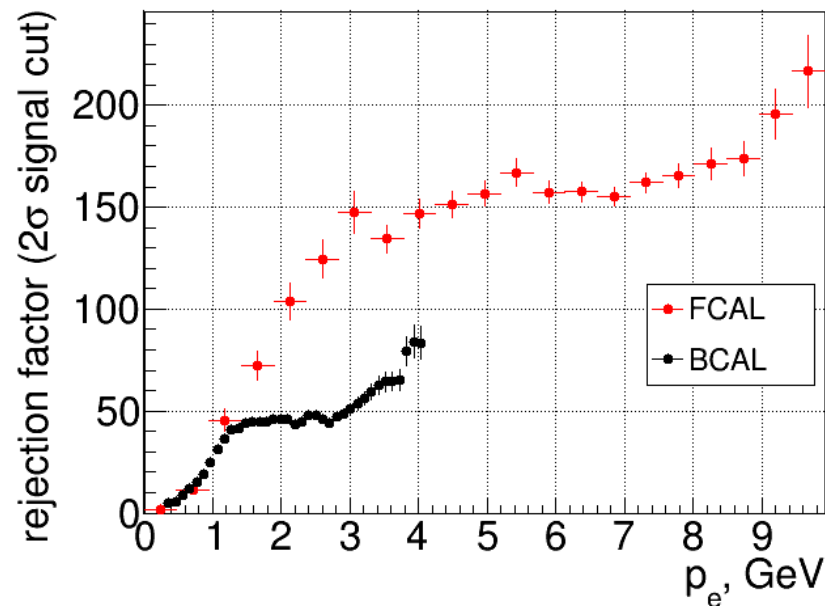
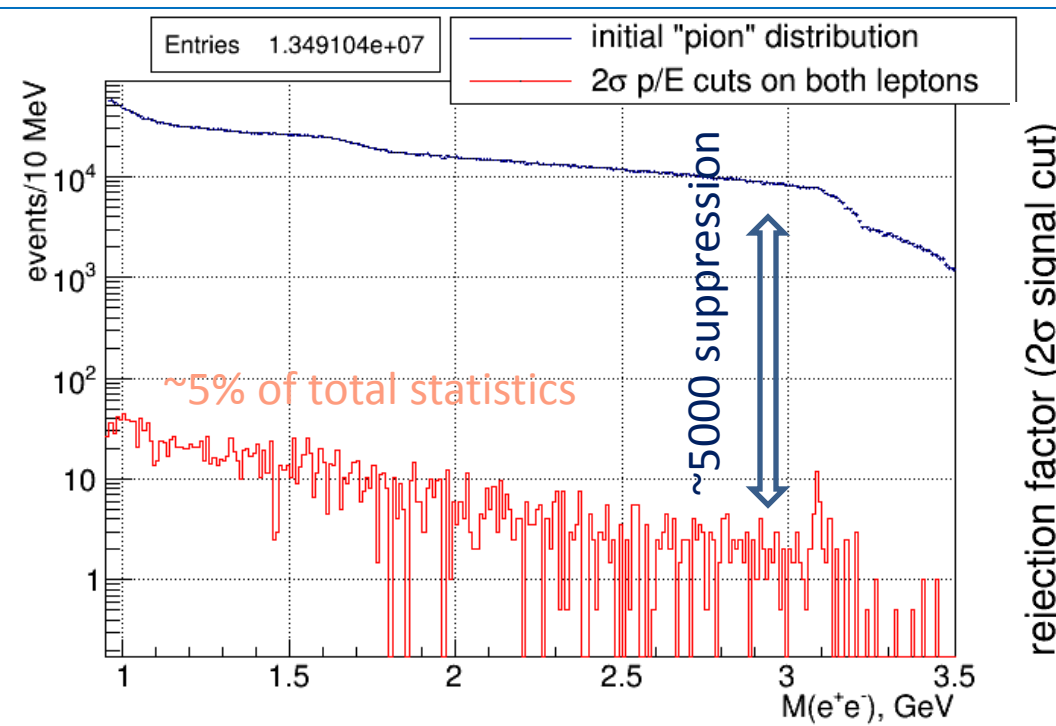


Update on J/ψ cross-section

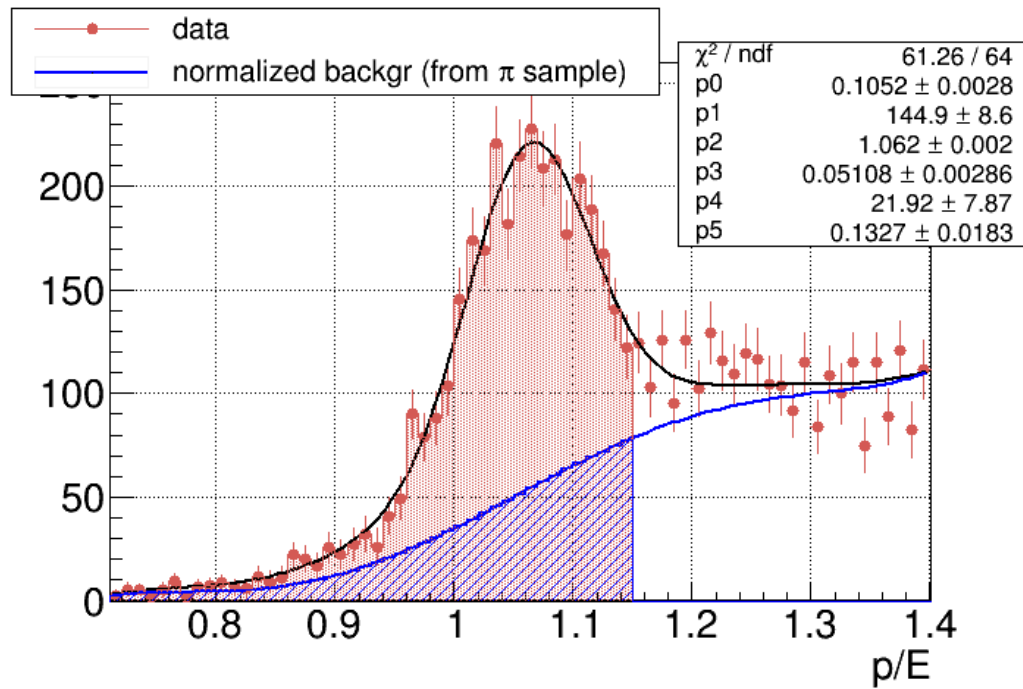
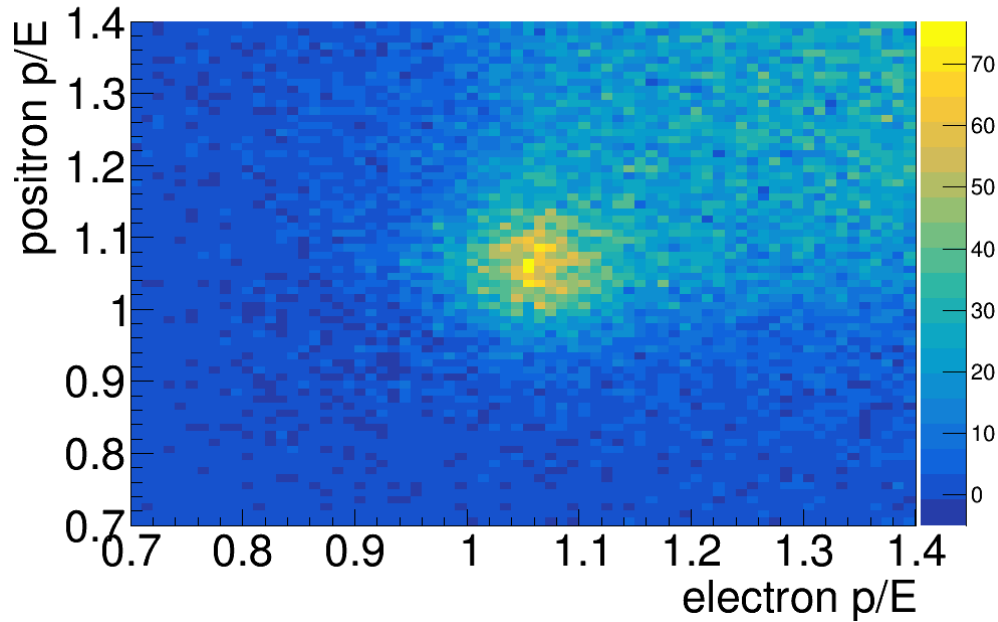
- Using latest reconstruction/analysis of all the data: sim-recon 2.20.1, REST production ver5 (2016) and ver2 (2017)
- Cross-section normalization to Bethe-Heitler (BH) continuum in 1.5-2.5 GeV invariant mass
- **Study of the normalization systematics by comparing the flux normalized yields for BH and J/ψ , for different run periods and reconstruction versions**
- More detailed study of the suppression of the pions – main background for BH
- Further improvements: finer (5 MeV) binning, simplified cuts for better modeling (exclude dE/dx cut)

Electron/proton separation using p(tracking)/E(calorimetry)



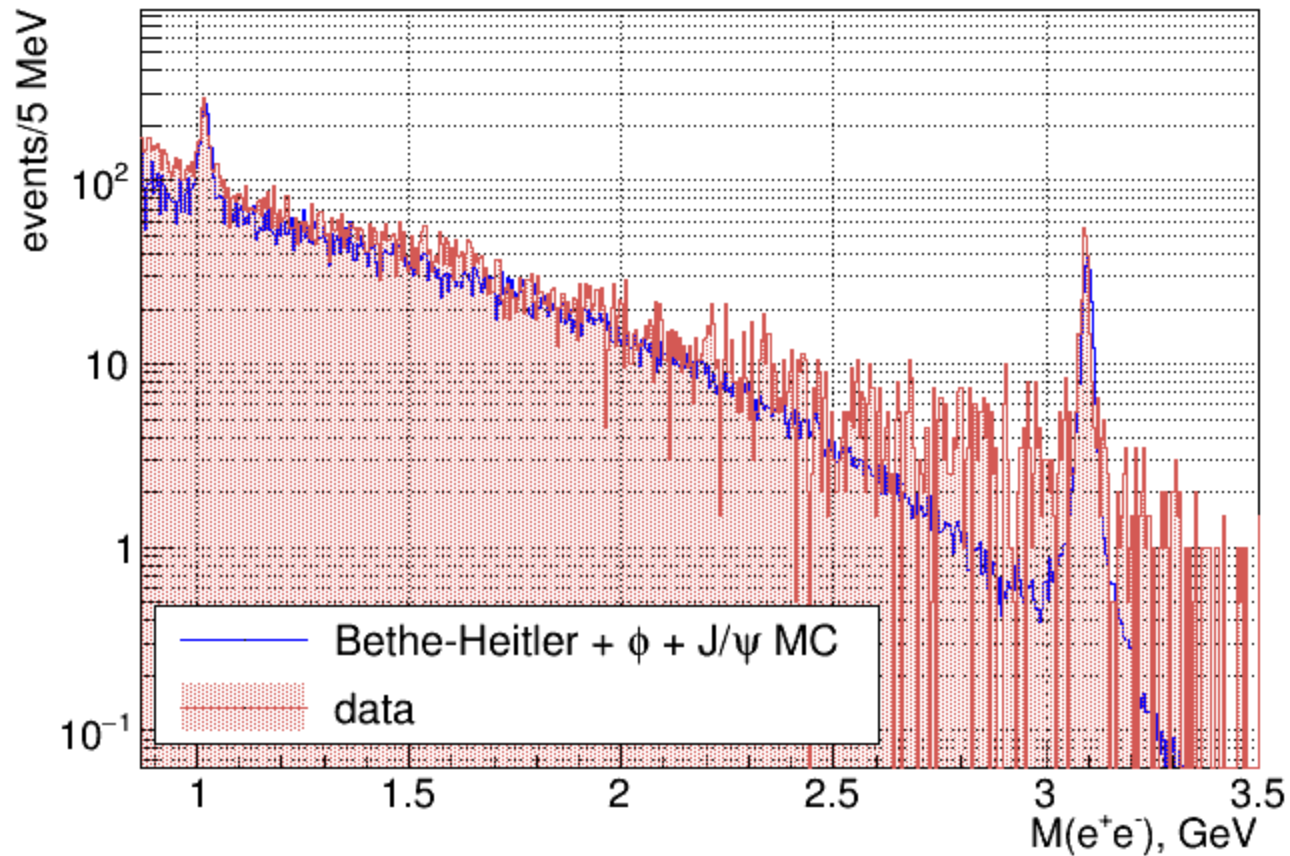
- Suppression factor of ~ 5000 by p/E cuts only
- Different for BCAL and FCAL; depends on energy

Electron/proton separation using p(tracking)/E(calorimetry)



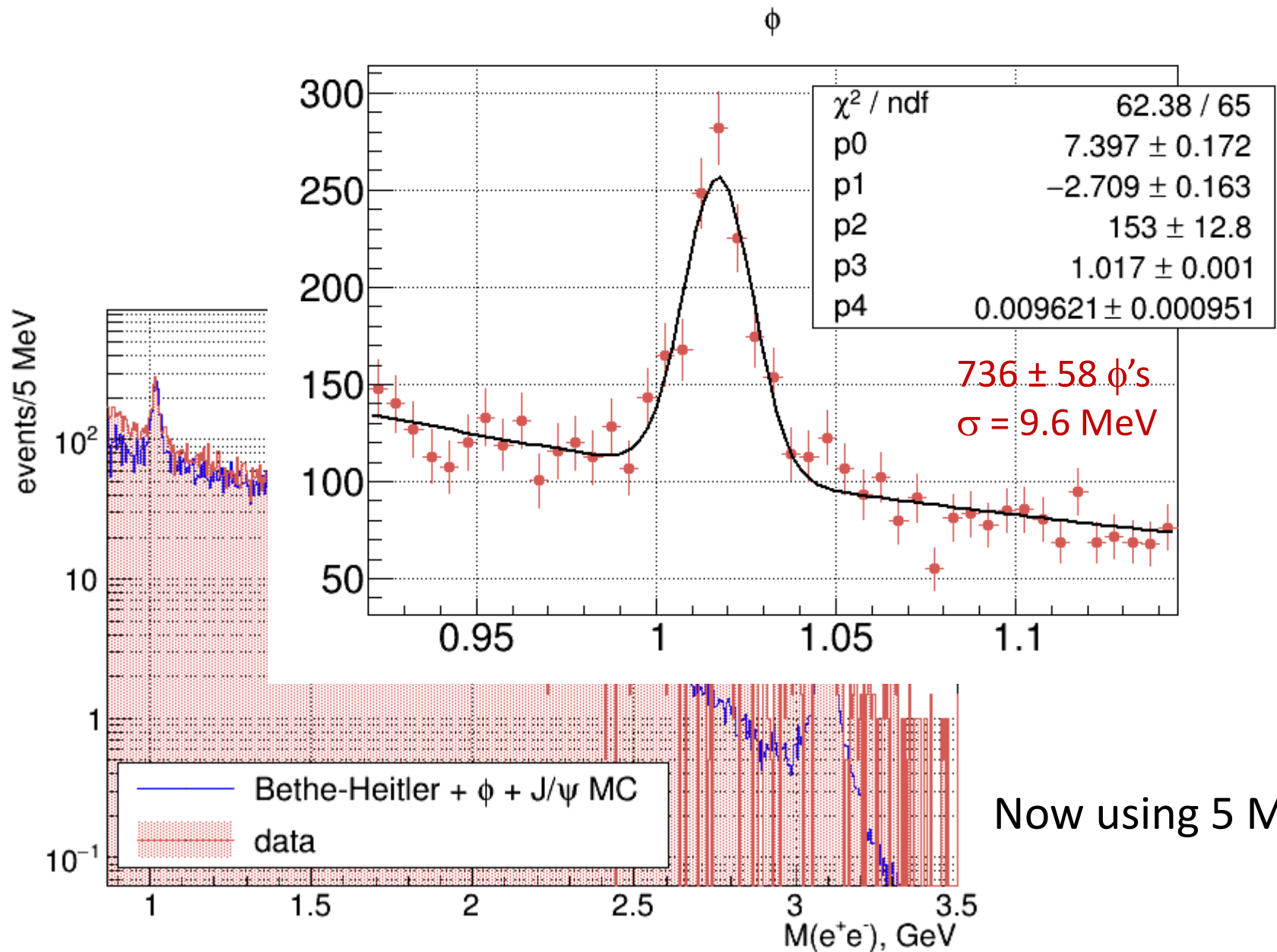
- $36 \pm 1.2\%$ contamination in 1.5-2.5 GeV $M(e^+e^-)$ region with 2σ cut on electrons
- BH yields corrected in bins of energy – percentage slightly varies with energy
- Background shape from pion sample (p/E anti-cuts)
- Contribution to systematics $\sim 5\%$ based on different pion shapes

Invariant mass spectrum



Now using 5 MeV bins

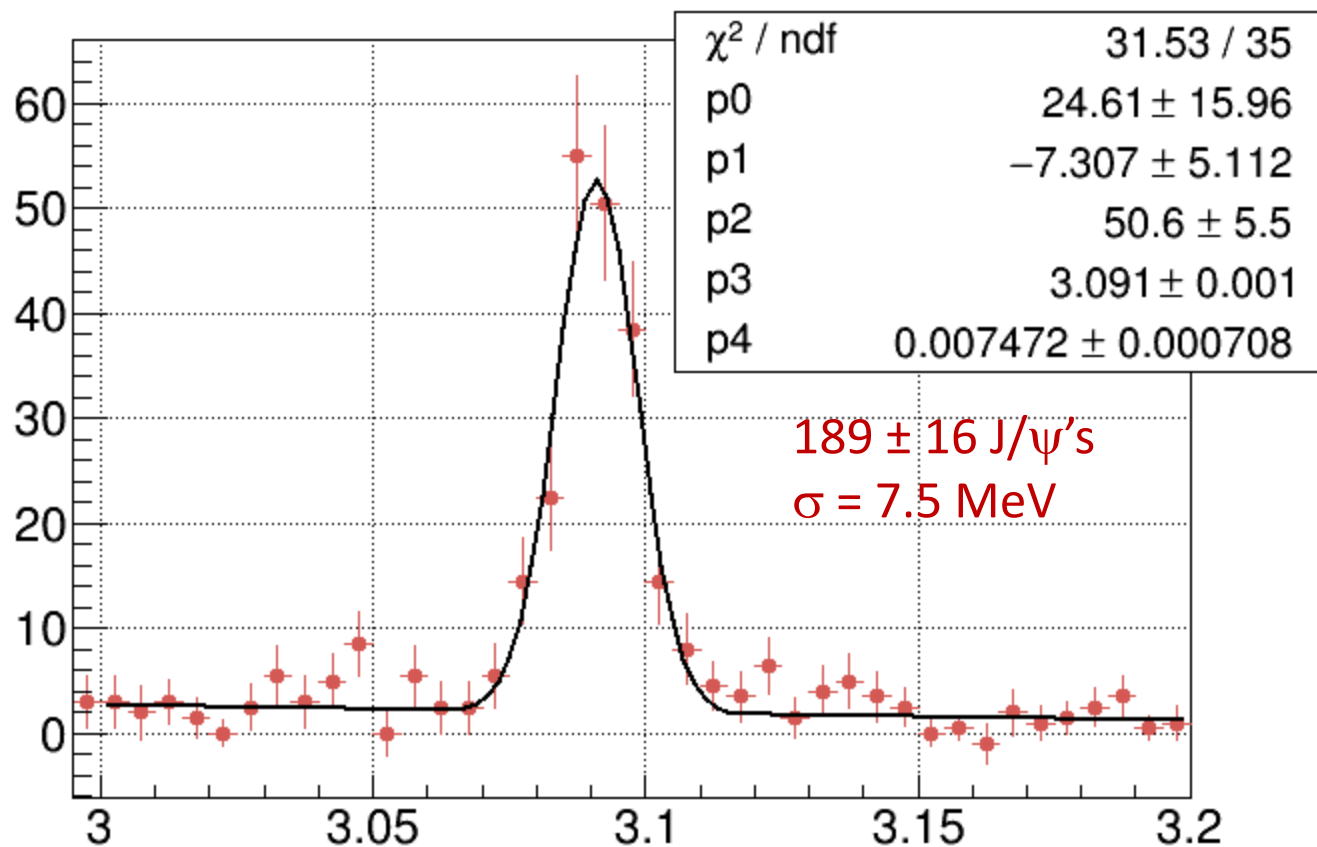
Invariant mass spectrum



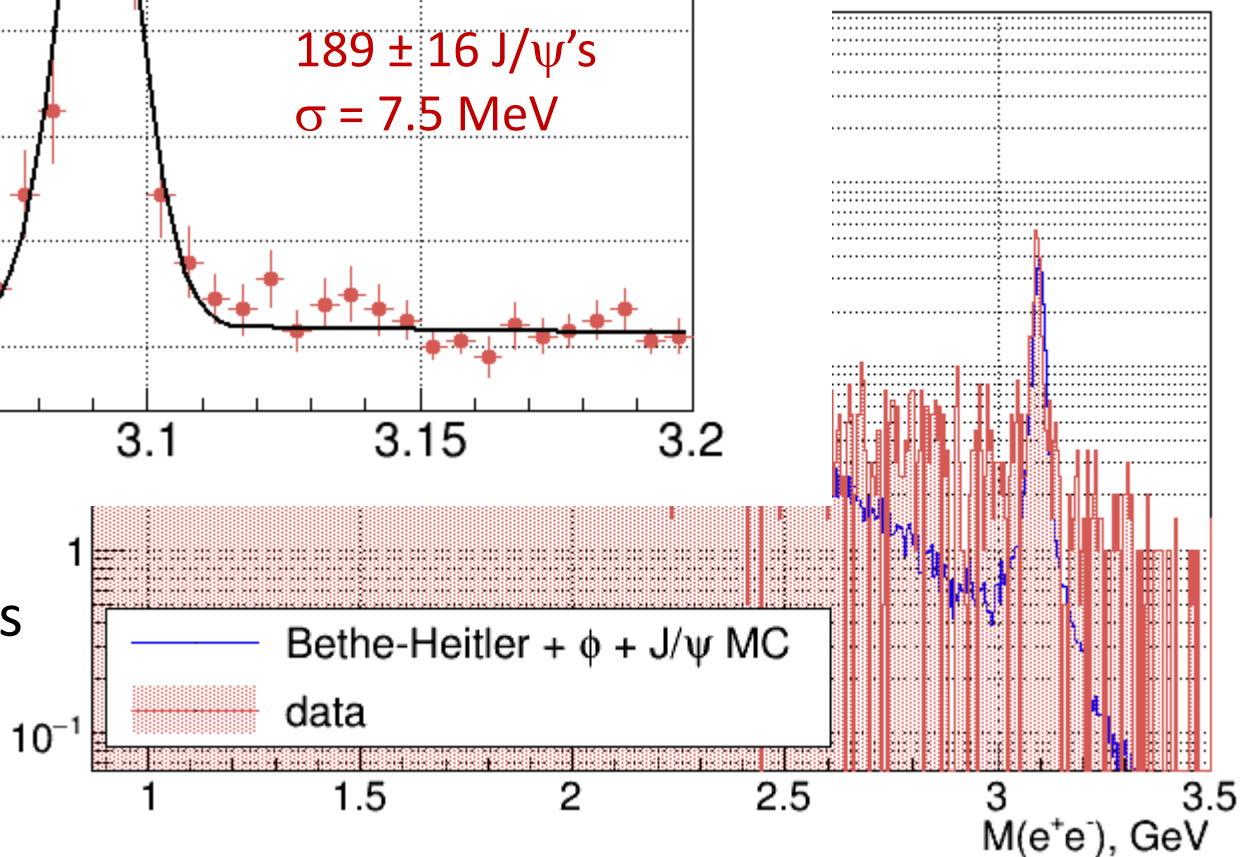
Now using 5 MeV bins

Invariant mass spectrum

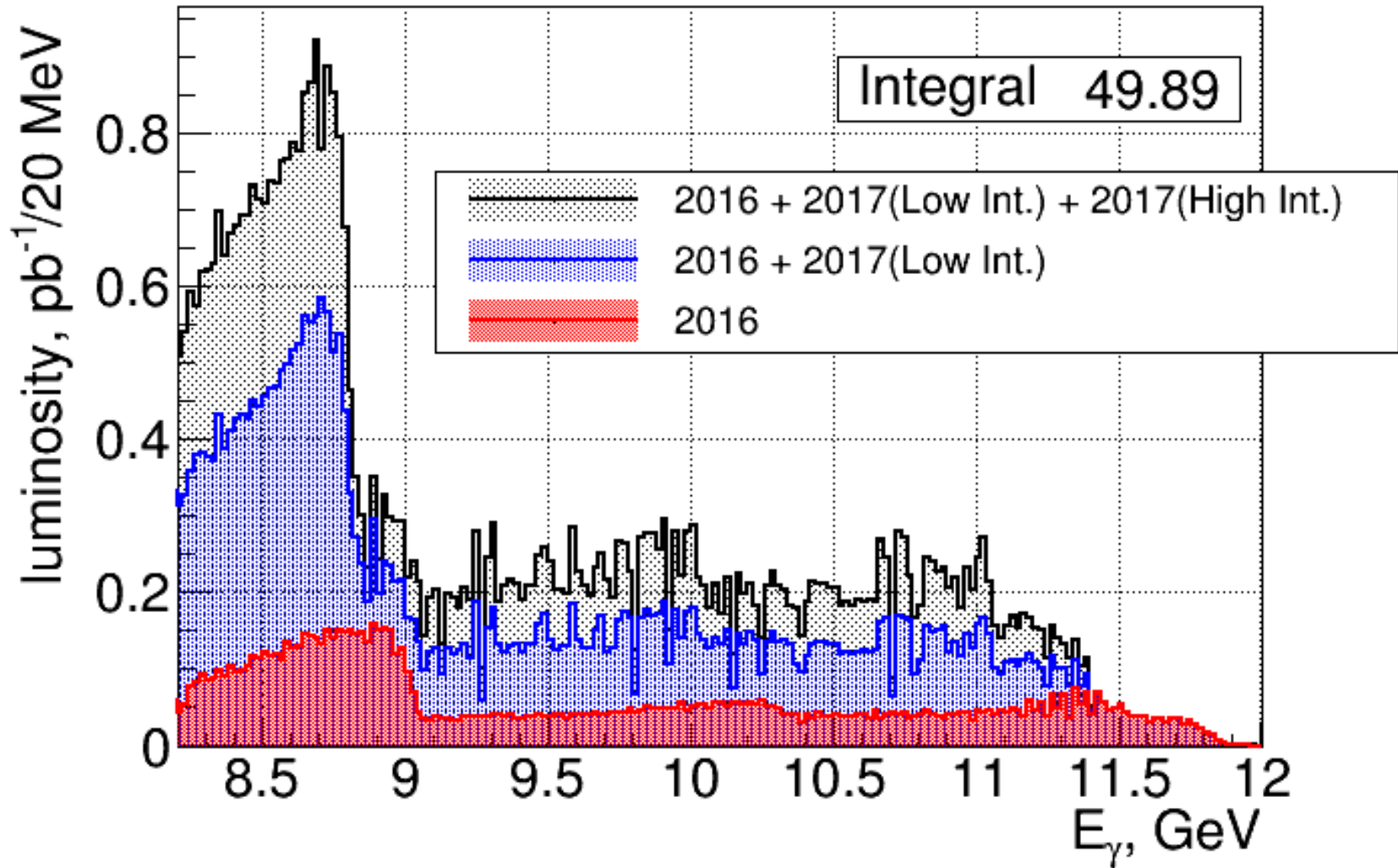
J/ψ



Now using 5 MeV bins

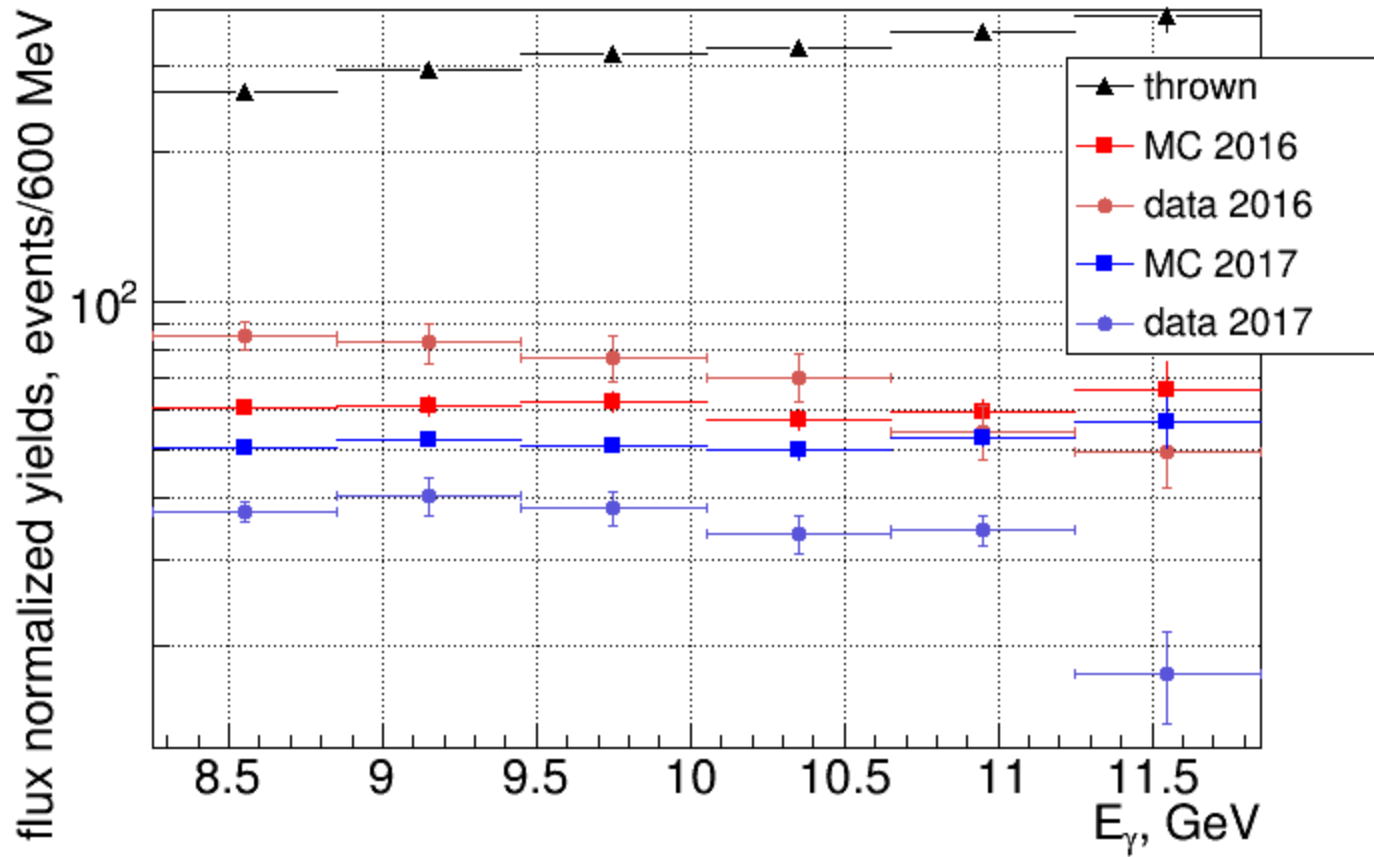


Tagged Flux



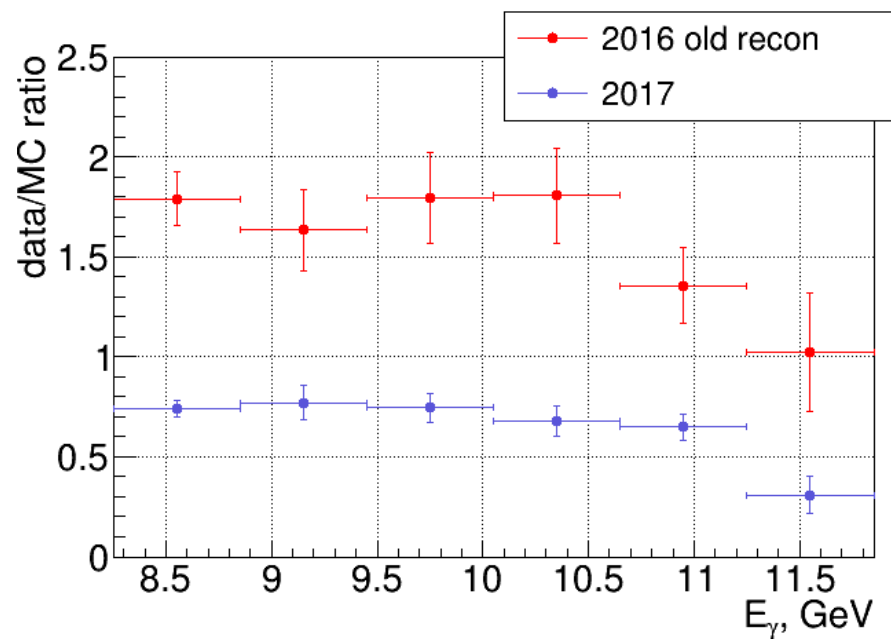
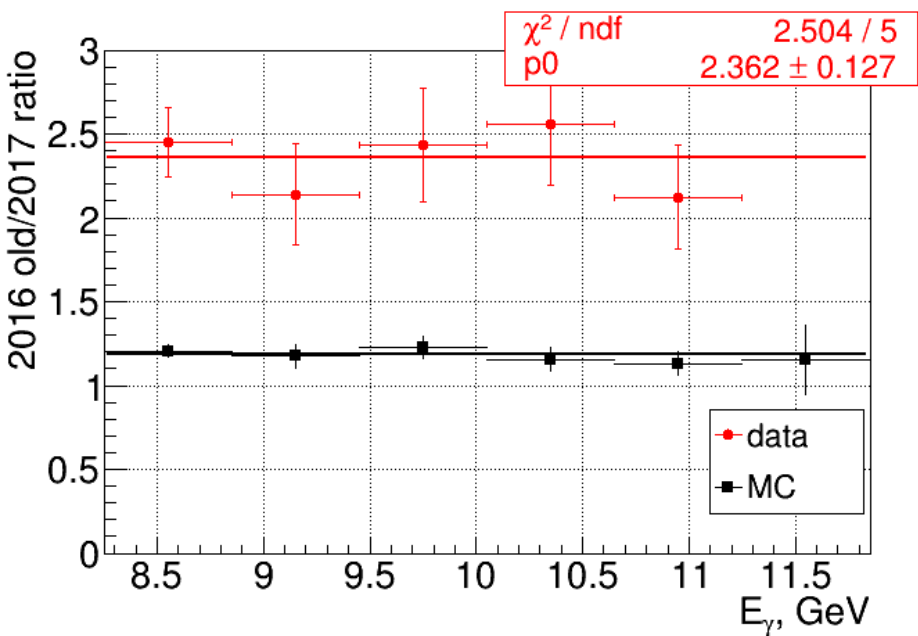
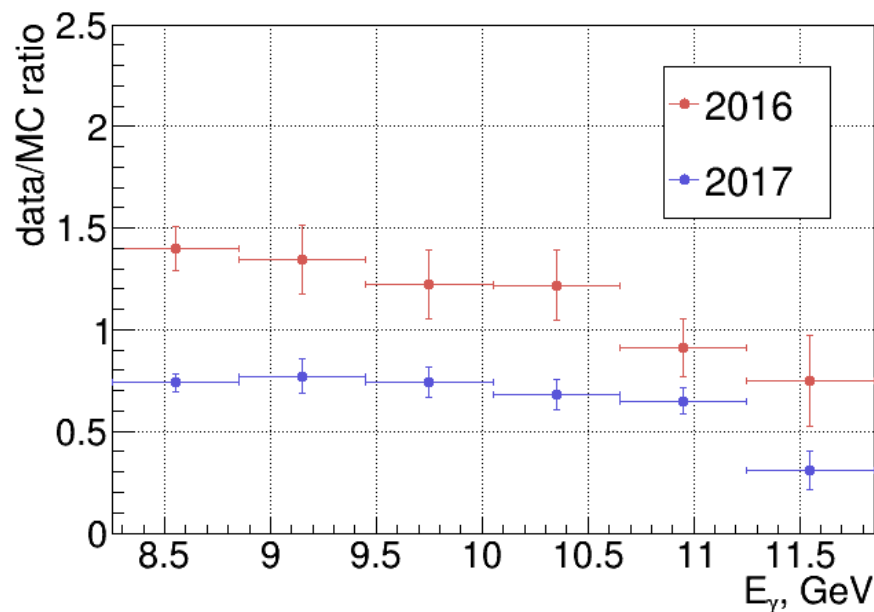
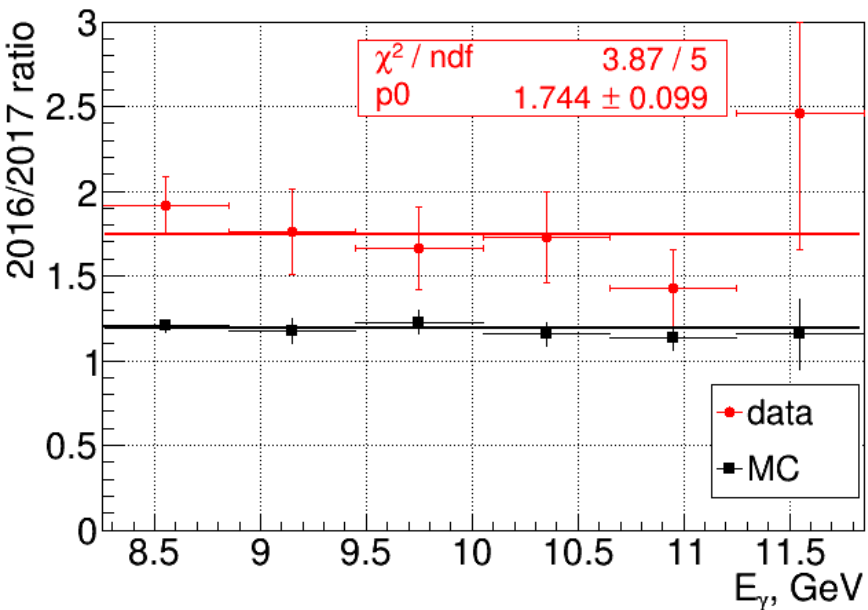
Flux normalized yields (BH)

$1.5 < M(e^+e^-) < 2.5 \text{ GeV}$



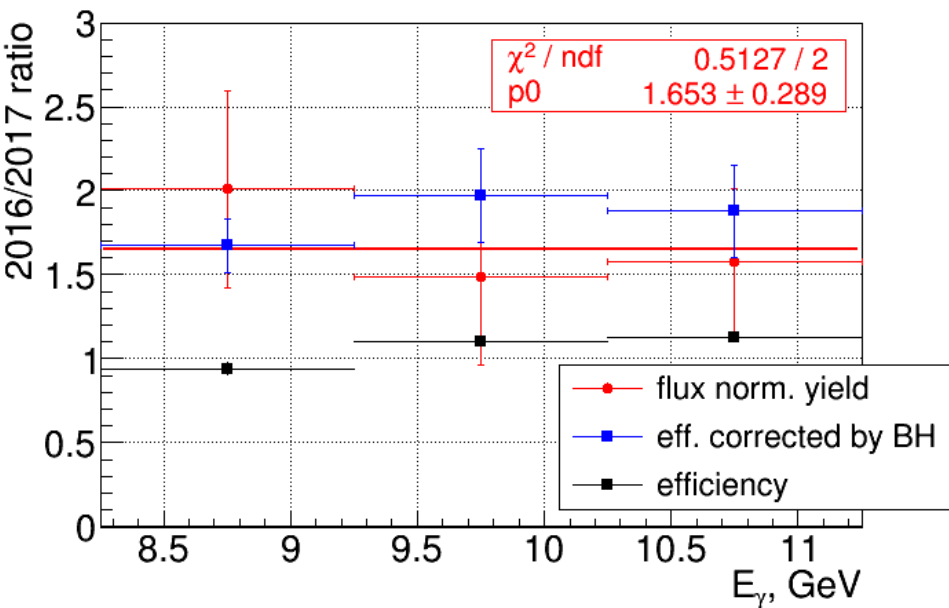
BH yields corrected for π contamination in bins of energy

Flux normalized yields (BH)

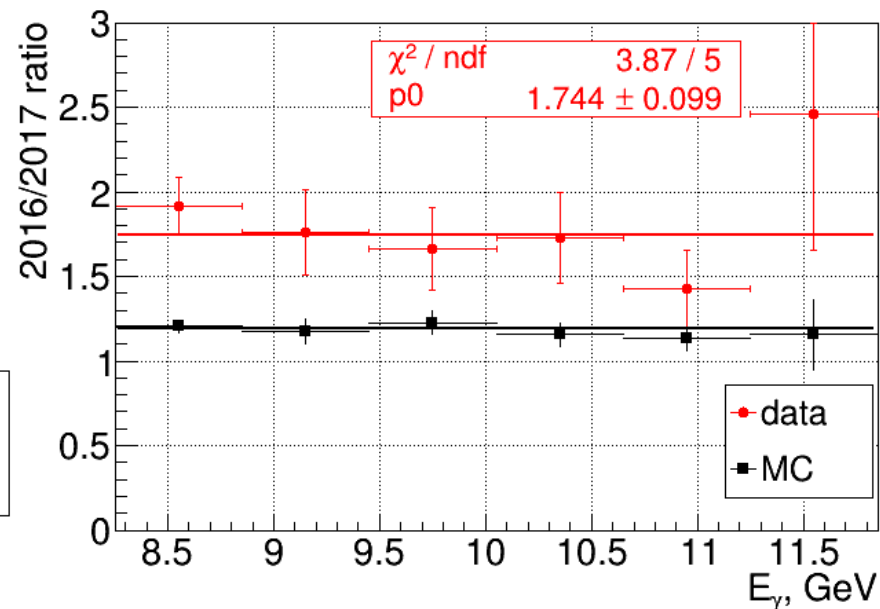


Flux normalized yields (J/ ψ vs BH)

J/ ψ new reconstruction



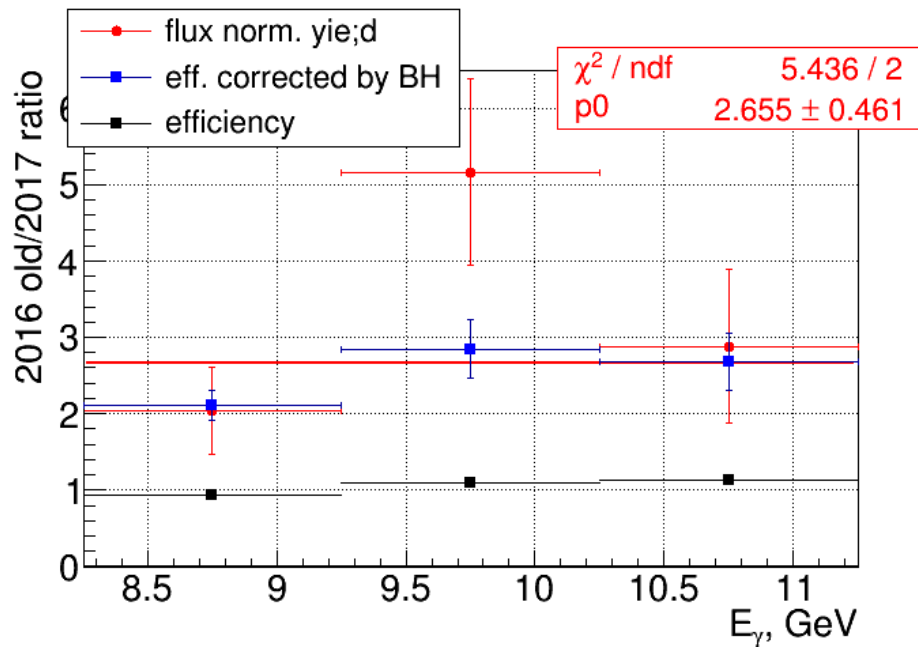
BH new reconstruction



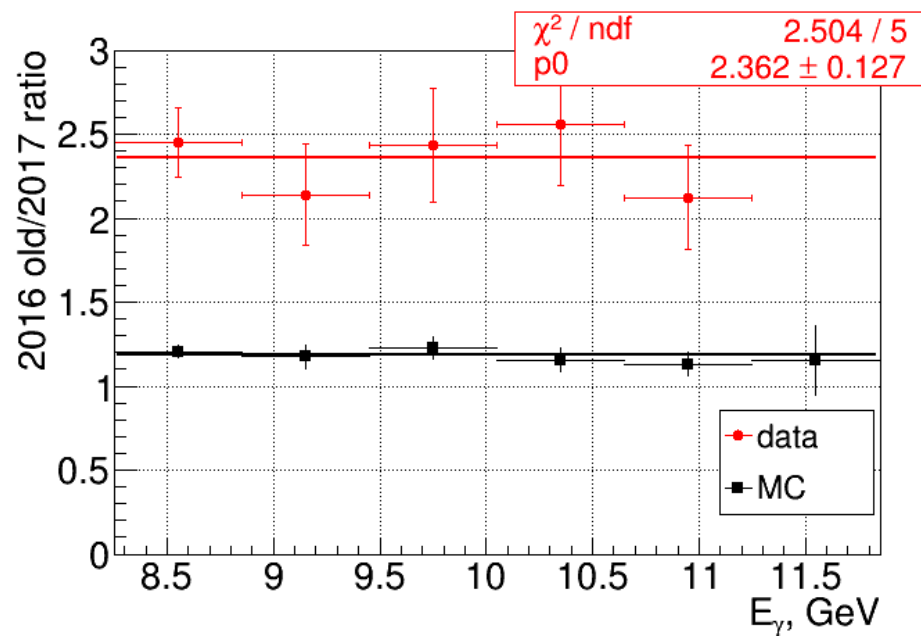
Change of the yields (2016 to 2017) for J/ ψ and BH
- same with 18% error (J/ ψ /BH=0.95 \pm 0.17)

Flux normalized yields (J/ψ vs BH)

J/ψ old reconstruction



BH old reconstruction

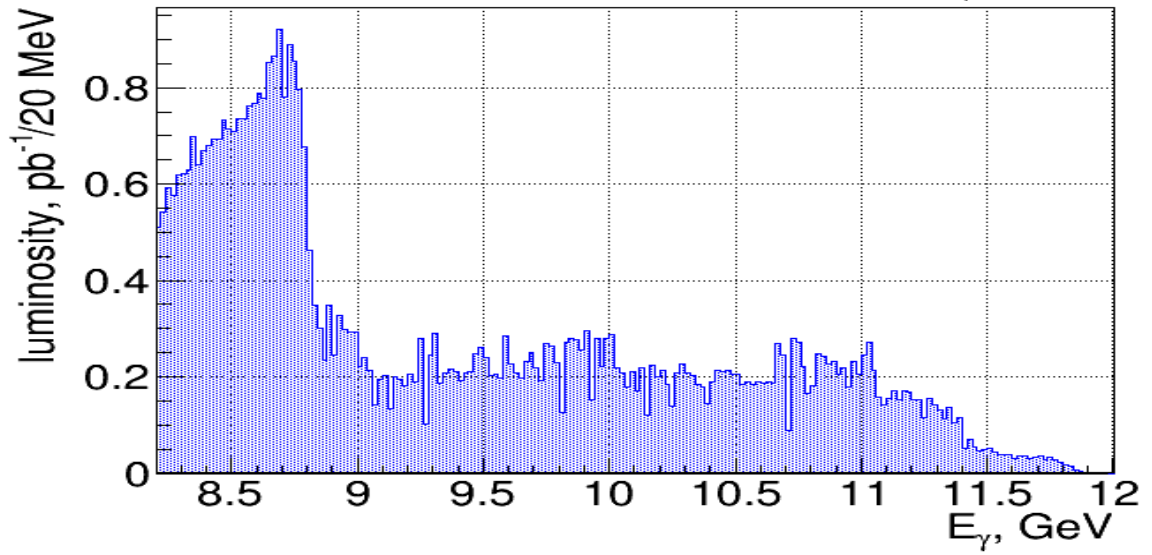
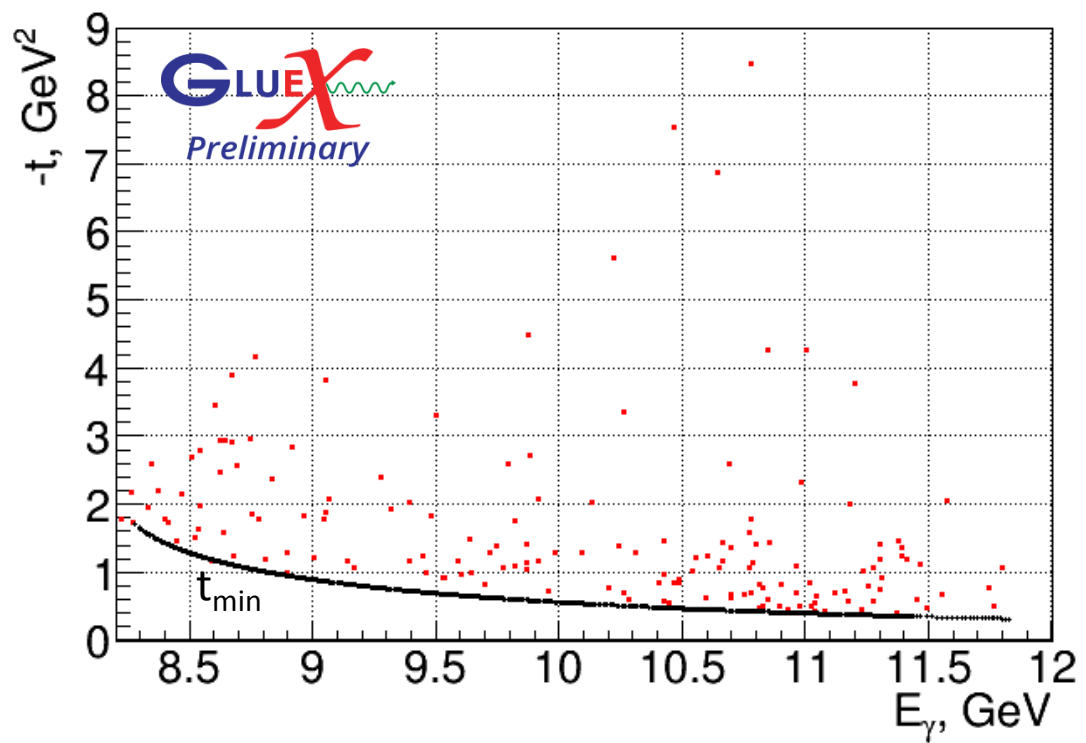


Change of the yields (2016 old recon. to 2017) for J/ψ and B
- same with 18% error (J/ψ /BH=1.12±0.20)

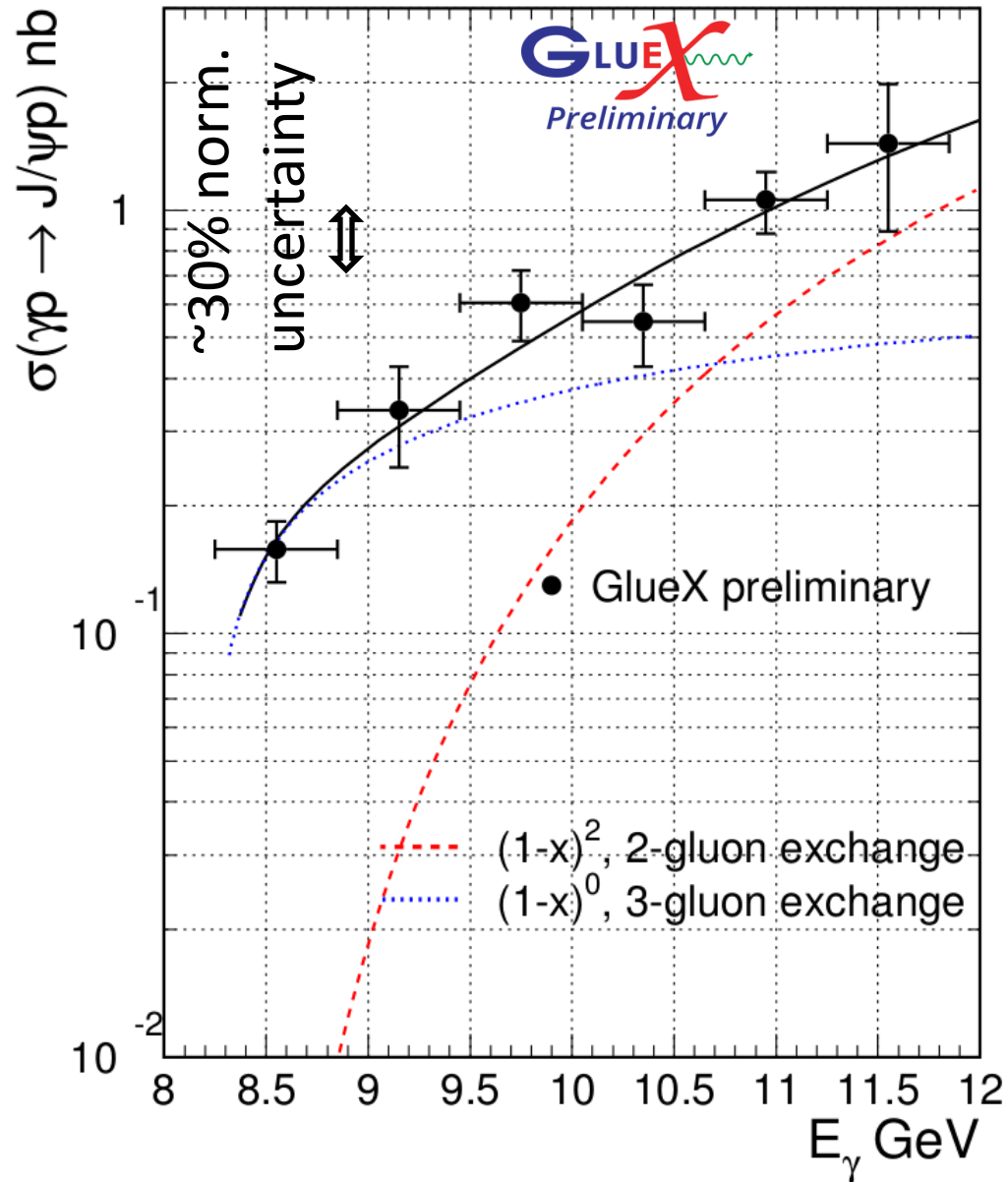
J/ ψ cross-section - systematics on normalization

Systematic error from	Estimate (%)
J/ ψ to BH relative yield	18
BH x-section calculations	10
Pion contamination in BH	5
ρ' contribution to BH	10
Total (so far)	23.4

J/ψ t vs E_γ distribution – preliminary results



J/ψ cross-section – preliminary results



J/ ψ cross-section – preliminary results

