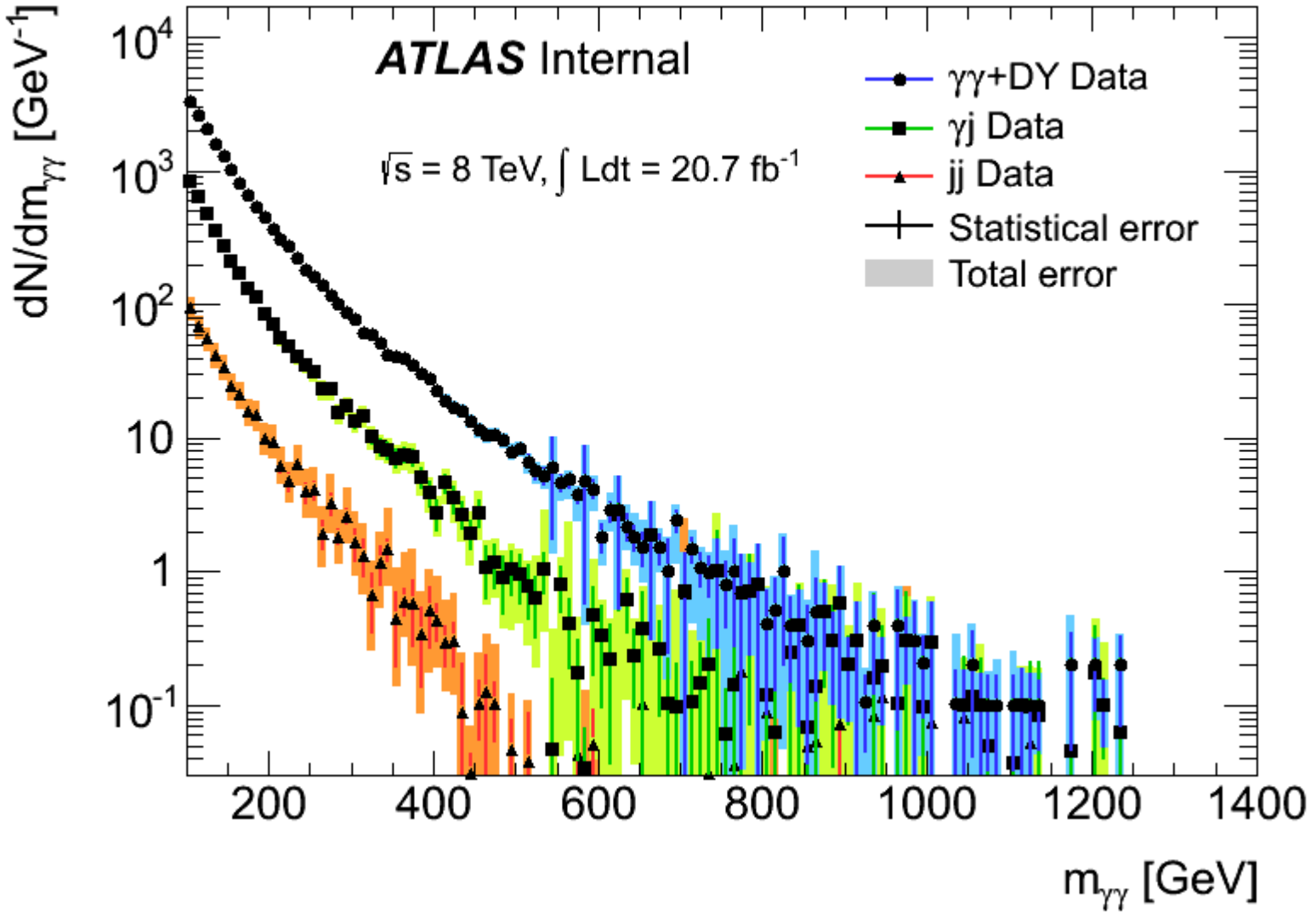
Photon isolation
Data and MC comparison

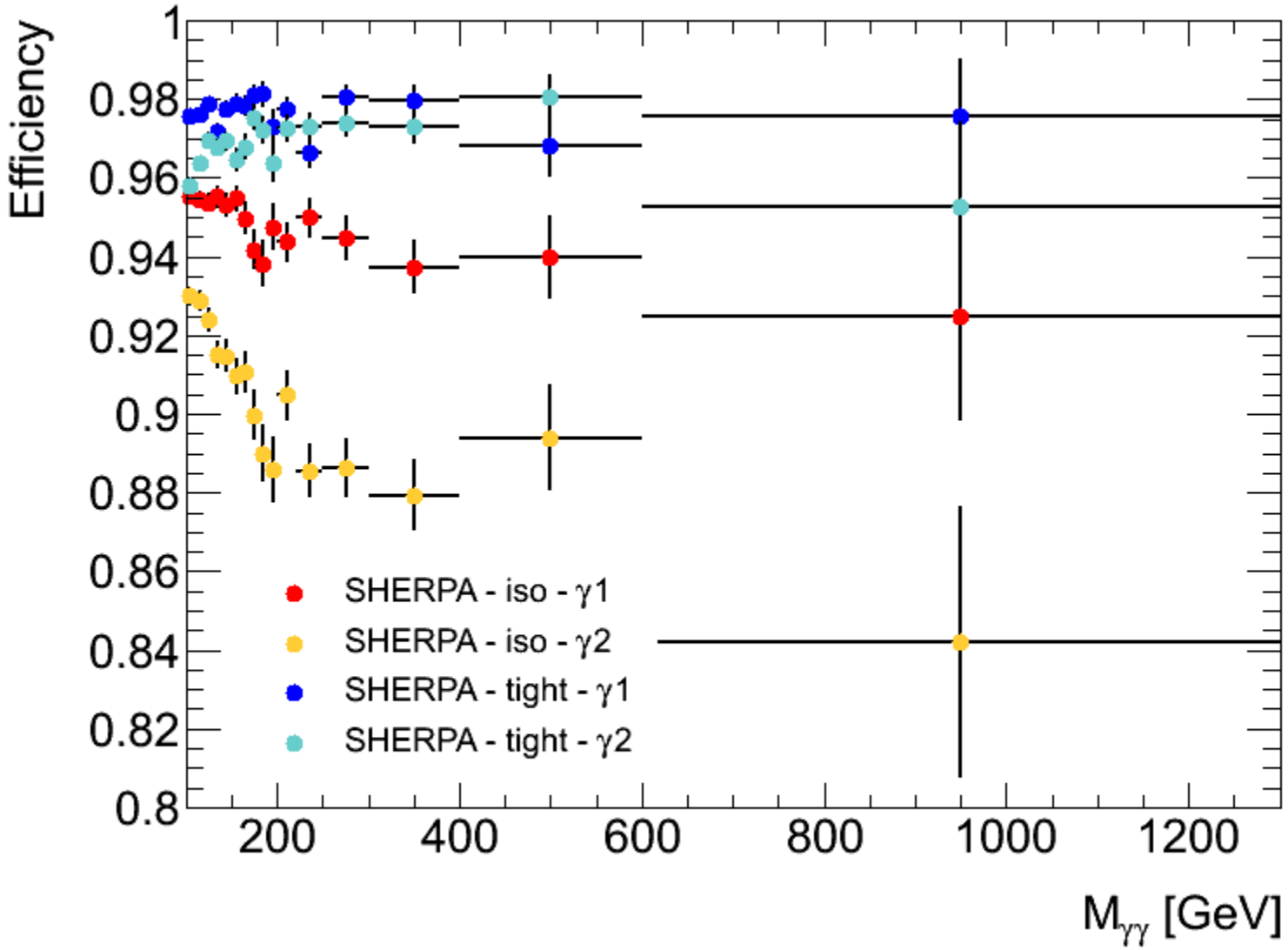
The LAPP Team

Laboratoire d'Annecy-le-Vieux
de Physique des Particules

Background decomposition @ high mass



Isolation & Tight efficiencies in MC

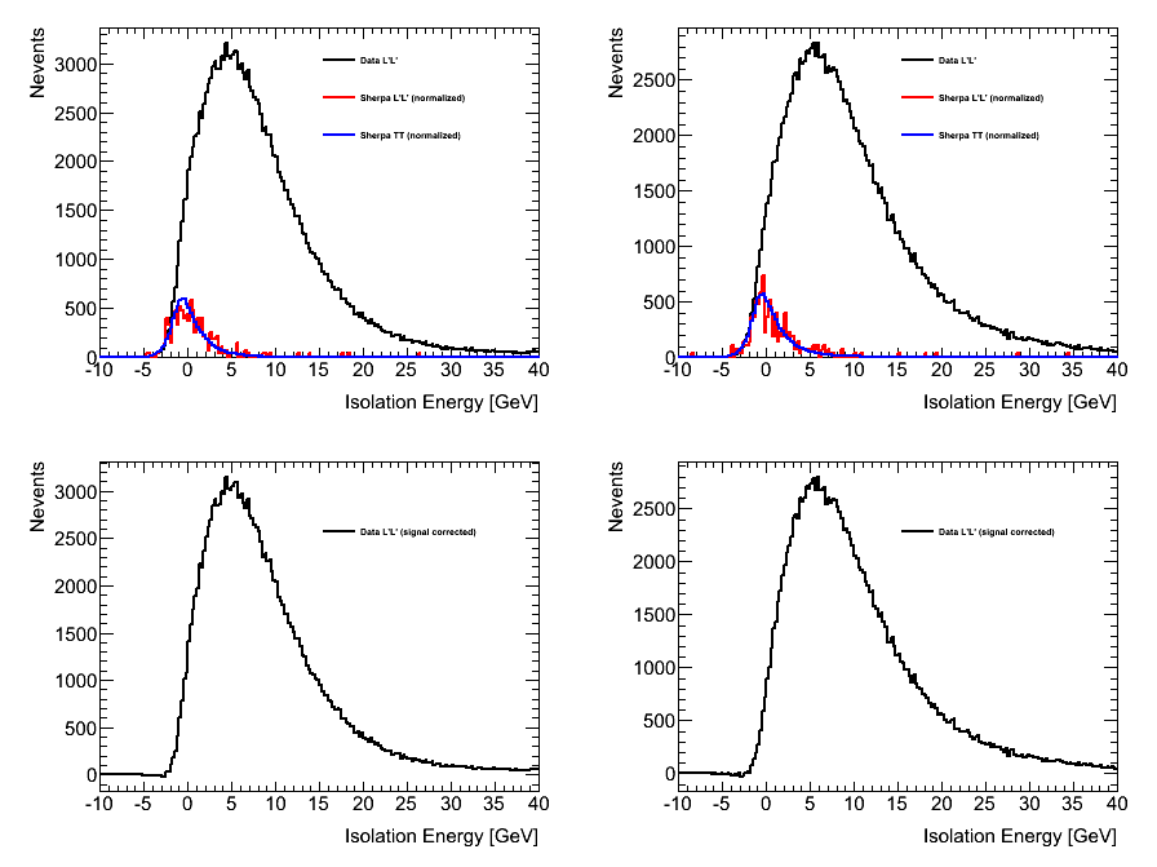


How does the isolation efficiency look like in data ?

1) Signal isolation extracted from data: Inclusive distributions

Signal isolation in data – Step 1

- Extract bkg shape from L'L' ($\overline{TT}$) data sample
- DR(γ1,γ2) > 0.4. No TrackIso cut
- Correct for signal leakage in L'L' ($\overline{TT}$) region using MC
- Extract normalization and efficiencies from 2Dx2D sidebands



leading **subleading**

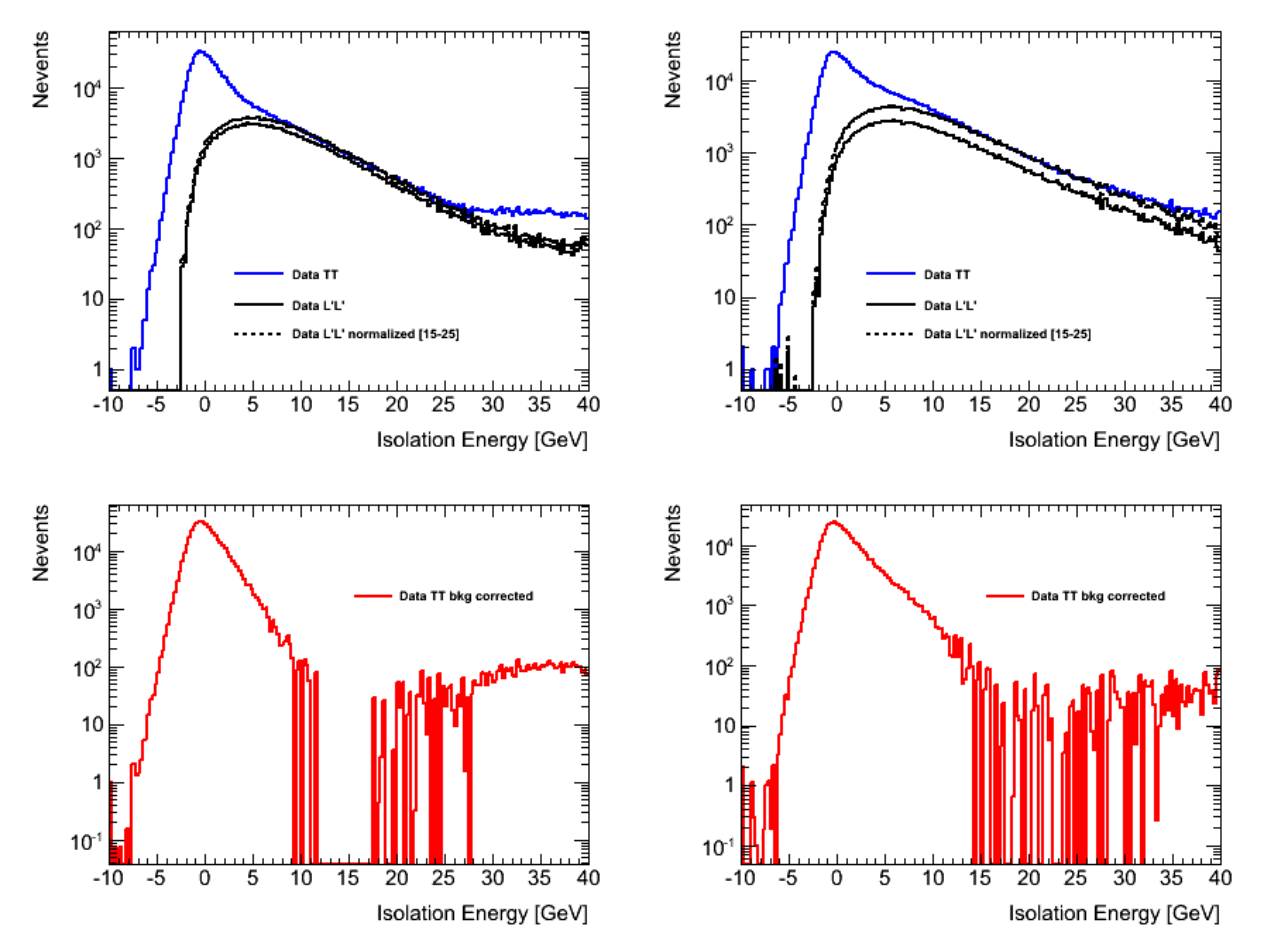
- Signal MC normalized:

$$W^{\gamma\gamma}_{TITI} * (1-\varepsilon^{\gamma 1}_{T}\varepsilon^{\gamma 2}_{T})/(\varepsilon^{\gamma 1}_{T}\varepsilon^{\gamma 2}_{T}\varepsilon^{\gamma 1}_{I}\varepsilon^{\gamma 2}_{I})$$

Background shape from data

Signal isolation in data – Step 2

- Signal from tight-tight sample
- Bkg from L'L normalized to signal shape in [15-25] GeV window

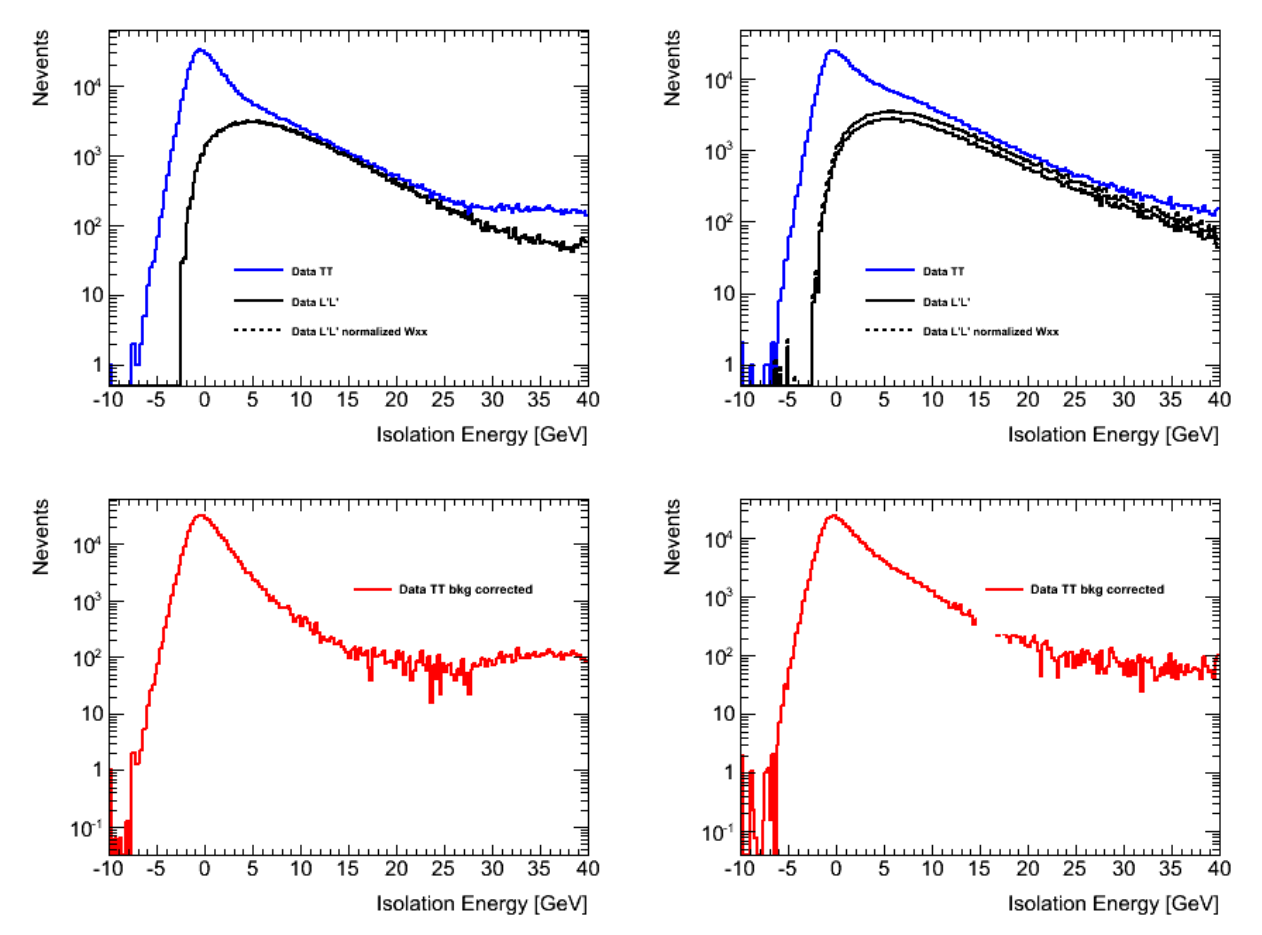


leading **subleading**

Signal shape from data

Signal isolation in data – Step 2'

- Signal from tight-tight sample
- Bkg from L'L' normalized in [-10;6] GeV to $w^{\gamma j}_{TITI} + w^{j\gamma}_{TITI} + w^{jj}_{TITI}$

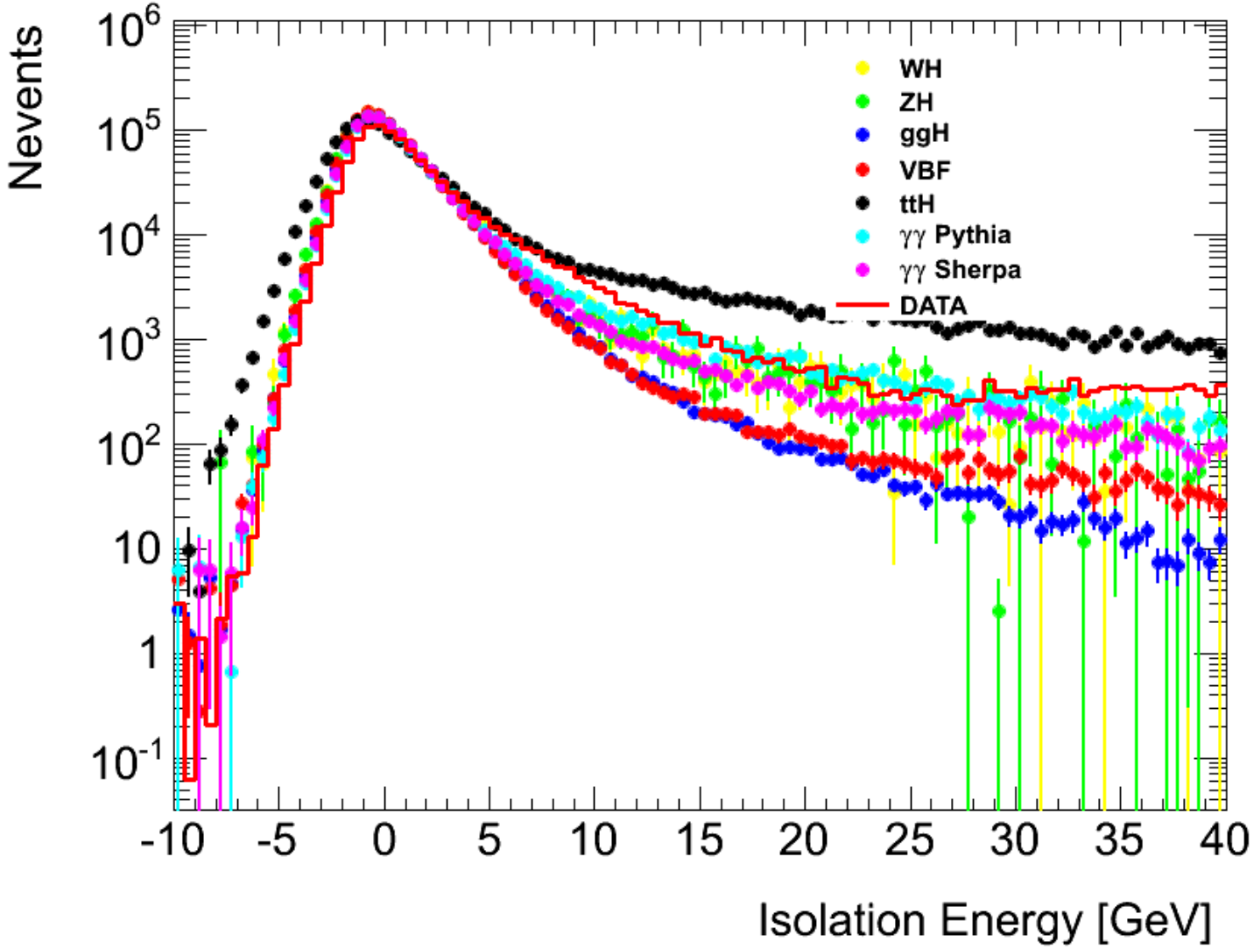


Signal shape from data

leading **subleading**

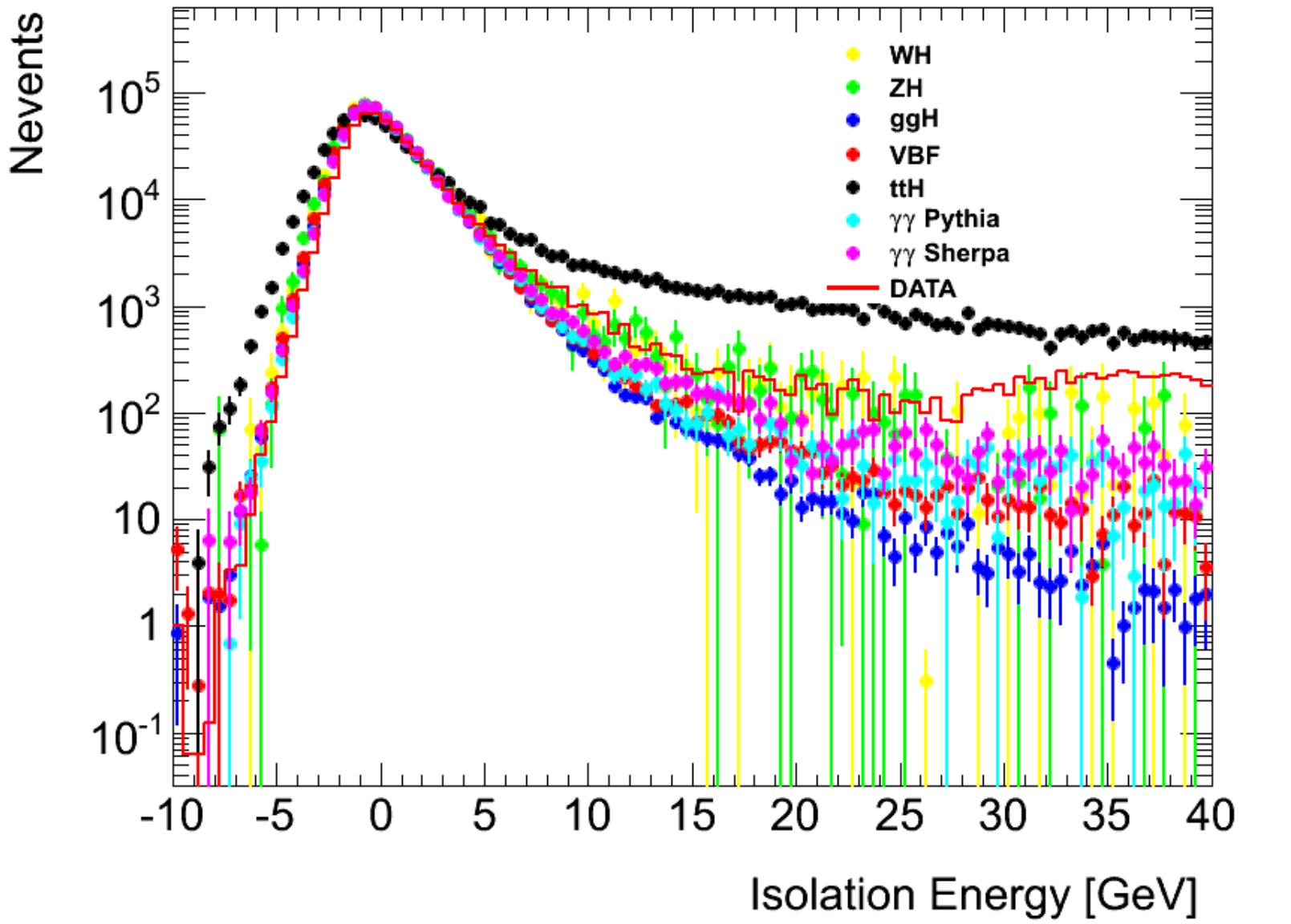
Data/MC comparison: all photons

Normalized within [0;5] GeV window



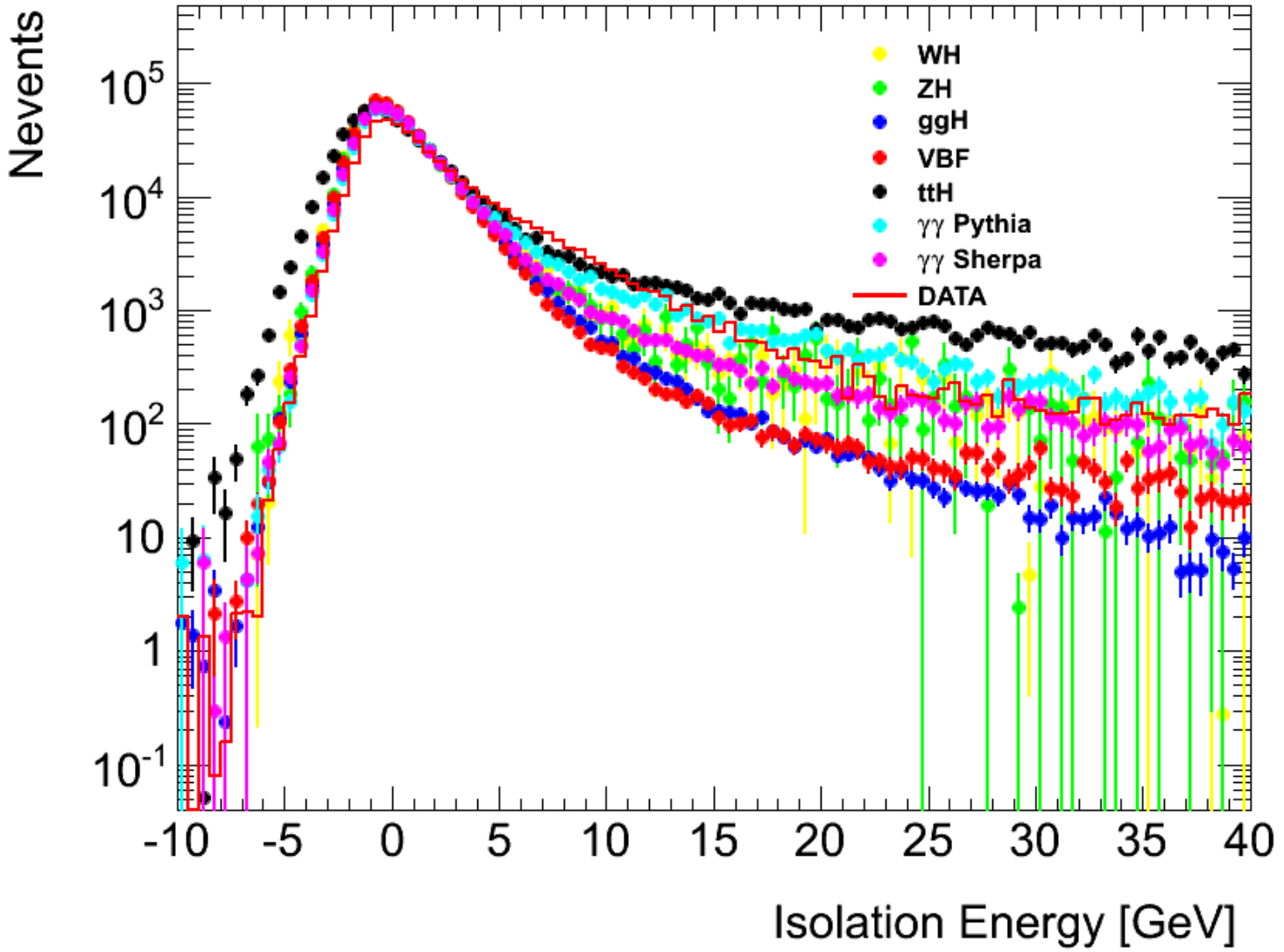
Data/MC comparison: Leading Photon

Normalized within [0;5] GeV window



Data/MC comparison: Subleading Photon

Normalized within [0;5] GeV window

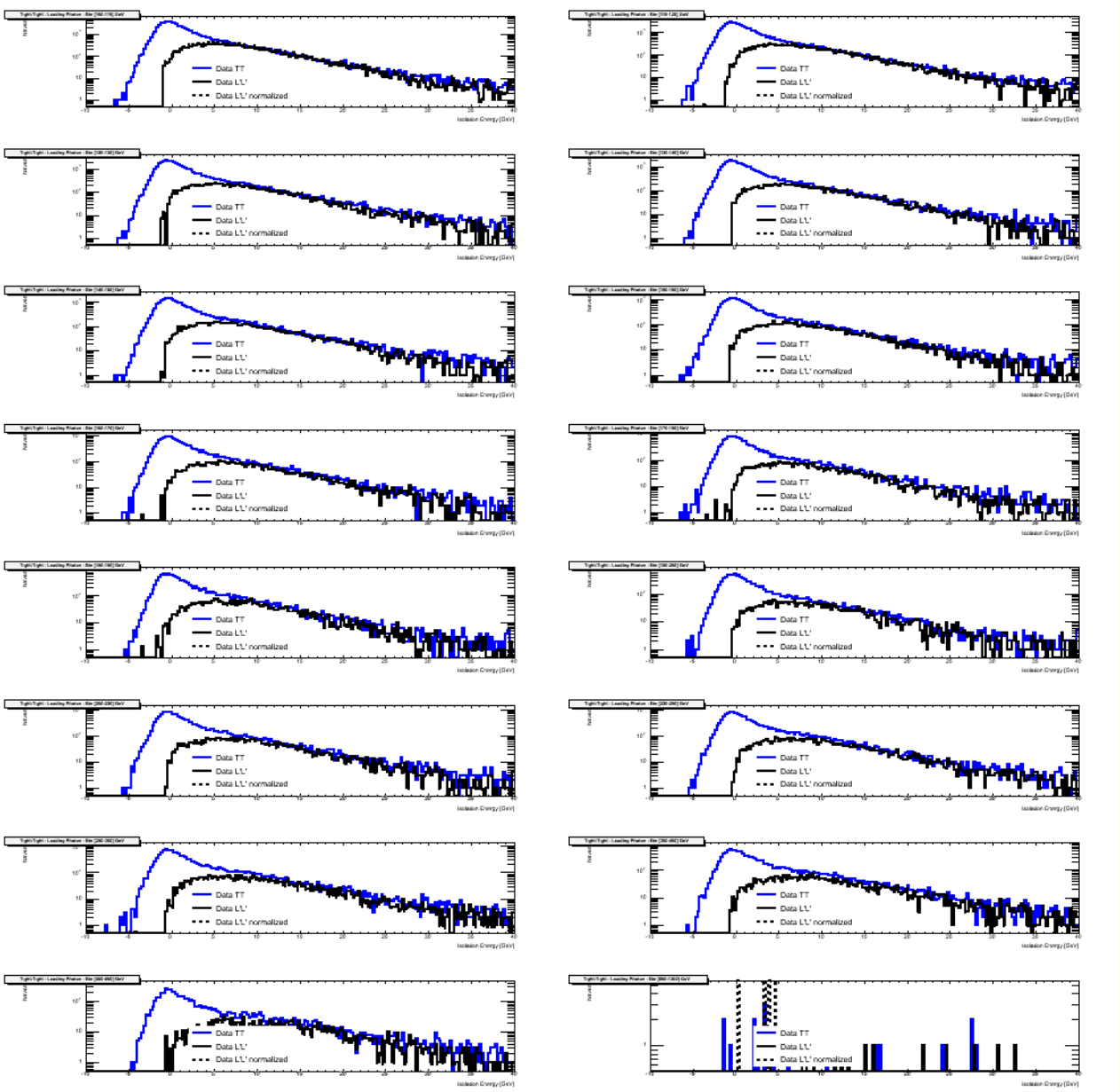


2) Signal Isolation extracted from data: vs $M_{\gamma\gamma}$

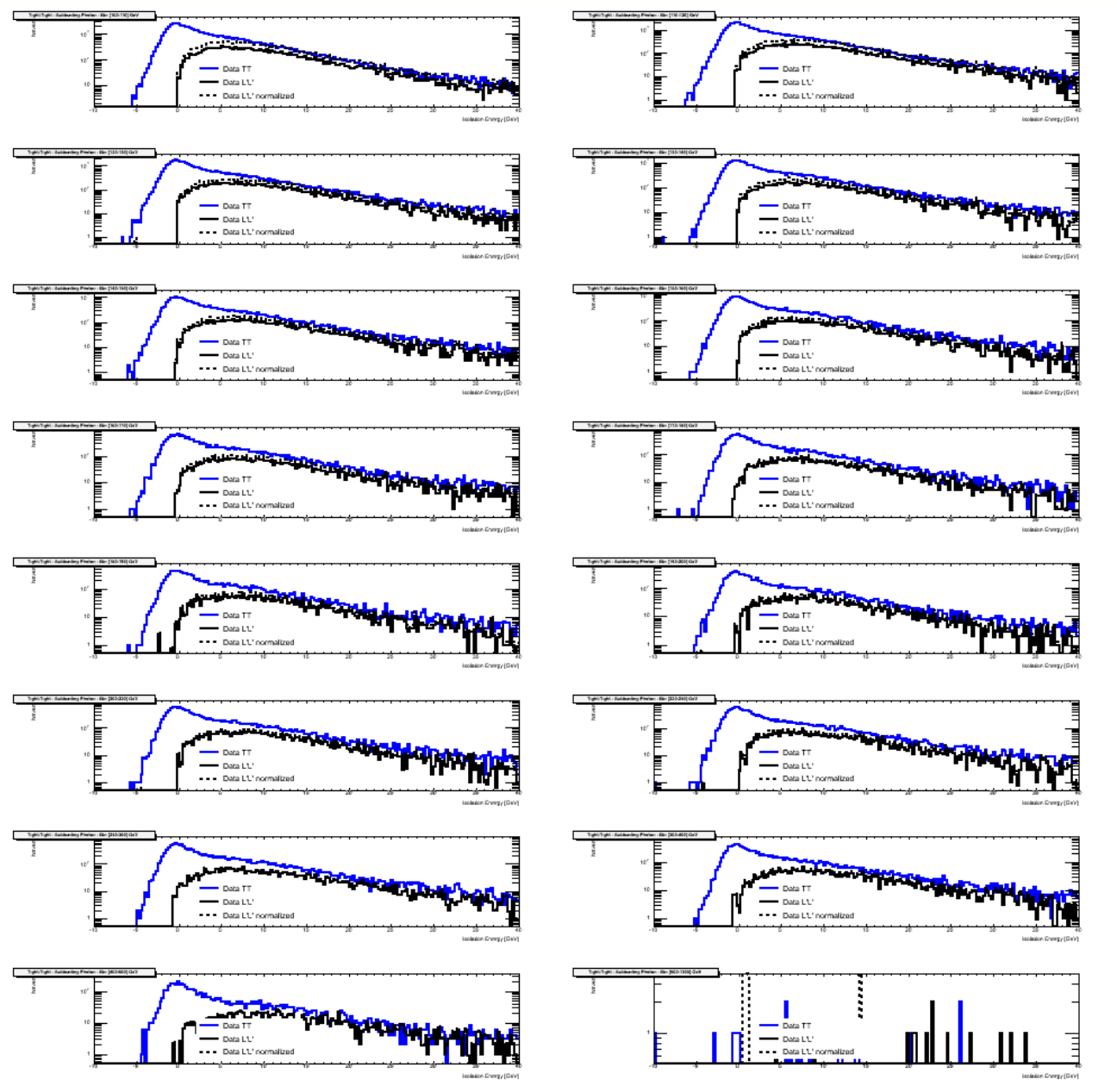
16 mass bins:

10 GeV bins in [100-200]
[200-220][220-250][250-300]
[300-400][400-600][600-1300]

Background substraction – Leading γ

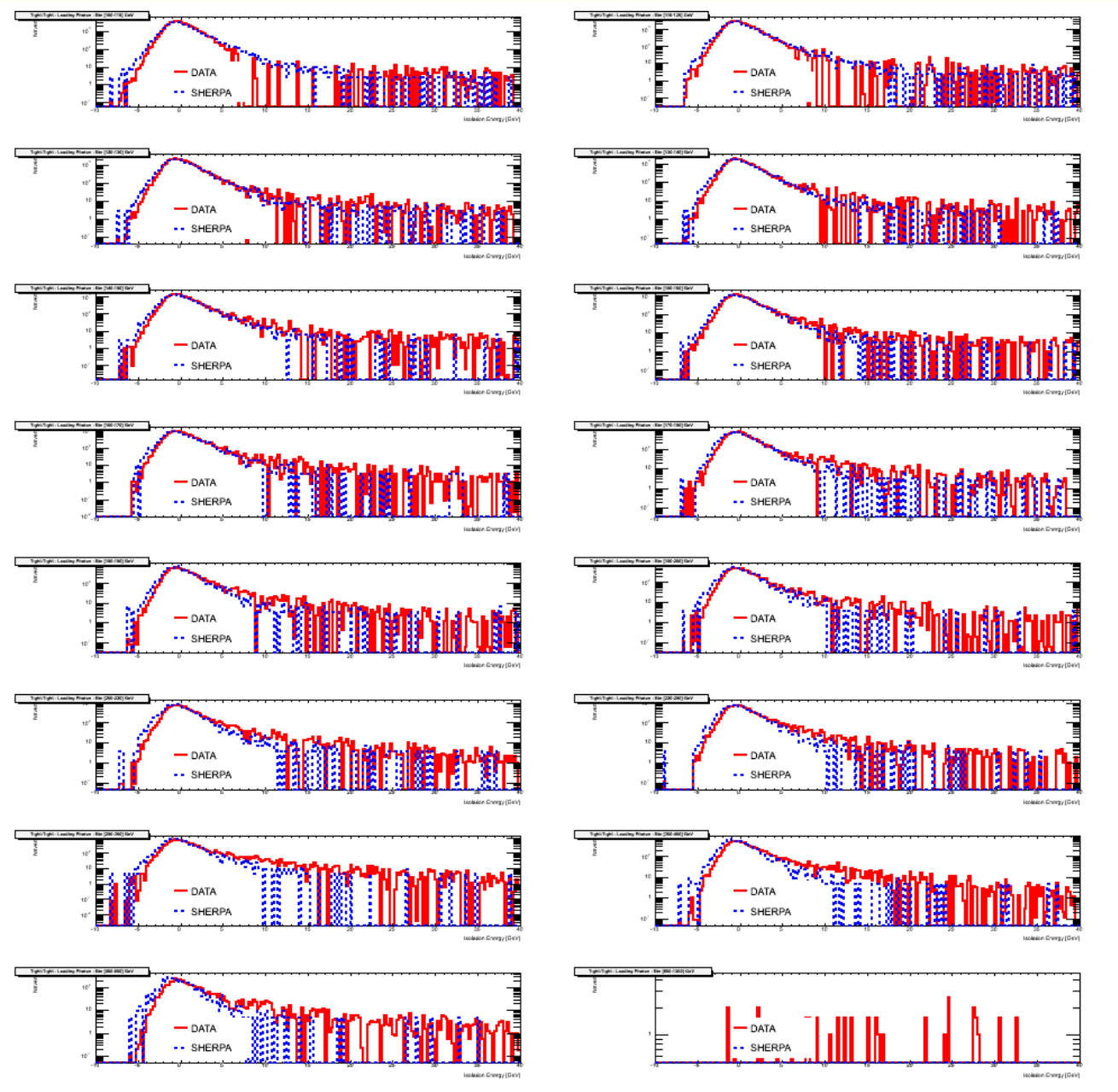


Background substraction – Subleading γ



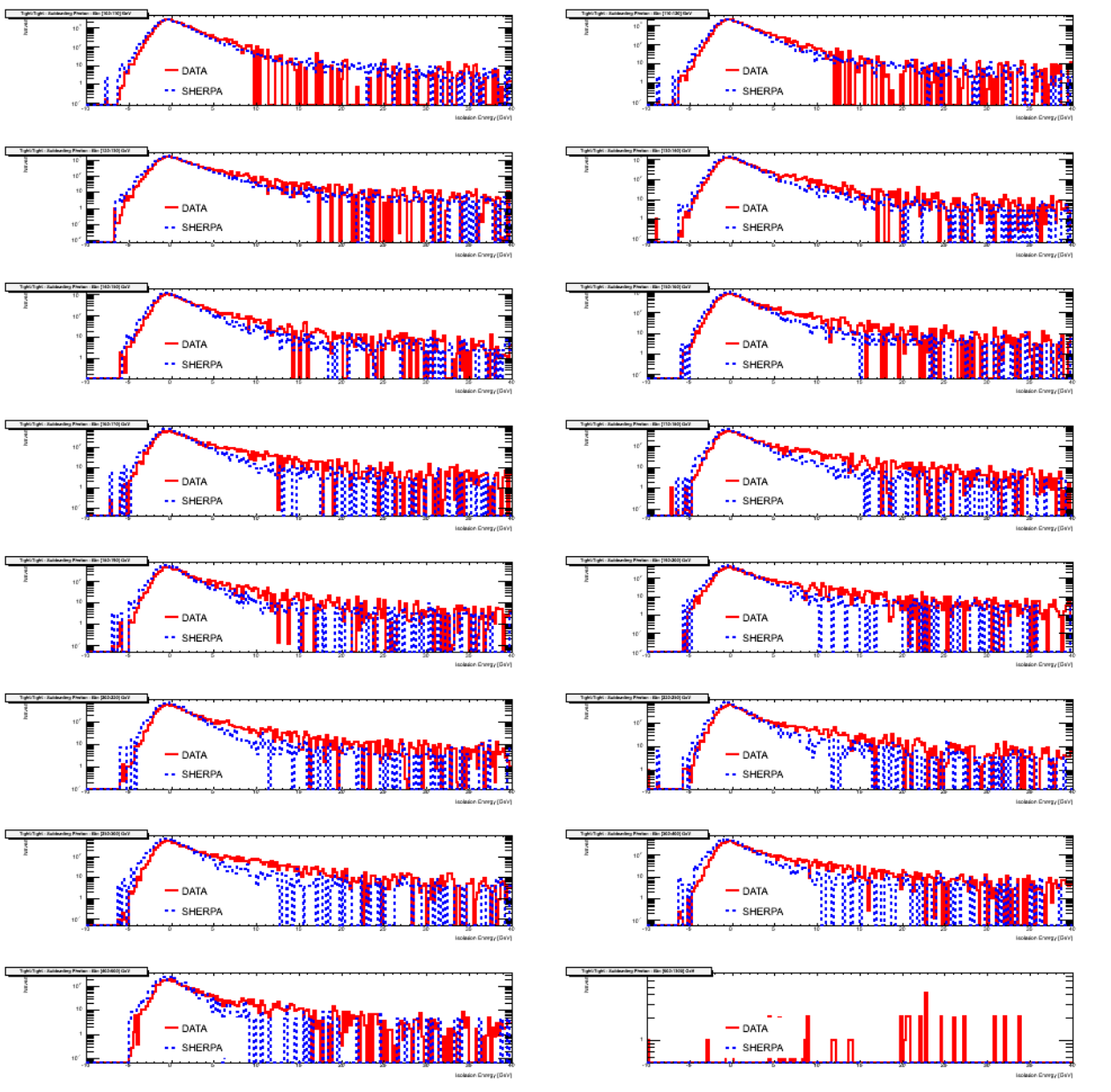
Signal Shape extraction – Leading γ

SHERPA MC (blue) superimposed with data shape (red)



Signal Shape extraction – Subleading γ

SHERPA MC (blue) superimposed with data shape (red)



Isolation efficiency in data vs SHERPA