Status Report
TTbar resonances
Angular Distributions

NTUA

GEORGE BAKAS

Variables

- We employ the dijet angular variable χ from the rapidities of the two leading jets
- Why χ?
  - The distributions associated with the final states produced via QCD interactions are relatively flat in comparison with the distributions of the BSM models or new particles, which typically peak at low values of x

- We can measure the variable χ in two ways

1. By measuring the difference of the rapidities of the two leading jets such as the corresponding rapidity in the ZMF is:

$$y^* = \frac{1}{2}(y_1 - y_2)$$

X is defined as $\chi = e^{|y^*|} = e^{|y_1 - y_2|}$ (1) and can be measured by creating the TLorentzVector, boost it to the ZMF and find the rapidity difference of the two leading jets

2. By measuring the scattering angle θ* (angle between top quark and z-axis in the Zero Momentum Frame)

We define as $y^* = \frac{1}{2}\ln(\frac{1+|cos\theta^*|}{1-|cos\theta^*|})$ and from (1) we can find that:

$$\chi = \frac{1 + |cos\theta^*|}{1 - |cos\theta^*|}$$

Response Matrices

- Selection:
  - Parton: partonPt > 400, |partonEta|< 2.4, mTTbarParton > 1000
  - Reco: jetPt>400, |jetEta| < 2.4, nLeptons ==0
  - Btagging Medium working point
  - Top tagger mva > 0.3
  - Jet mass soft Drop (120, 220)GeV
  - Jets are matched

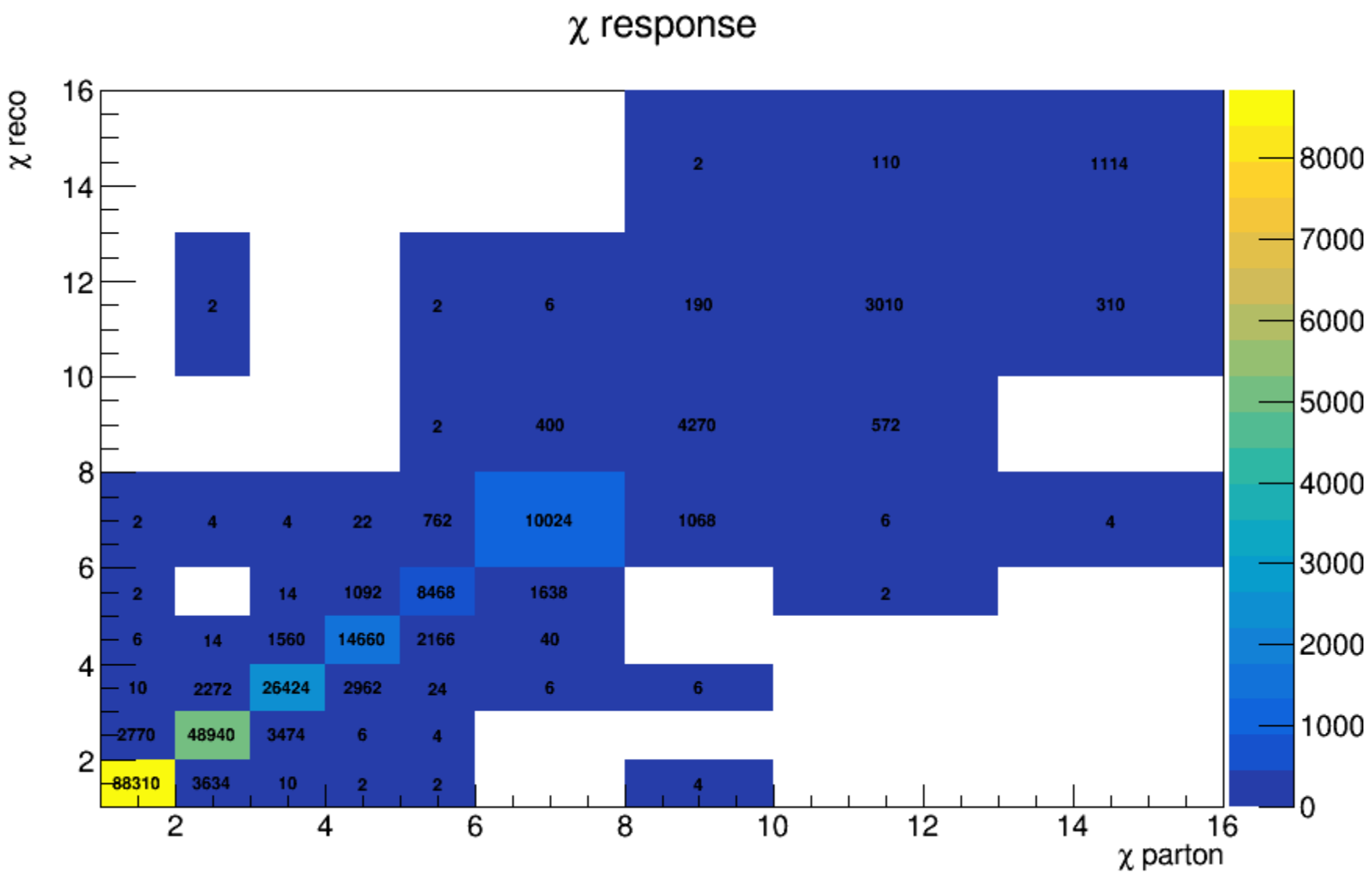
- Response matrix of χ_{reco}, χ_{parton} with {1,2,3,4,5,6,8,10,13,16} as variable binning

- The same binning is then used to find the response matrices in different mass (mTTbar) regions
  - [1000-1600]GeV
  - [1600-2200]GeV
  - [2200-3000]GeV
  - [3000-3600]GeV
  - [3600-6000]GeV

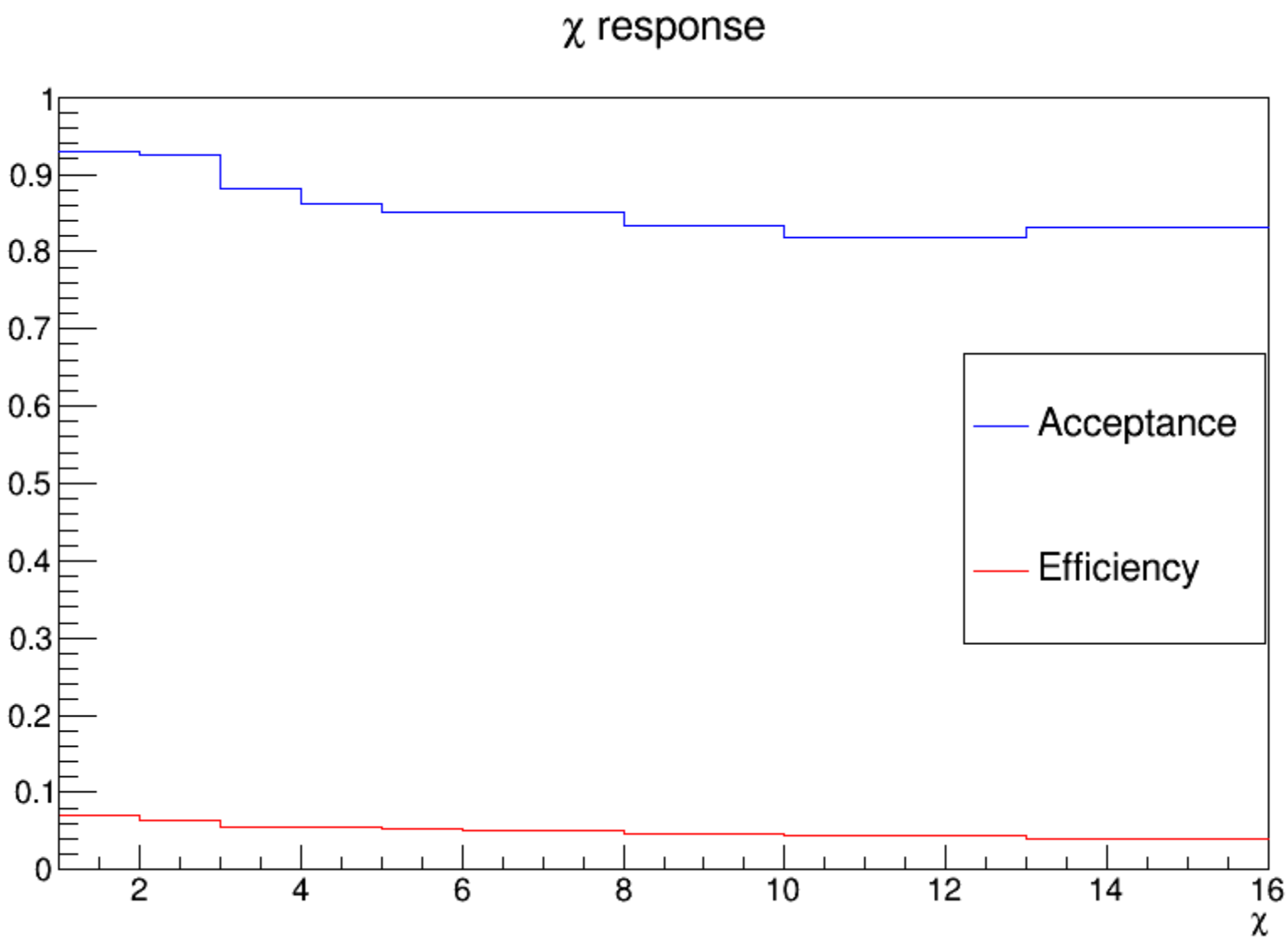
- Stability, Efficiency for χ distribution

- Acceptance and purity for χ

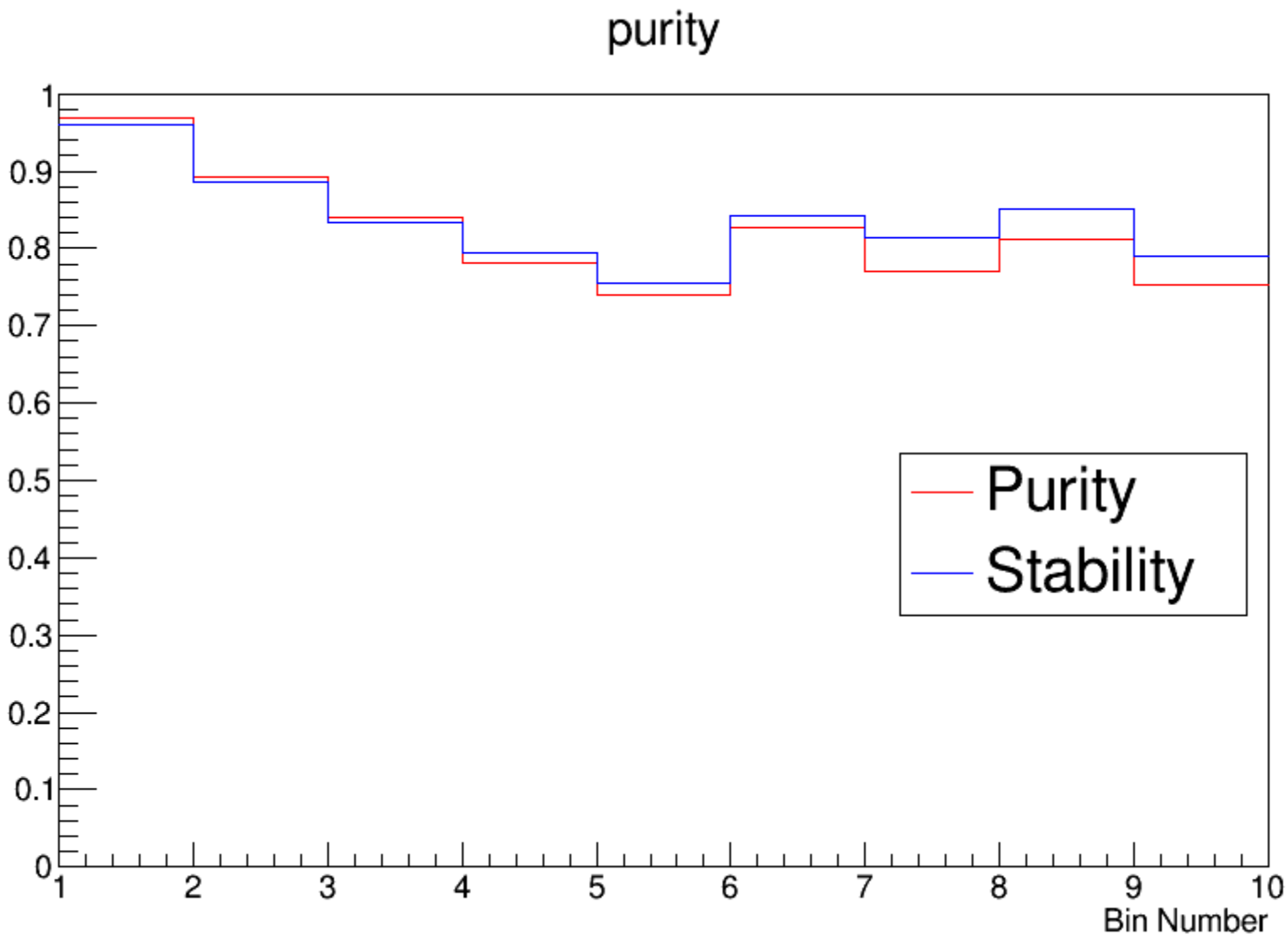
Response Matrix for χ distribution



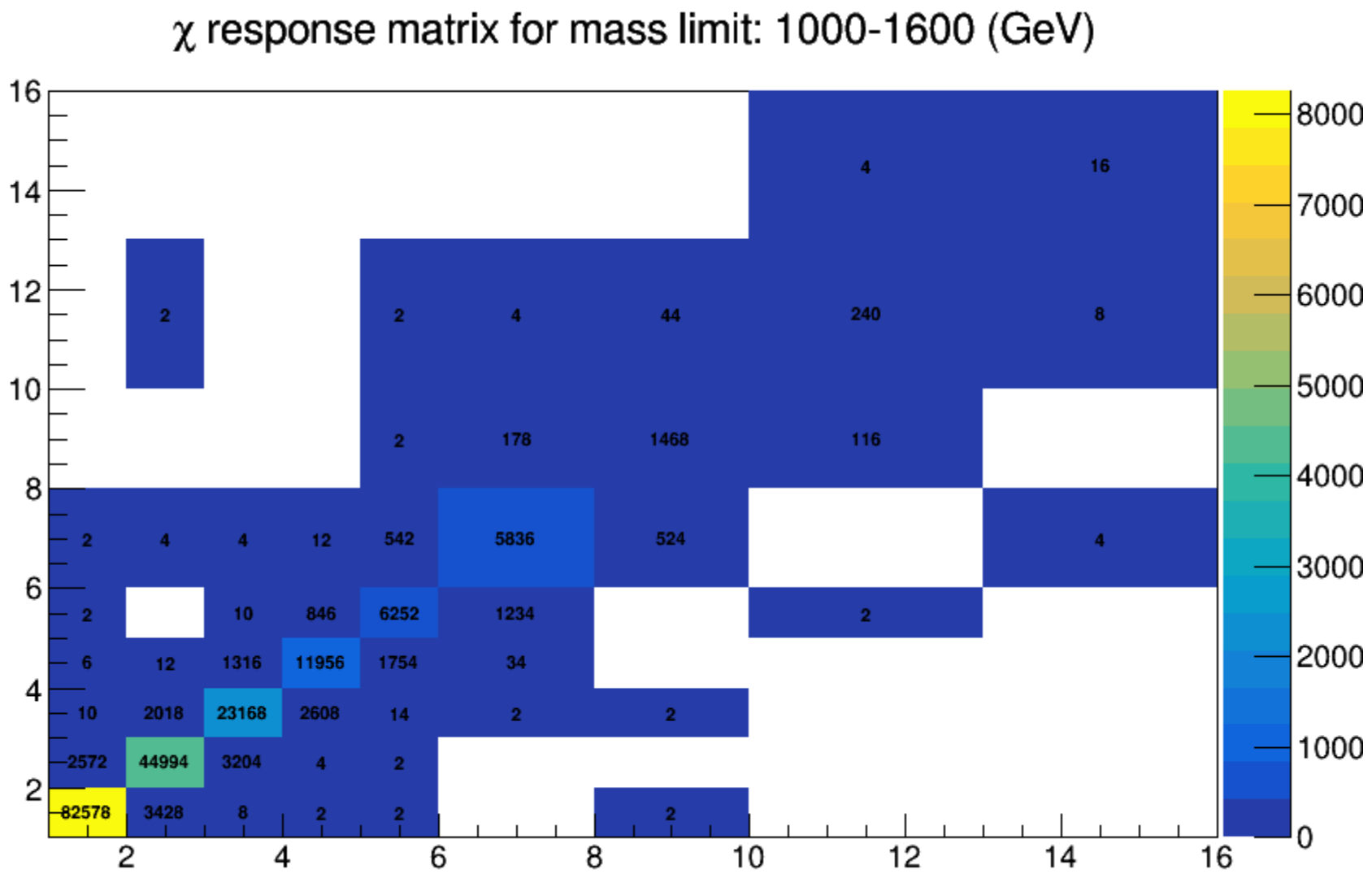
Efficiency and Acceptance



Purity and Stability



Response matrix for chi distribution in different mTTbar regions



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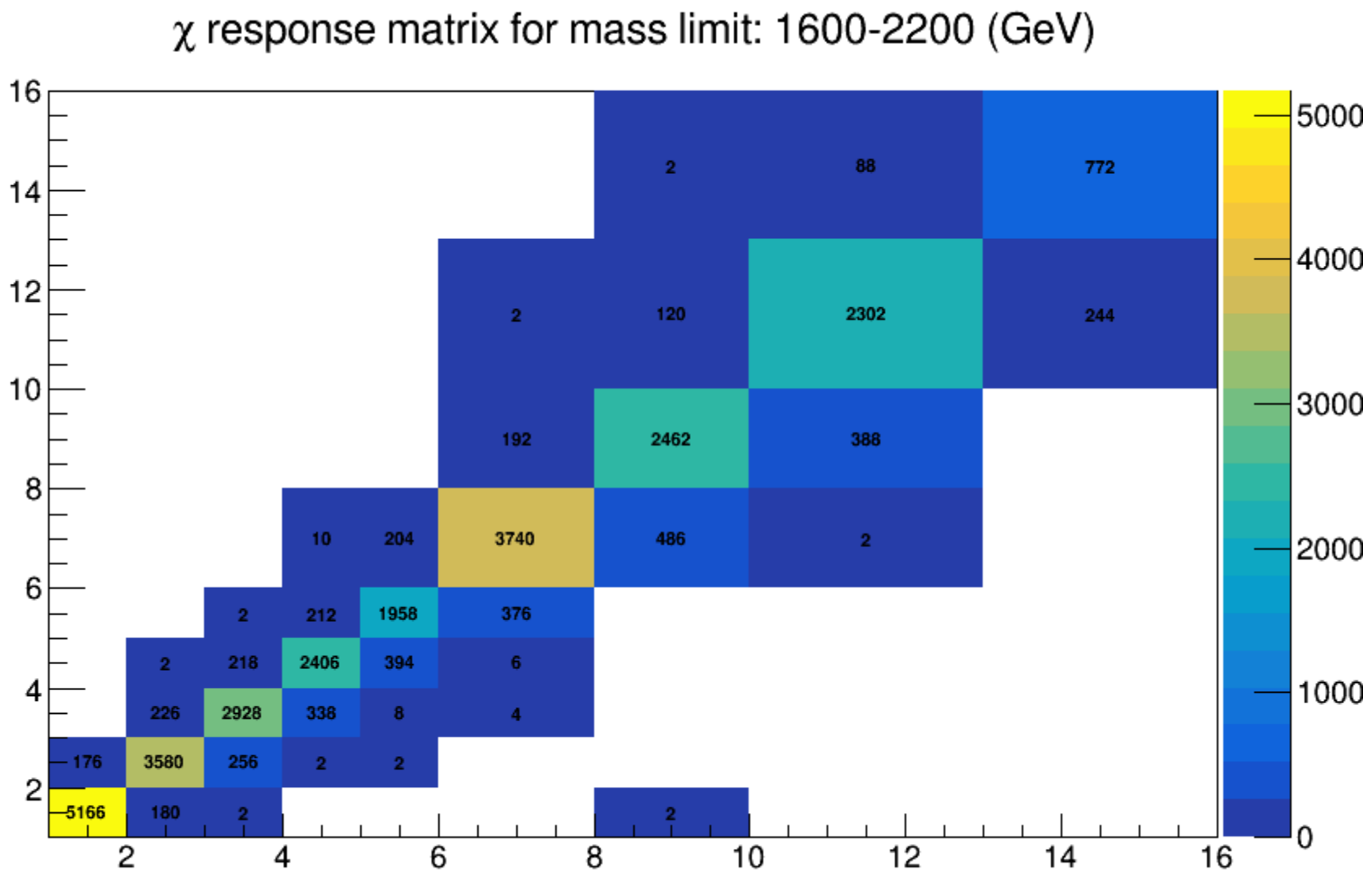

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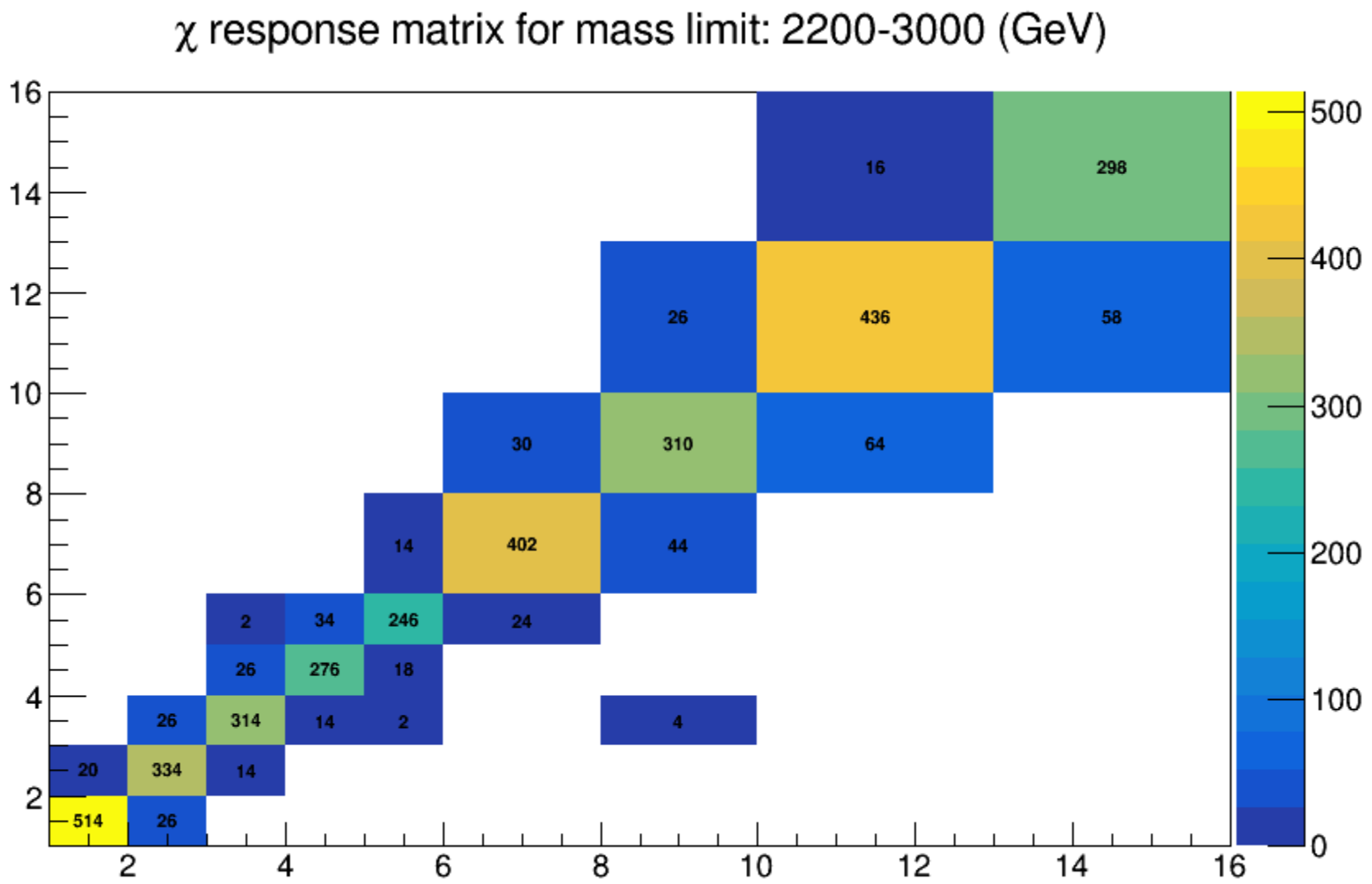

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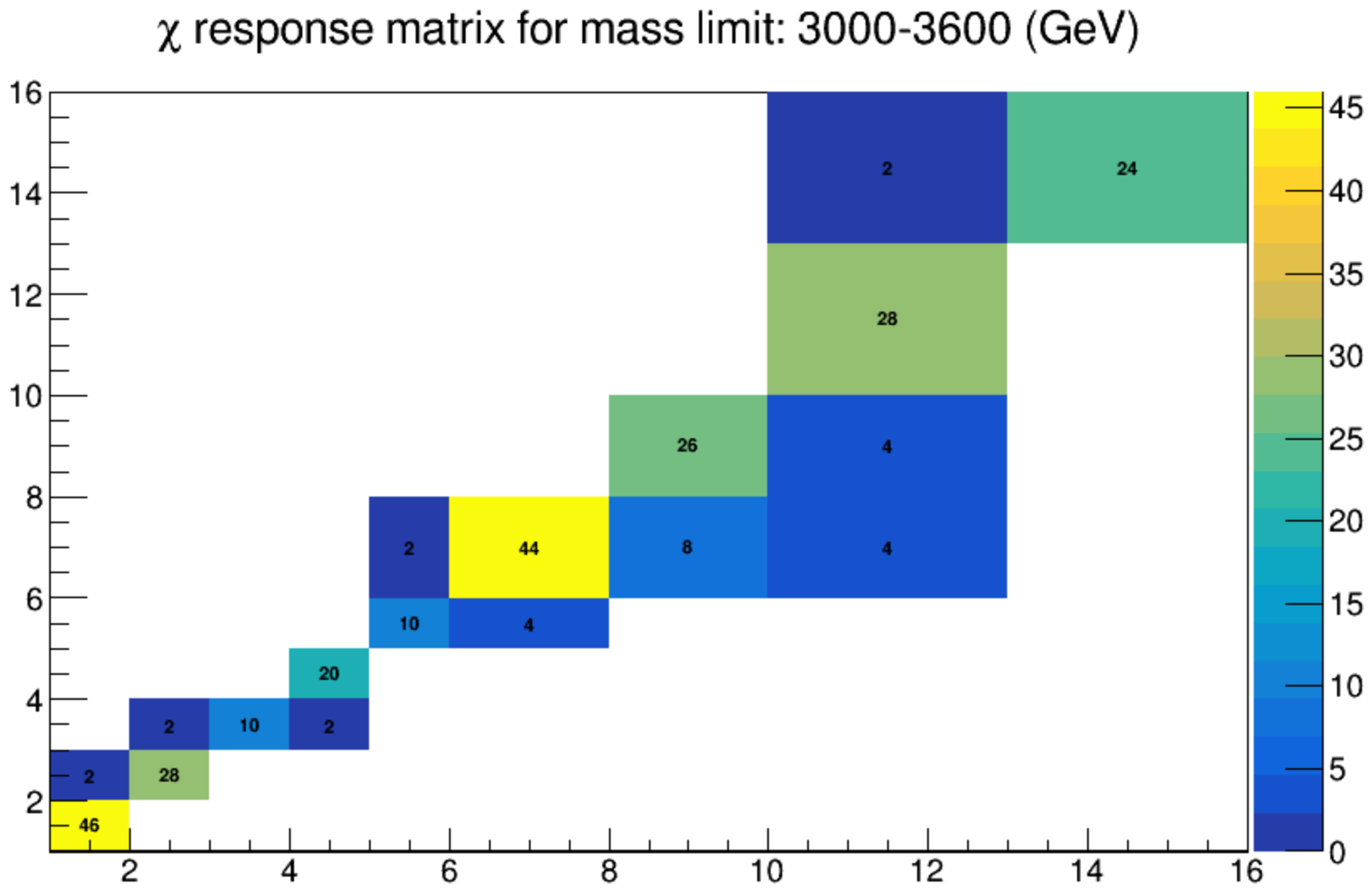

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