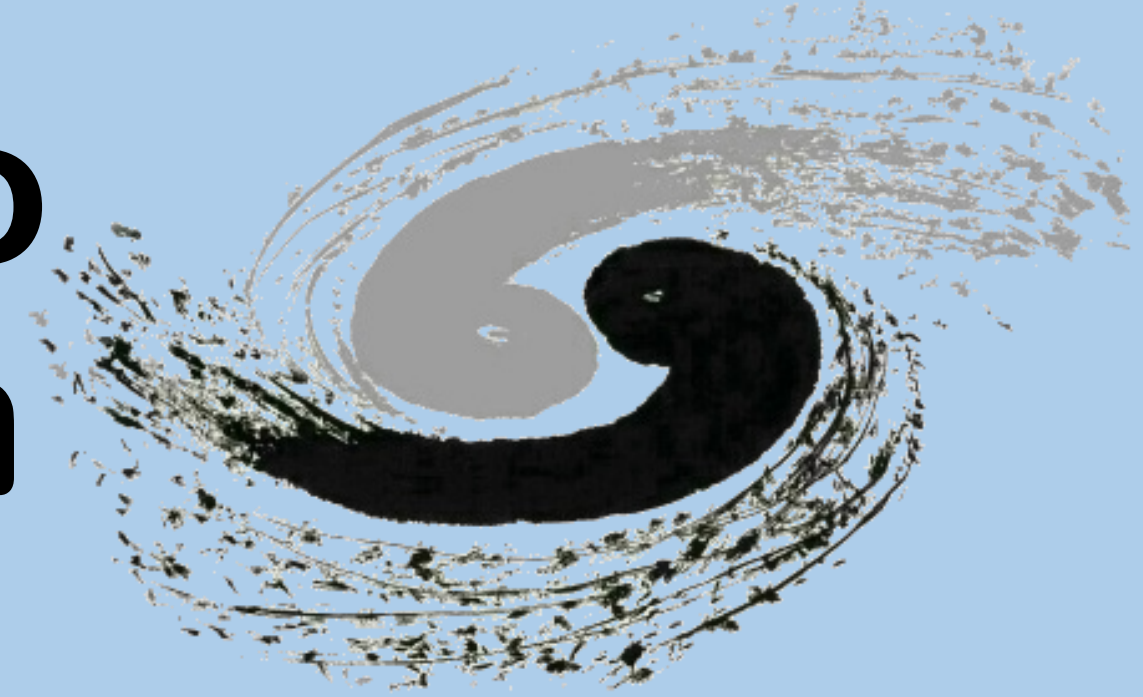


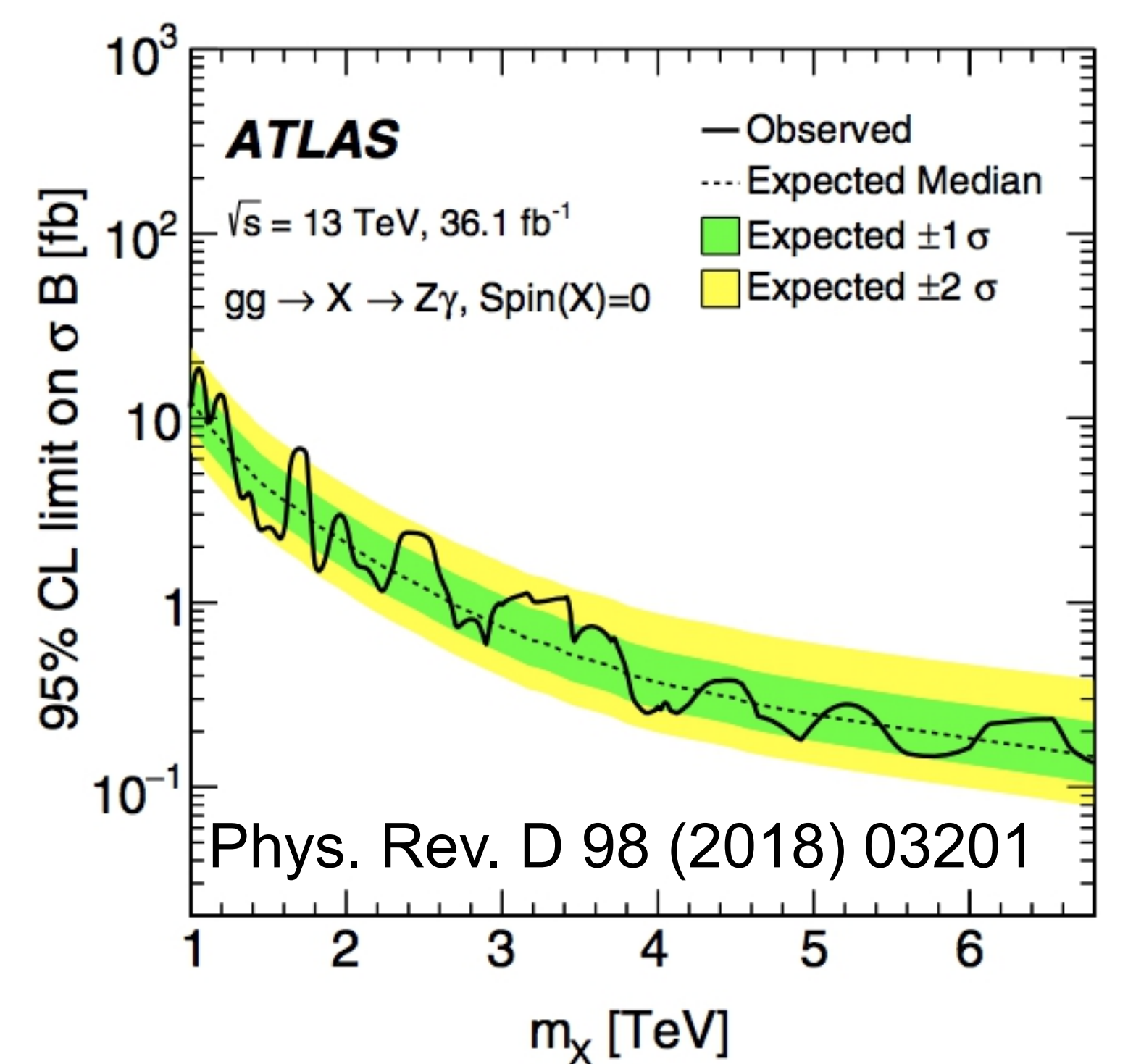
Search for heavy resonance decaying to an energetic photon and a W or Z boson in hadronic final state with ATLAS



7th CLHCP Workshop, 25-28 November 2021, Nanjing, China

Introduction

- ❖ Some models of physics beyond the Standard Model introduce new bosons through either an extension of the Higgs sector or additional gauge fields.
- ❖ Such new bosons can have various spin or charge properties due to different models.
- ❖ Subsequently, those bosons are expected to decay to an energetic photon associated with a W or Z boson.
- ❖ Both leptonic and hadronic decay of W/Z bosons are explored in ATLAS.
- ❖ This analysis focuses on the hadronic channel, which can explore extremely high resonance region.



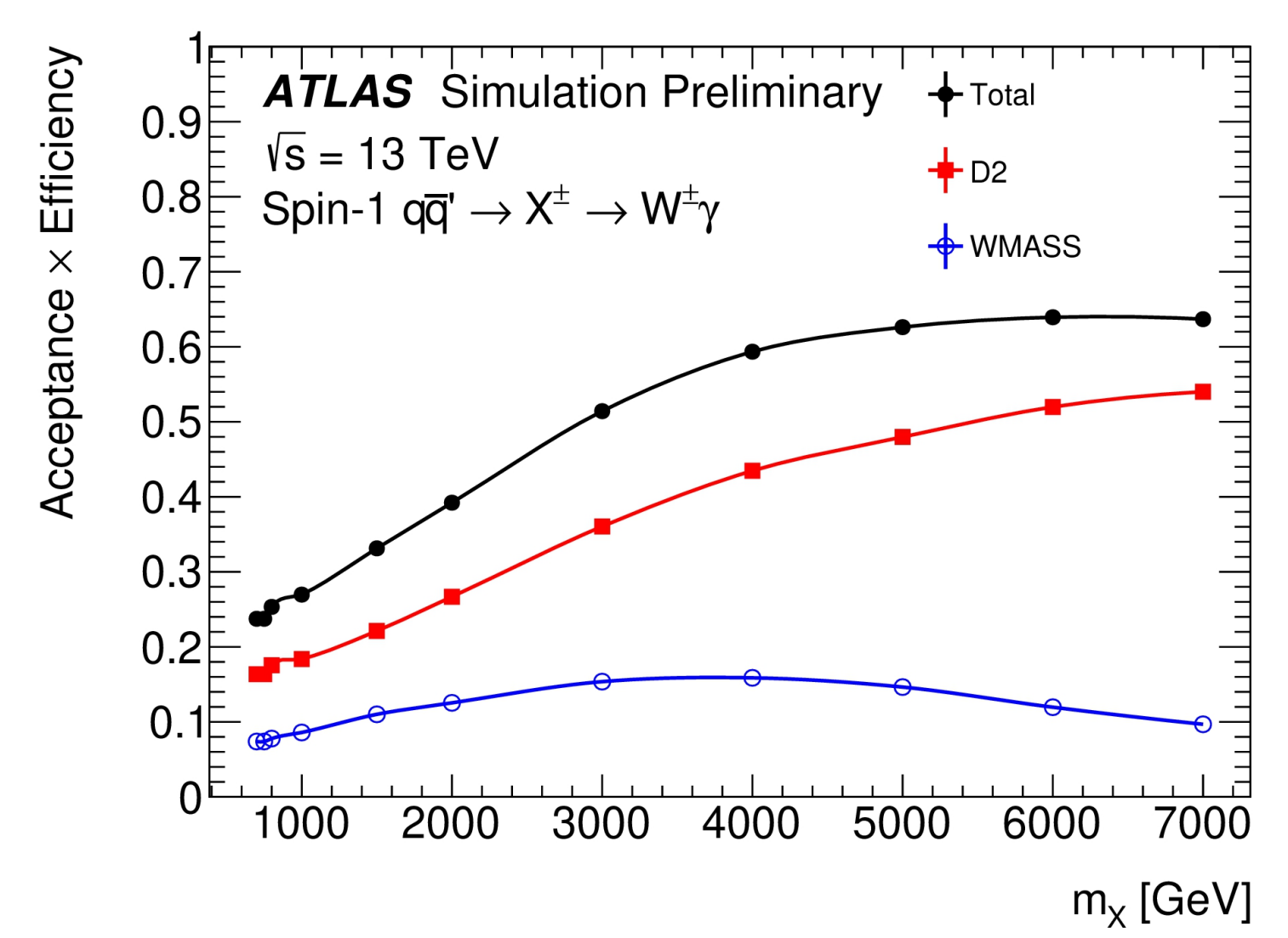
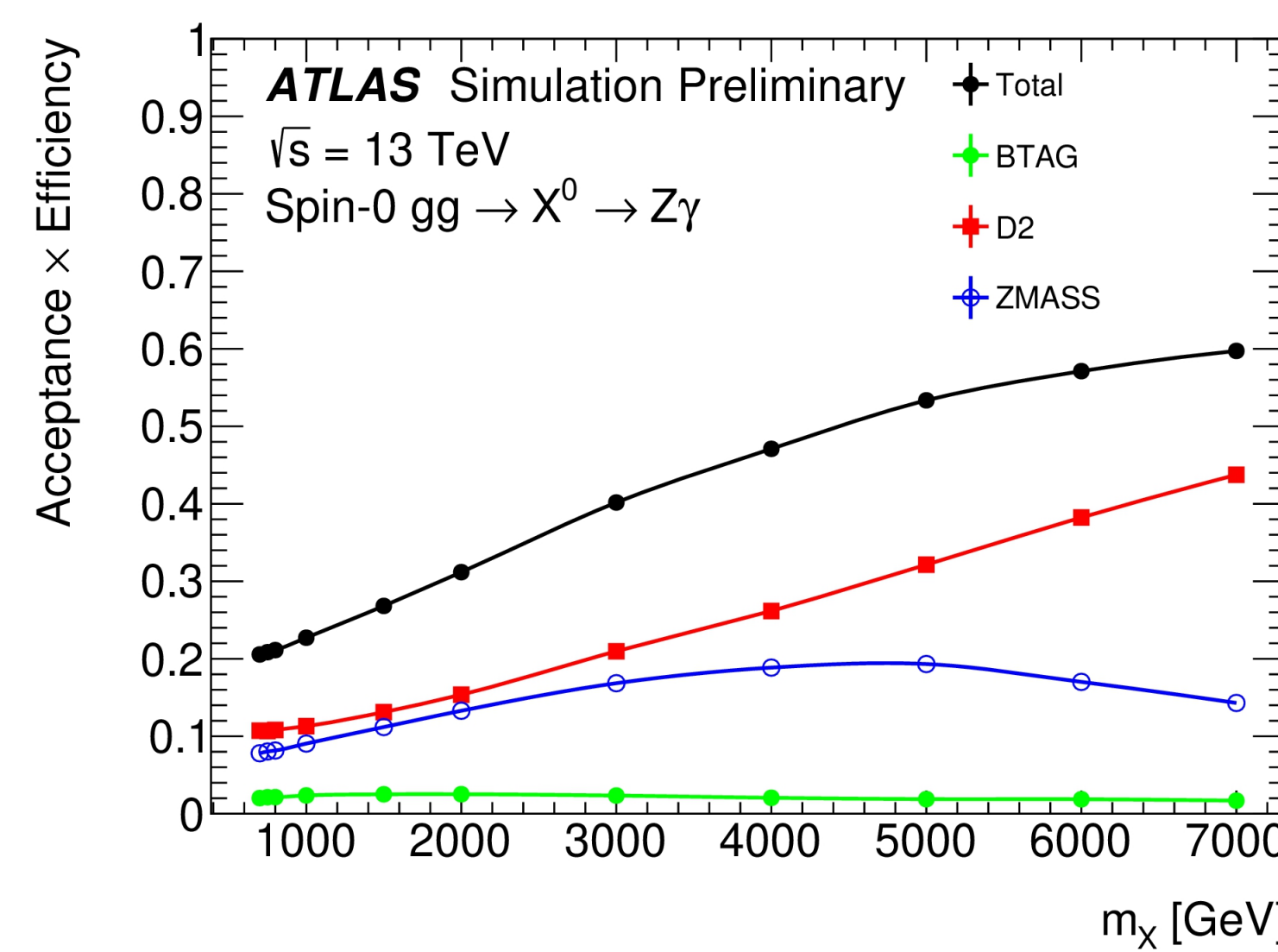
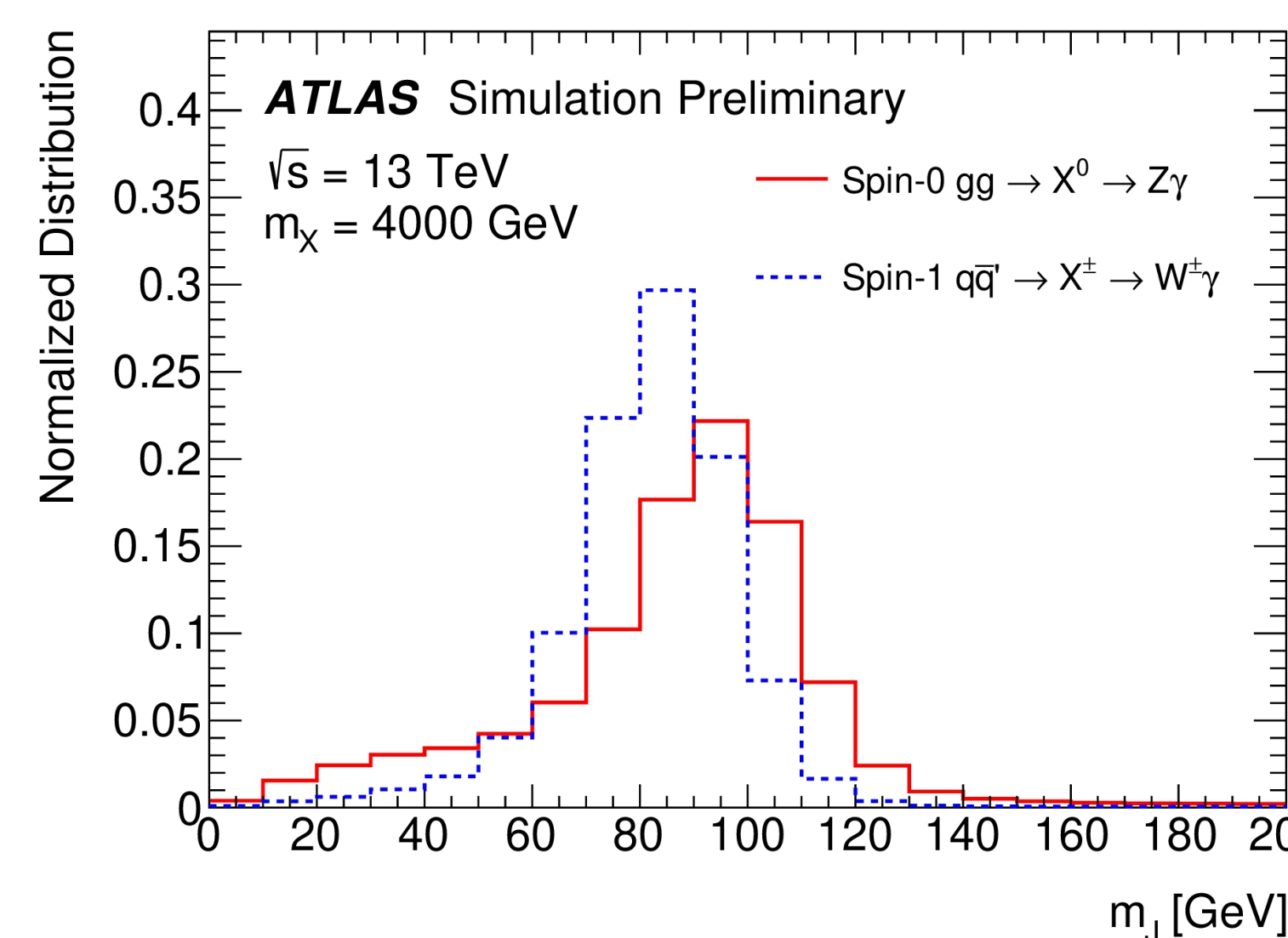
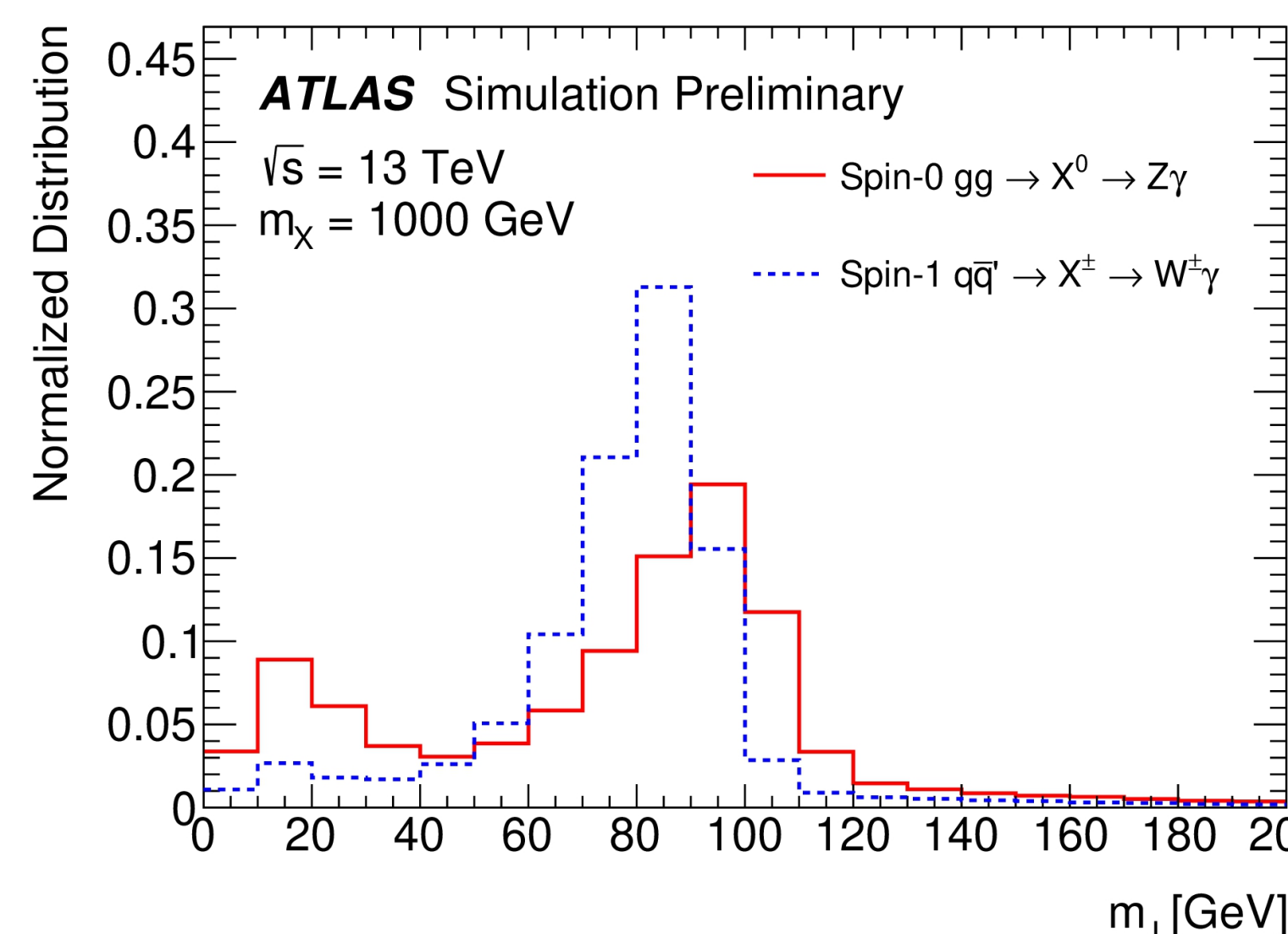
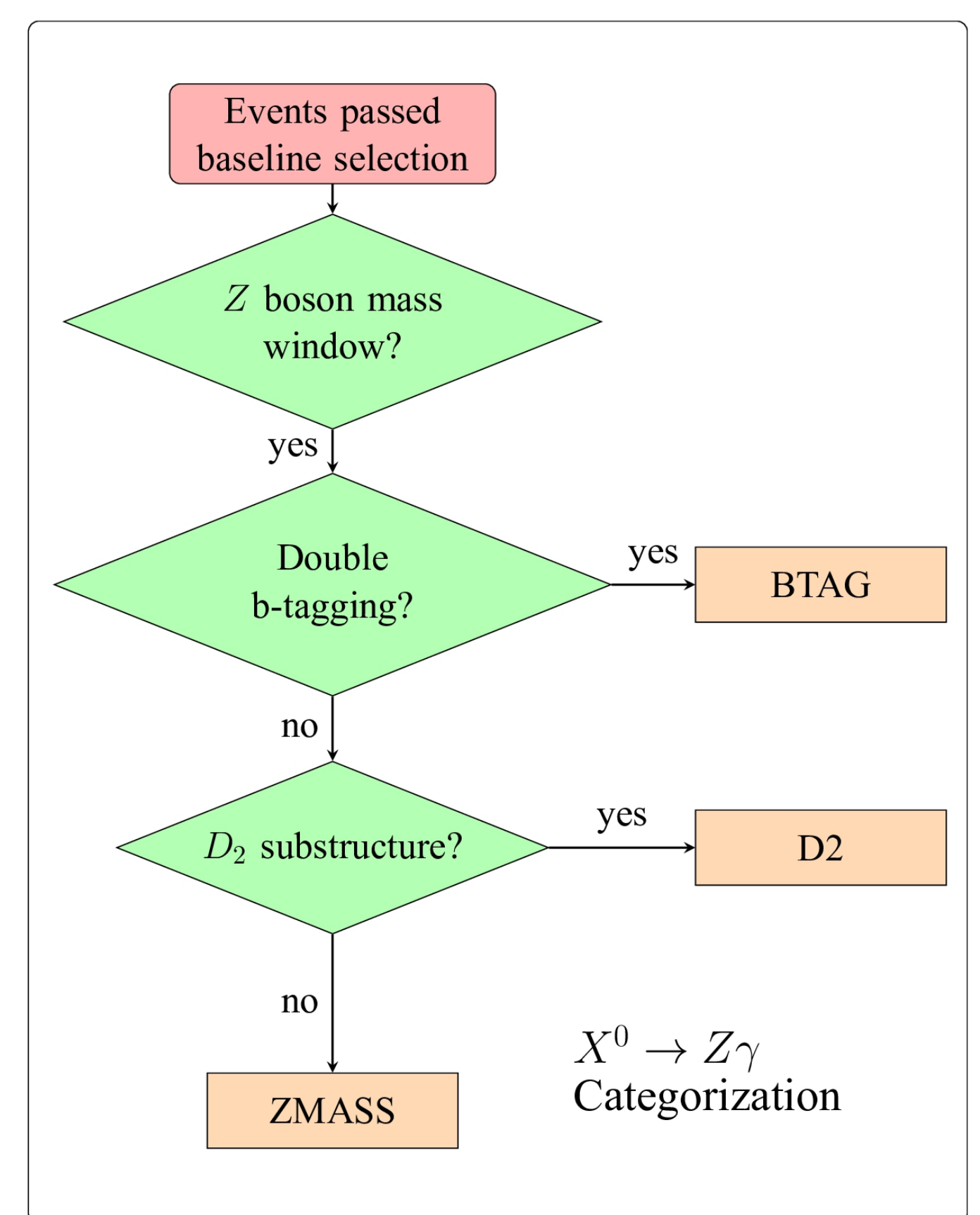
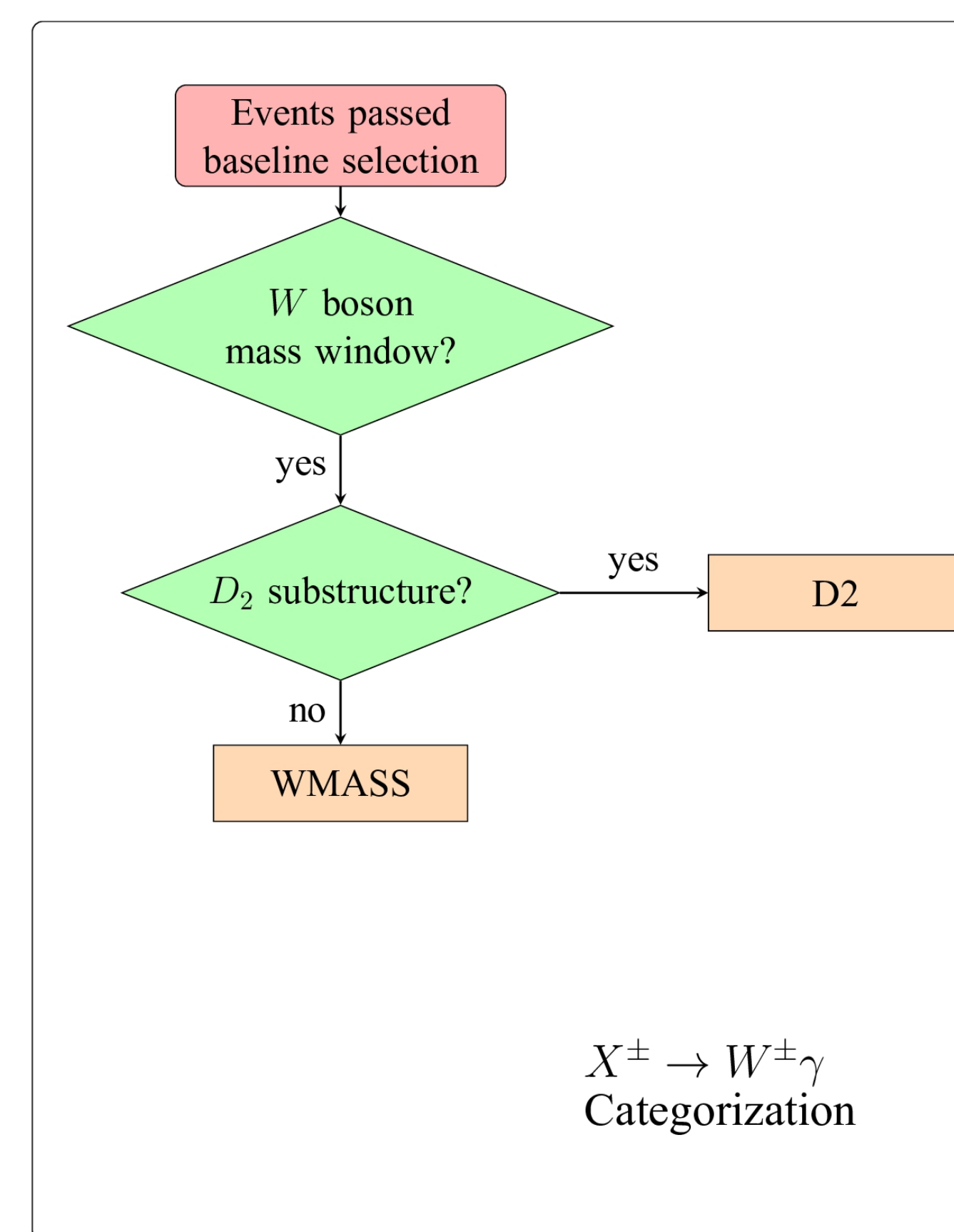
Overview of the analysis

❖ BaseLine selection

- Trigger: photon with $p_T > 140 \text{ GeV}$
- Tight-Isolated Photon: $p_T > 200 \text{ GeV}$ and $|\eta| < 1.37$ (barrel region)
- Large-R jet (**Antikt10 TrackCaloCluster jets**): $p_T > 200 \text{ GeV}$, $|\eta| < 2.0$, removal overlap with photon
- **Variable Radius (VR) subjet** reconstruction method for btagging

❖ Categorization

- Boson tagger based on **jet mass** and D_2 variables and also the subjet btagging information
- A further optimization of p_T of **photon** and **jet** for different categorizations to maximize significance



Results

- ❖ Signal is modelled with the Double-Sided Crystal Ball function
- ❖ Background is modelled by the Dijet family function

$$\mathcal{B}(m_{J\gamma}; p) = (1 - x)^{p_1} x^{p_2 + p_3 \log(x)}$$

