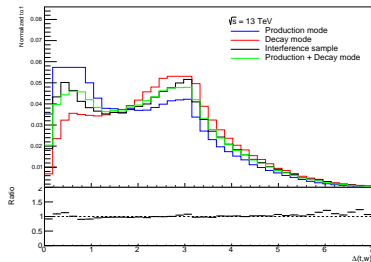
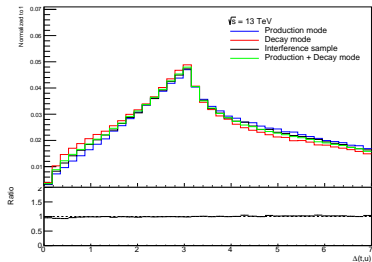
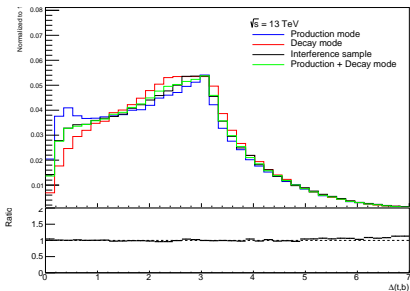
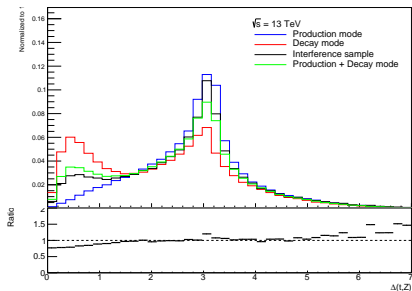
W boson



t quark







Jet

Monte Carlo details

Production

- $\sigma = (0.6402 \pm 1.1 \times 10^{-2}) \text{ pb}$
- generate $p p \rightarrow t z \bar{t} + \text{anti-particle process}$
- add process $p p \rightarrow t z j \bar{t} + \text{anti-particle process}$
- 102 diagrams (42 independent)

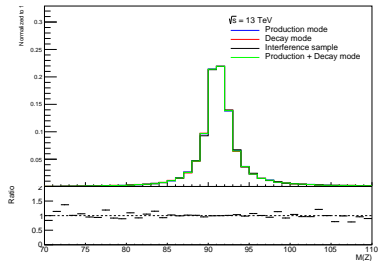
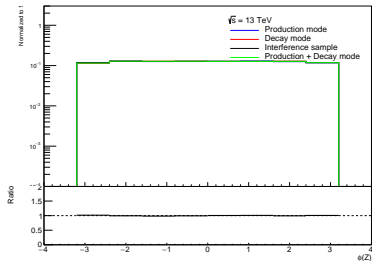
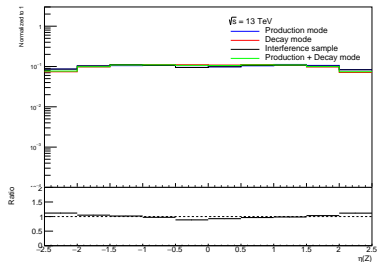
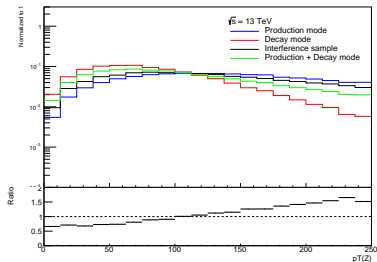
Decay

- $\sigma = (0.1891 \pm 3.4 \times 10^{-3}) \text{ pb}$
- generate $p p \rightarrow t \bar{t} \rightarrow b w^+ z j \bar{t} + \text{anti-particle process}$
- 26 diagrams (8 independent)

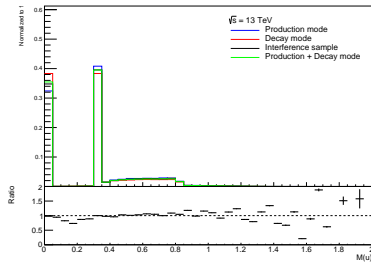
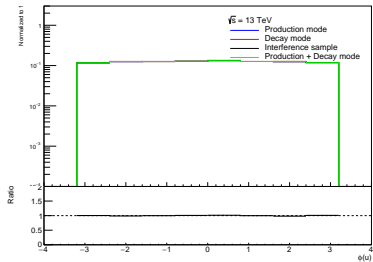
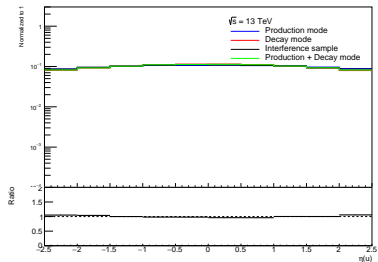
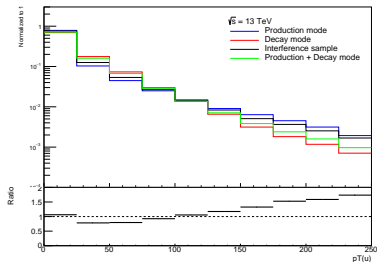
Interference

- $\sigma = (0.8436 \pm 1.5 \times 10^{-2}) \text{ pb}$
- generate $p p \rightarrow t z + \text{anti-particle process}$
- add process $p p \rightarrow t j \bar{t} z + \text{anti-particle process}$
- 128 diagrams (52 independent)
- The ratio is between the Interference sample and the Production + Decay mode

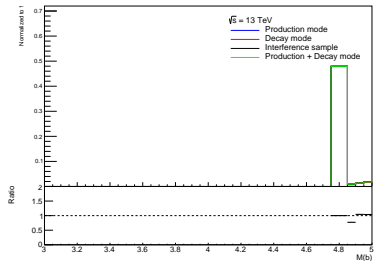
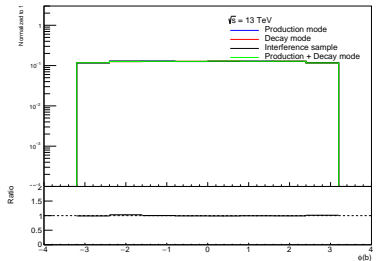
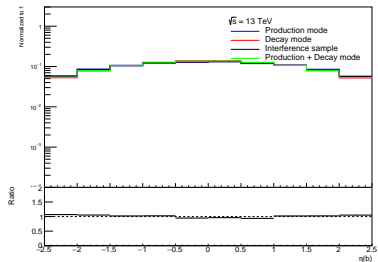
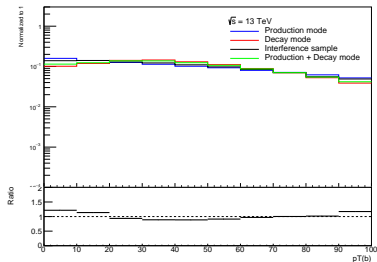
Z boson



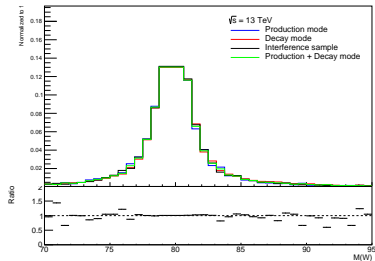
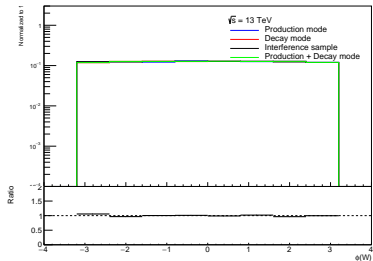
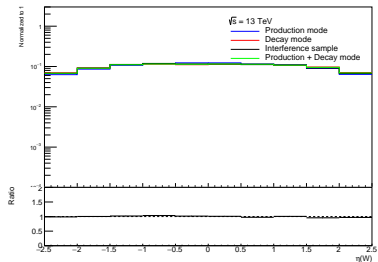
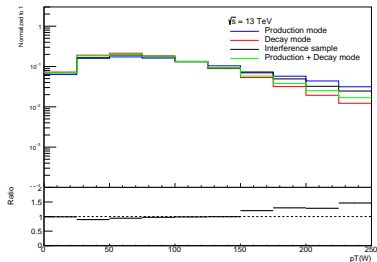
u quark



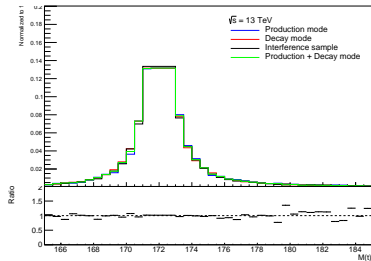
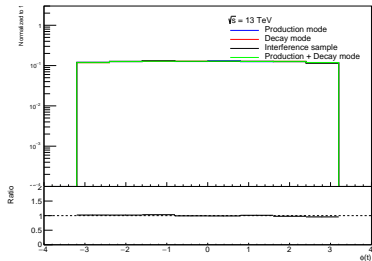
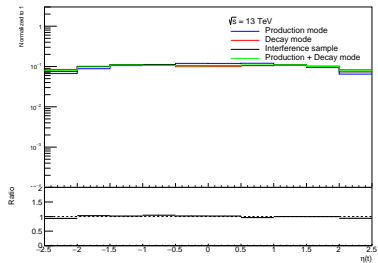
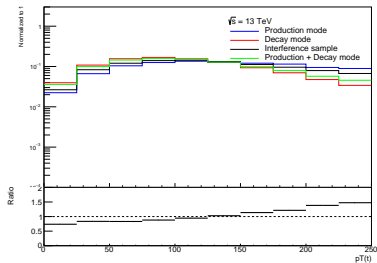
b quark

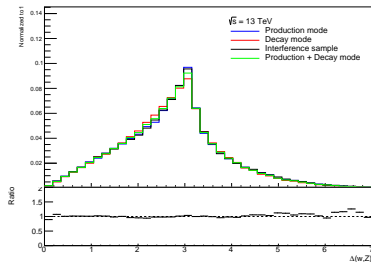
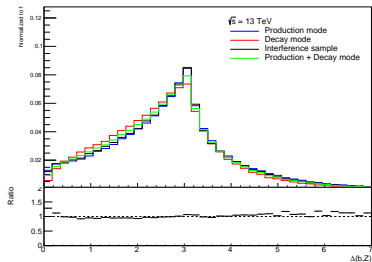
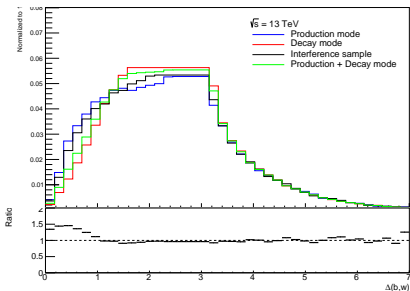
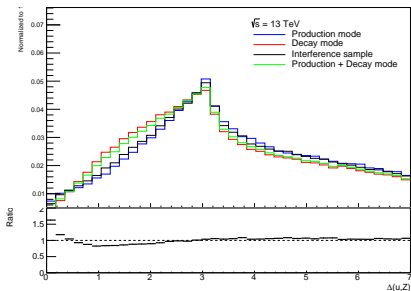


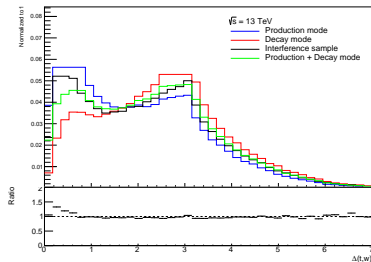
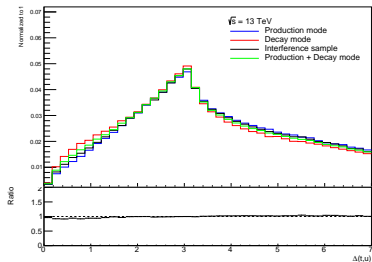
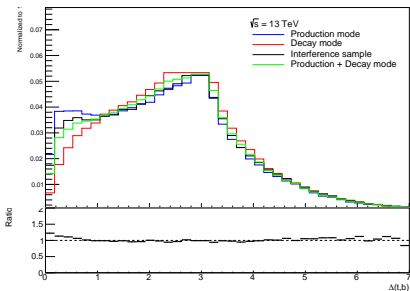
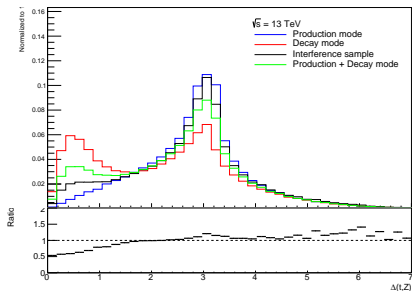
W boson



t quark







c quark

Monte Carlo details

Production

- $\sigma = (0.1881 \pm 3.4 \times 10^{-3}) \text{ pb}$
- generate $p p \rightarrow t z \bar{t} + \text{anti-particle process}$
- add process $p p \rightarrow t z c \bar{t} + \text{anti-particle process}$
- 46 diagrams (22 independent)

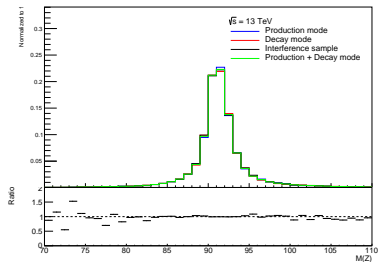
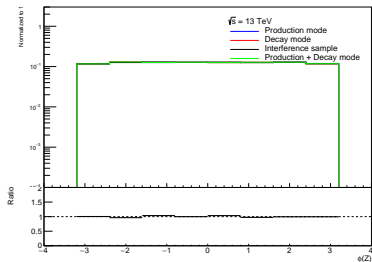
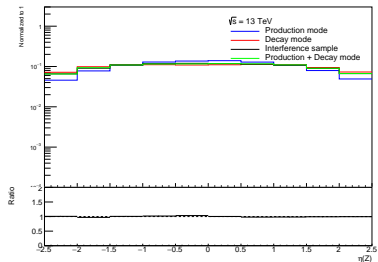
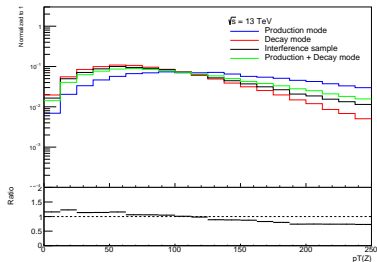
Decay

- $\sigma = (0.6762 \pm 1.2 \times 10^{-2}) \text{ pb}$
- generate $p p \rightarrow t \bar{t} \rightarrow b w^+ z c \bar{t} + \text{anti-particle process}$
- 26 diagrams (8 independent)

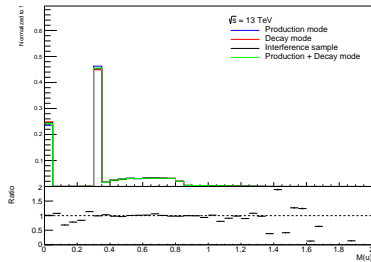
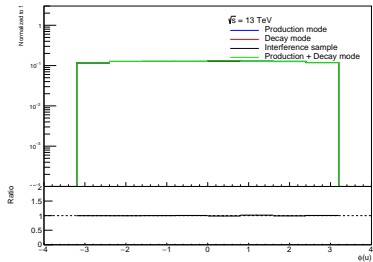
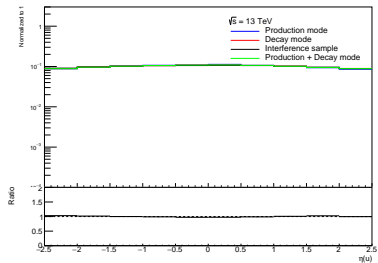
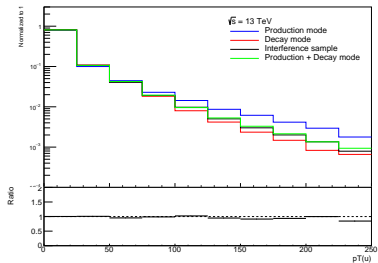
Interference

- $\sigma = (0.9157 \pm 1.6 \times 10^{-2}) \text{ pb}$
- generate $p p \rightarrow t z + \text{anti-particle process}$
- add process $p p \rightarrow t c \bar{t} z + \text{anti-particle process}$
- 72 diagrams (32 independent)
- The ratio is between the Interference sample and the Production + Decay mode

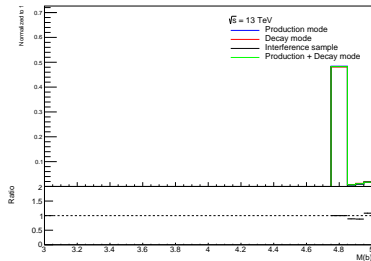
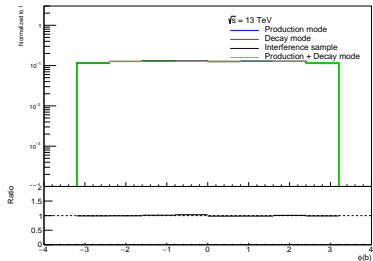
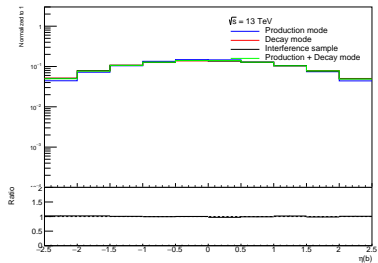
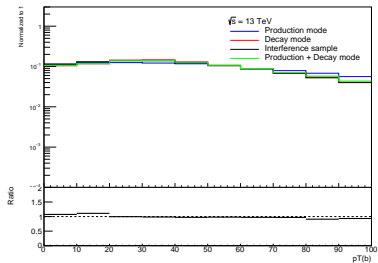
Z boson



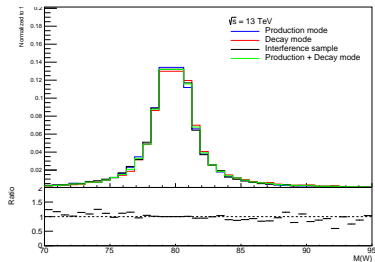
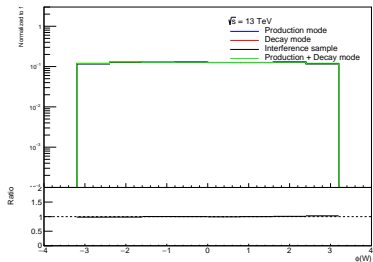
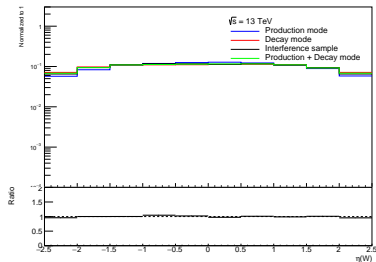
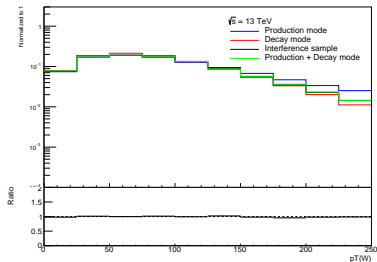
u quark



b quark



W boson



t quark

