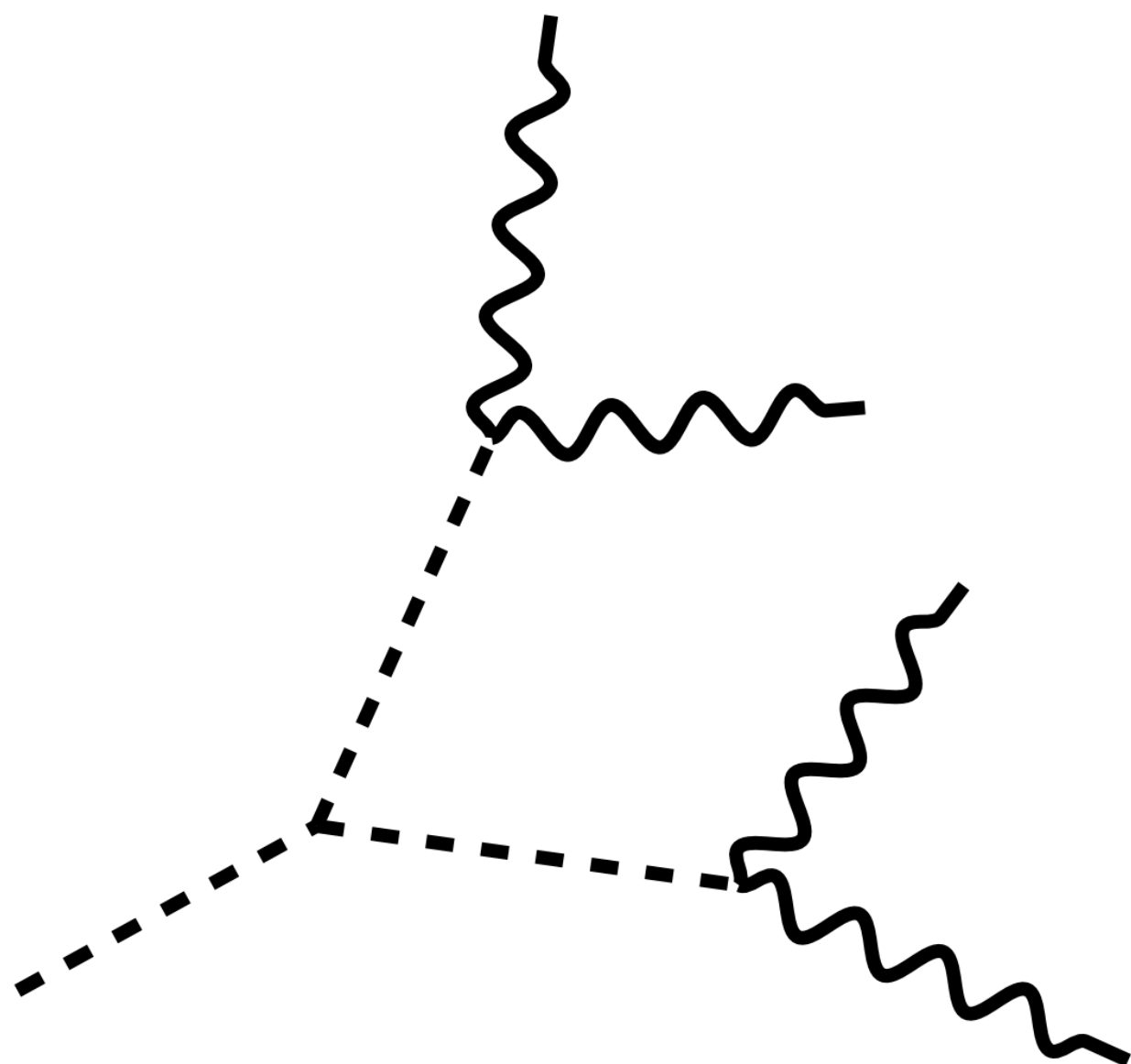




$$h(125) \rightarrow aa \rightarrow \gamma\gamma\gamma\gamma$$



Higgs to 4 Gamma Update

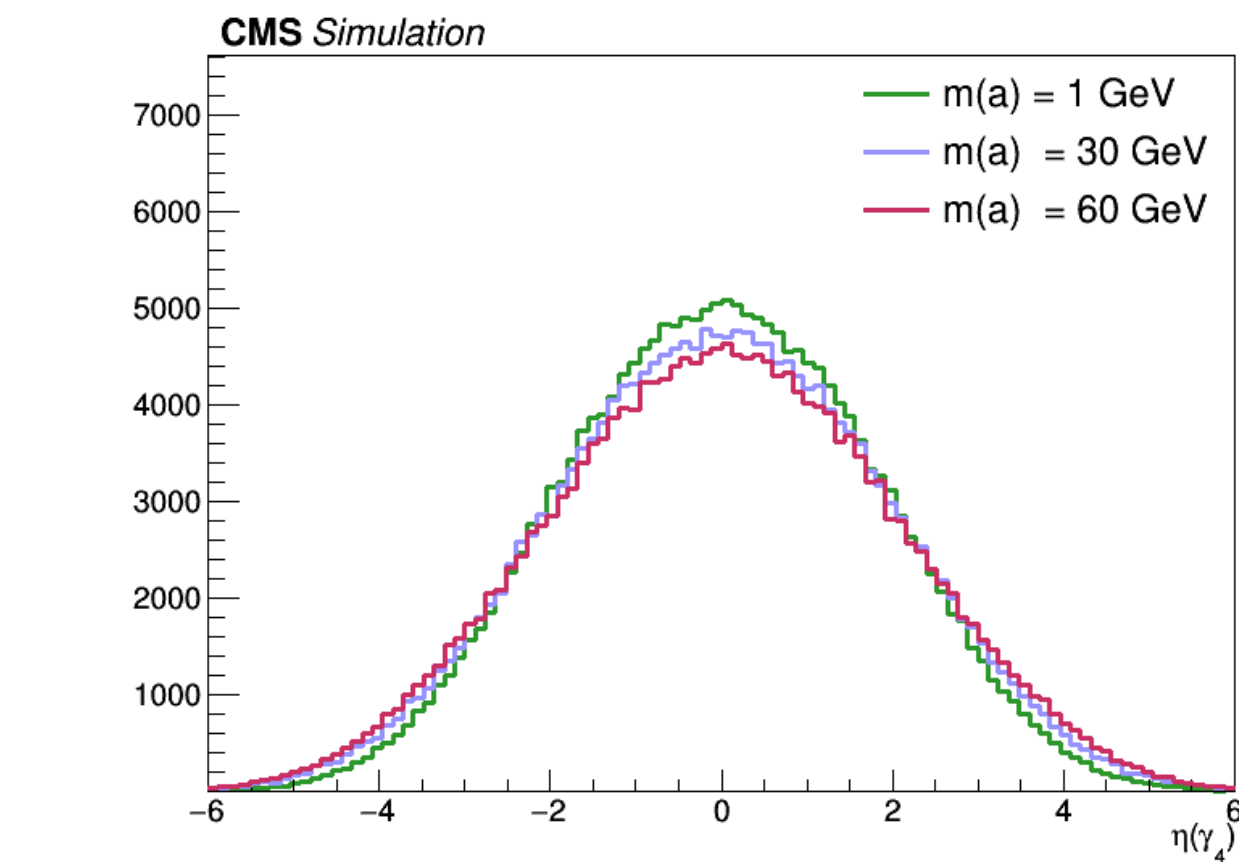
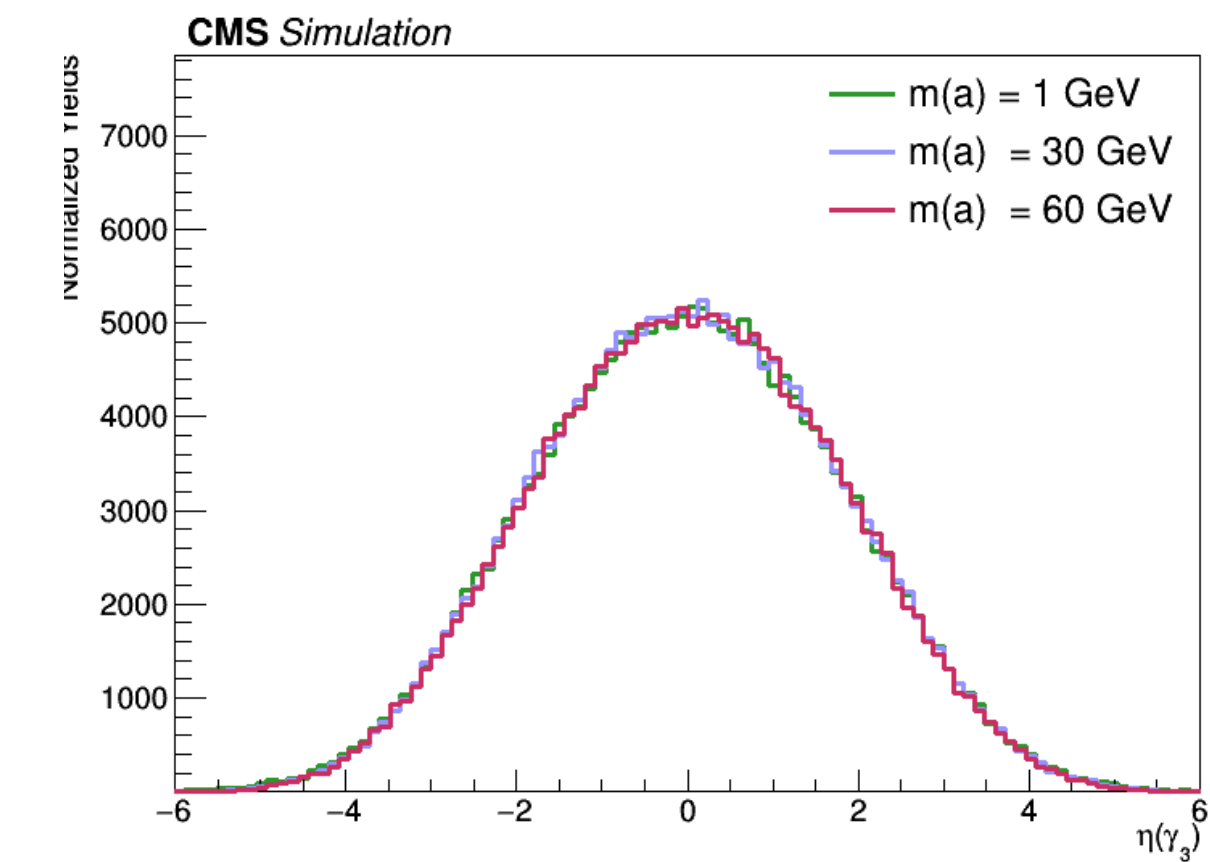
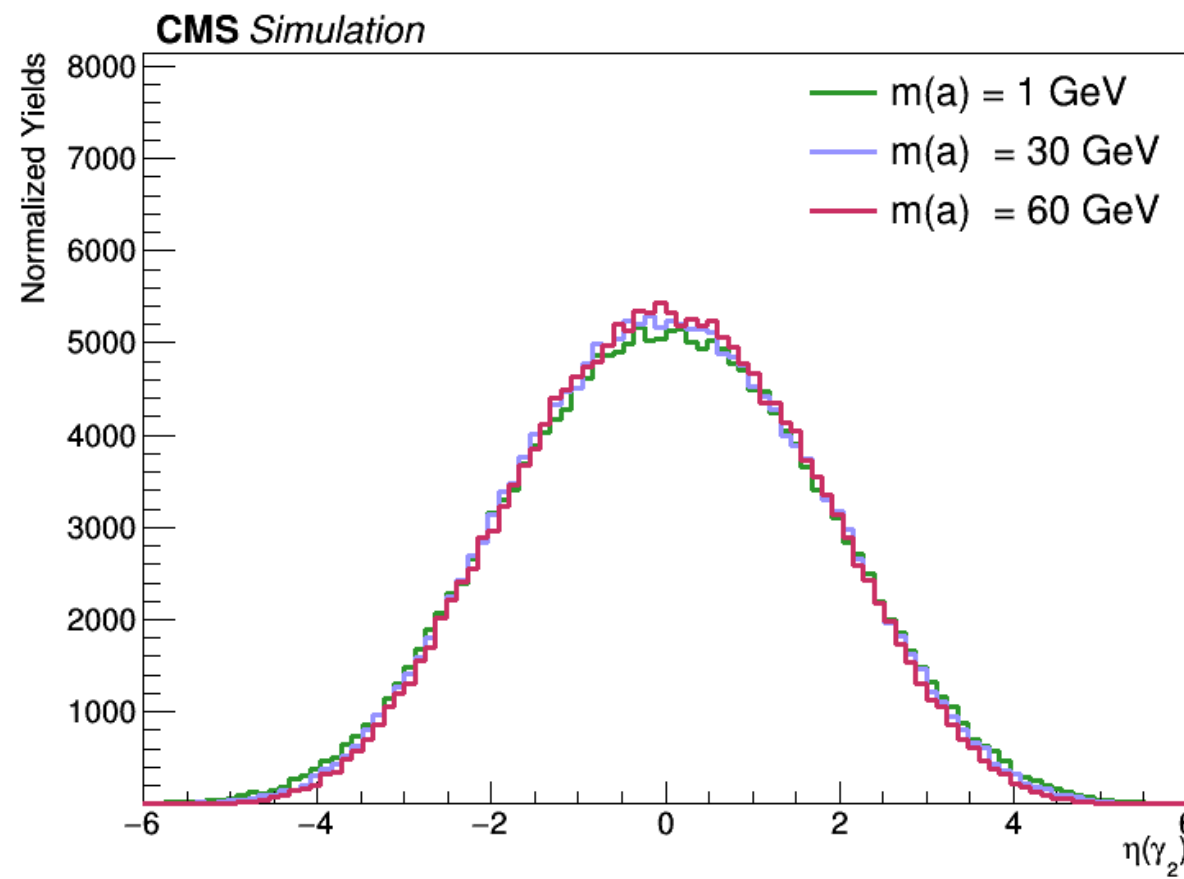
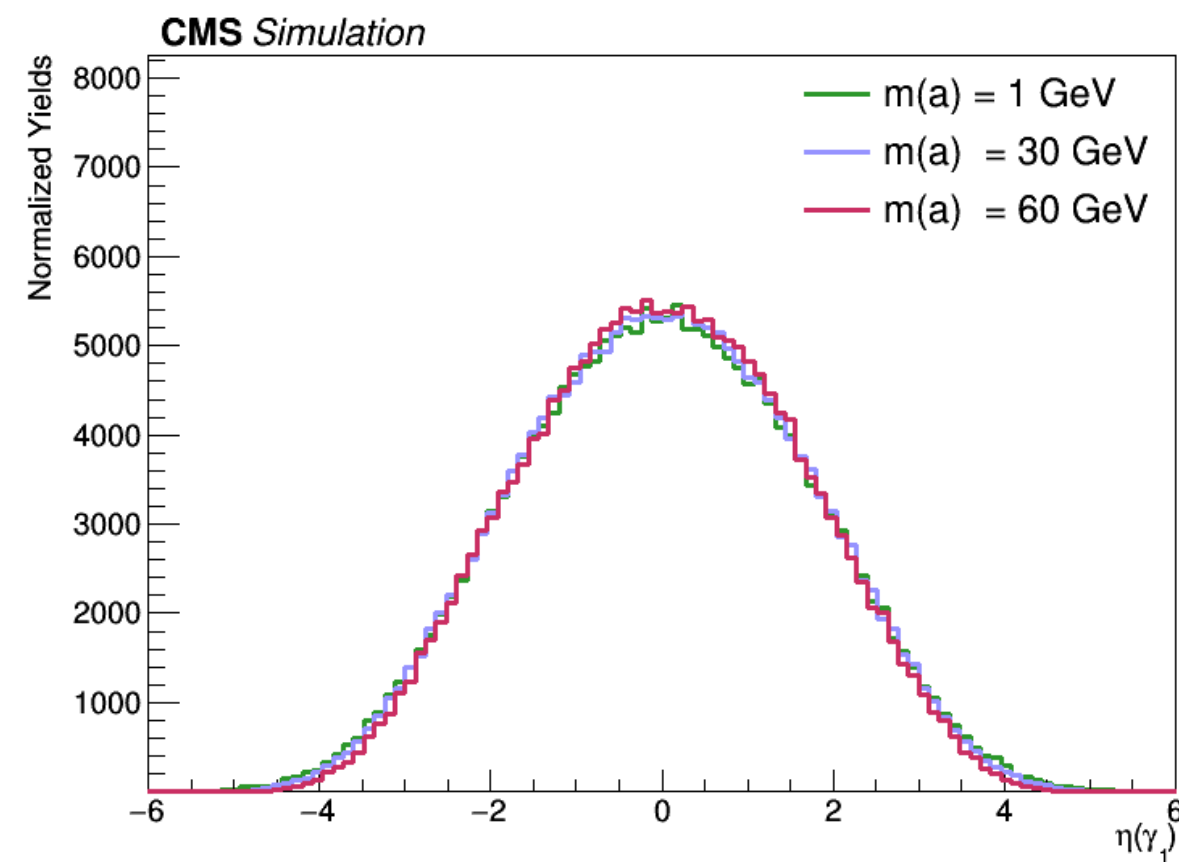
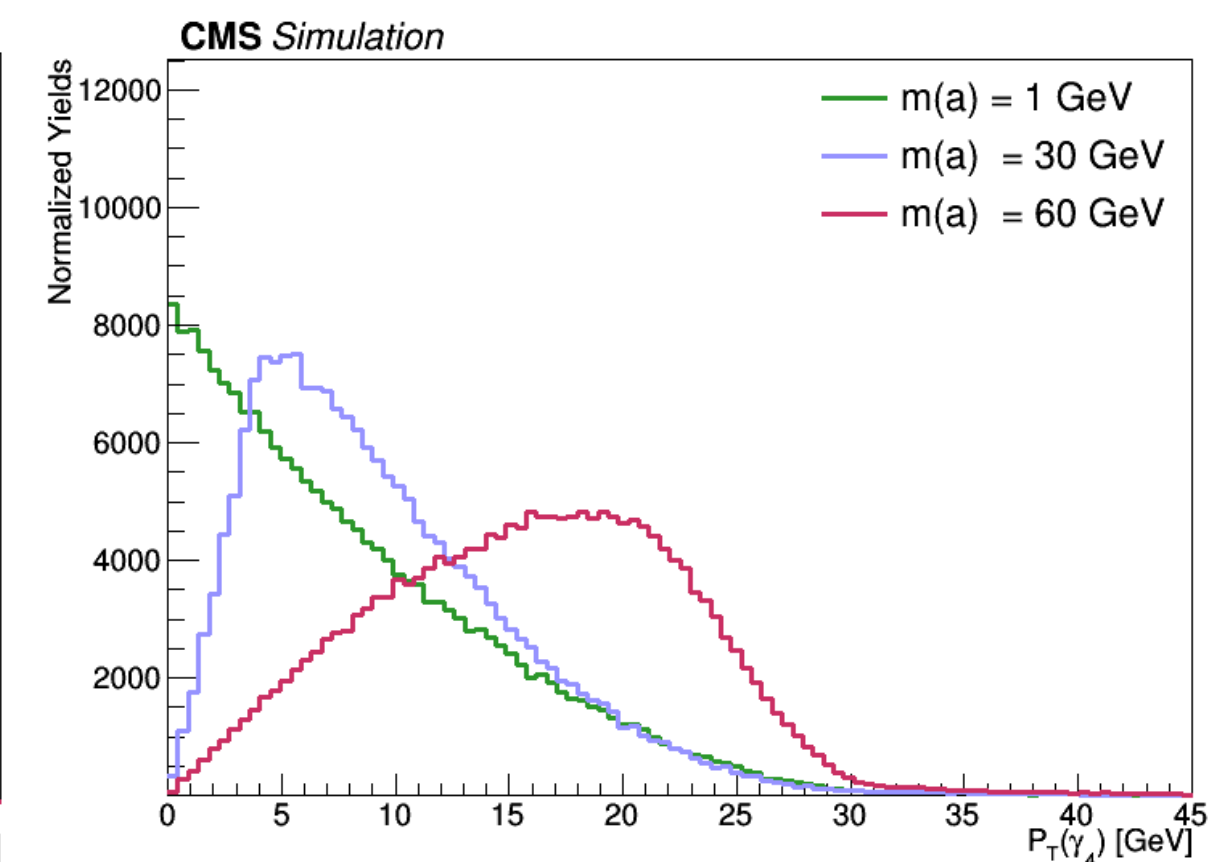
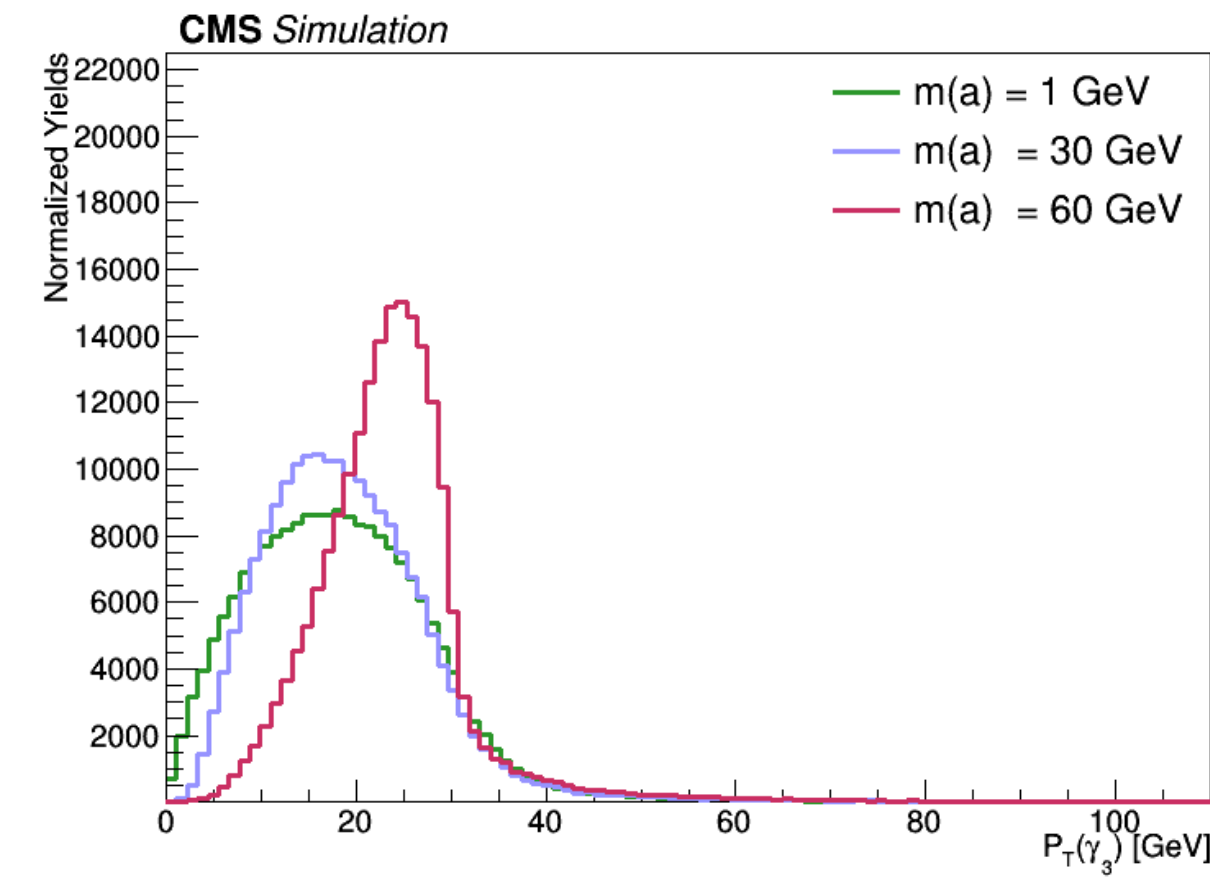
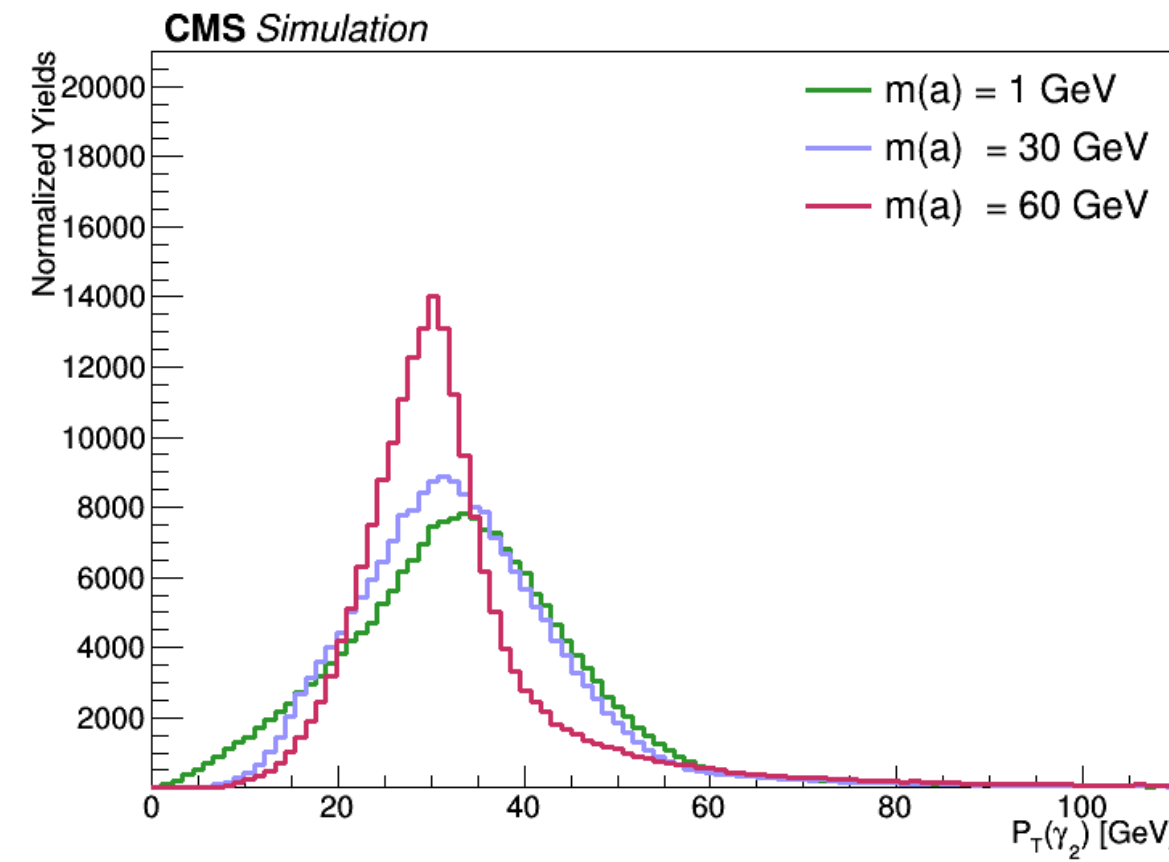
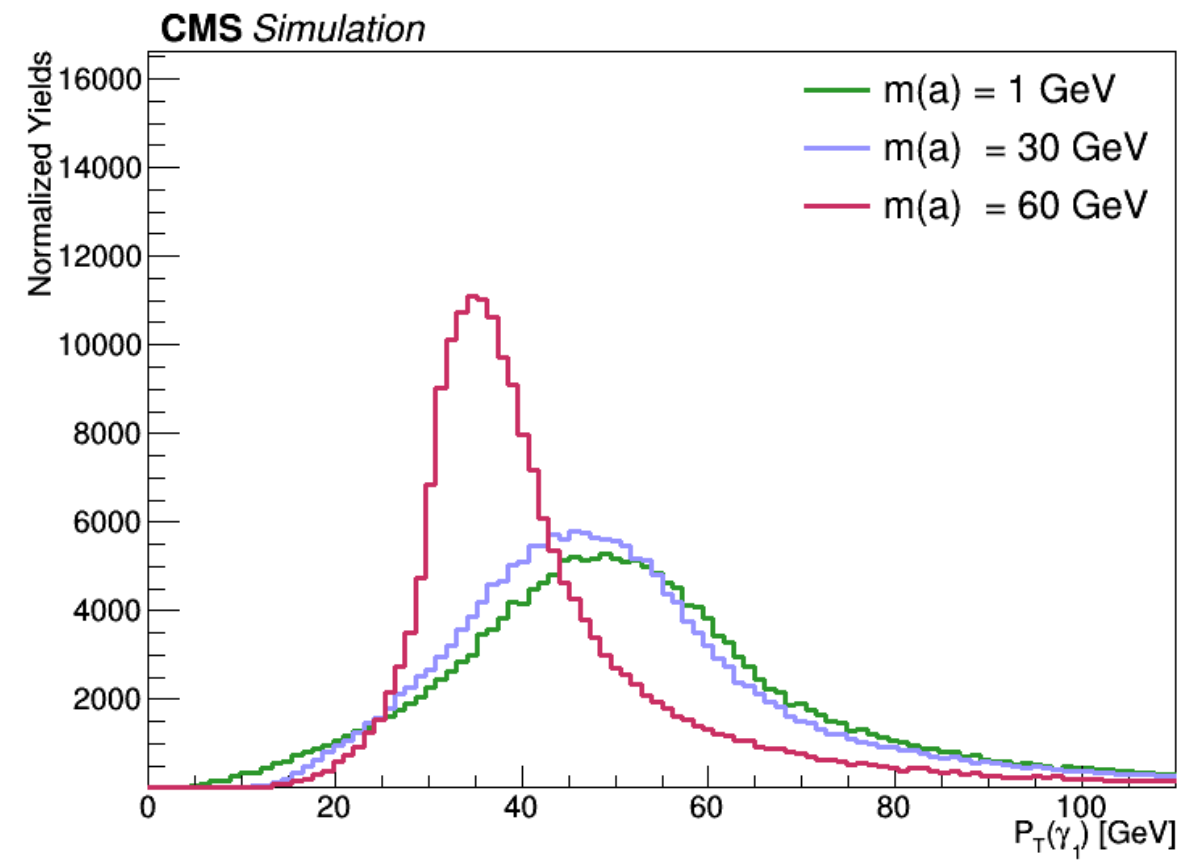
Tanvi Wamorkar¹
Toyoko Orimoto¹
Andrea Massironi²

¹Northeastern University

²INFN Milano-Bicocca

H4G chat
27/03/2018

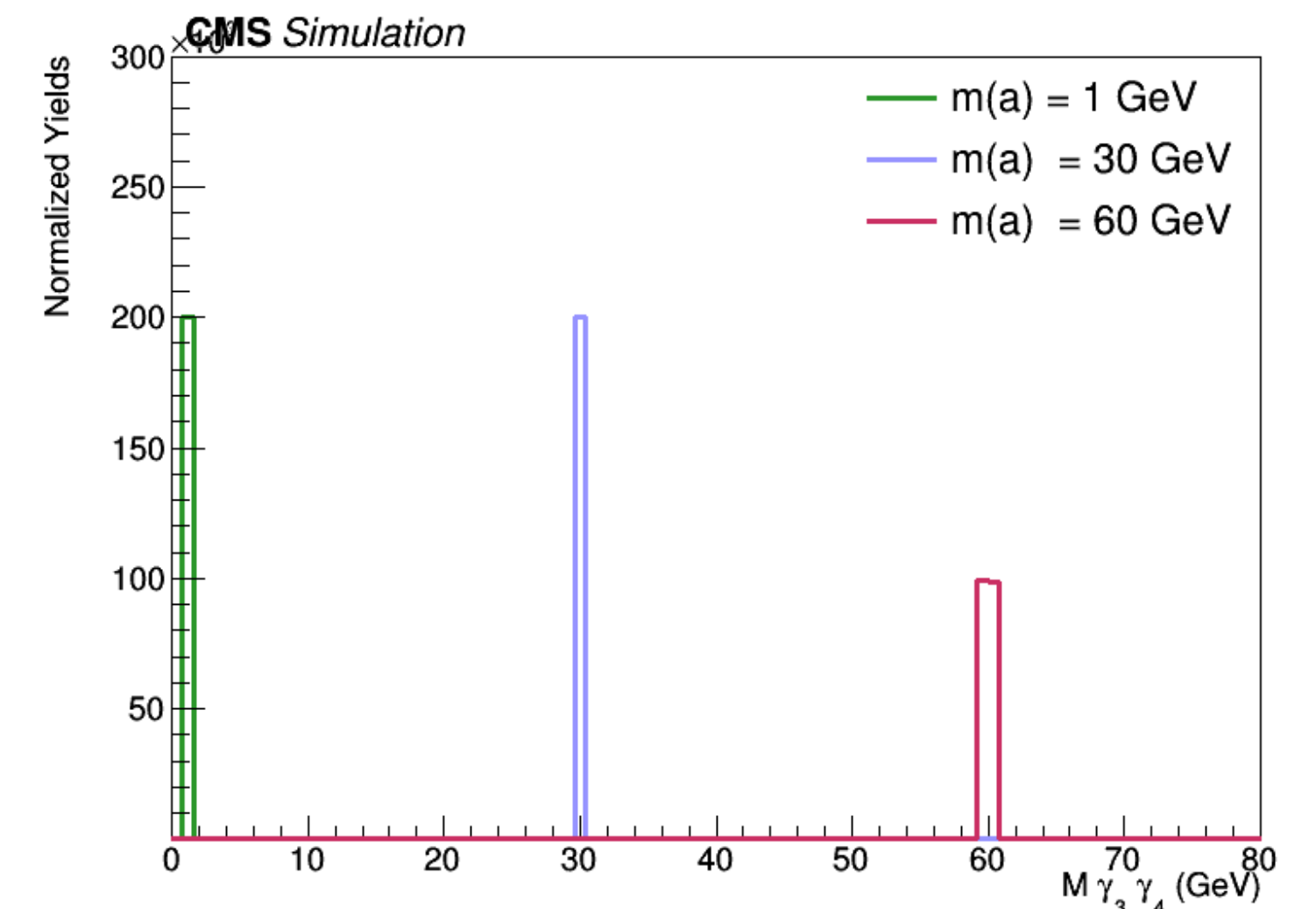
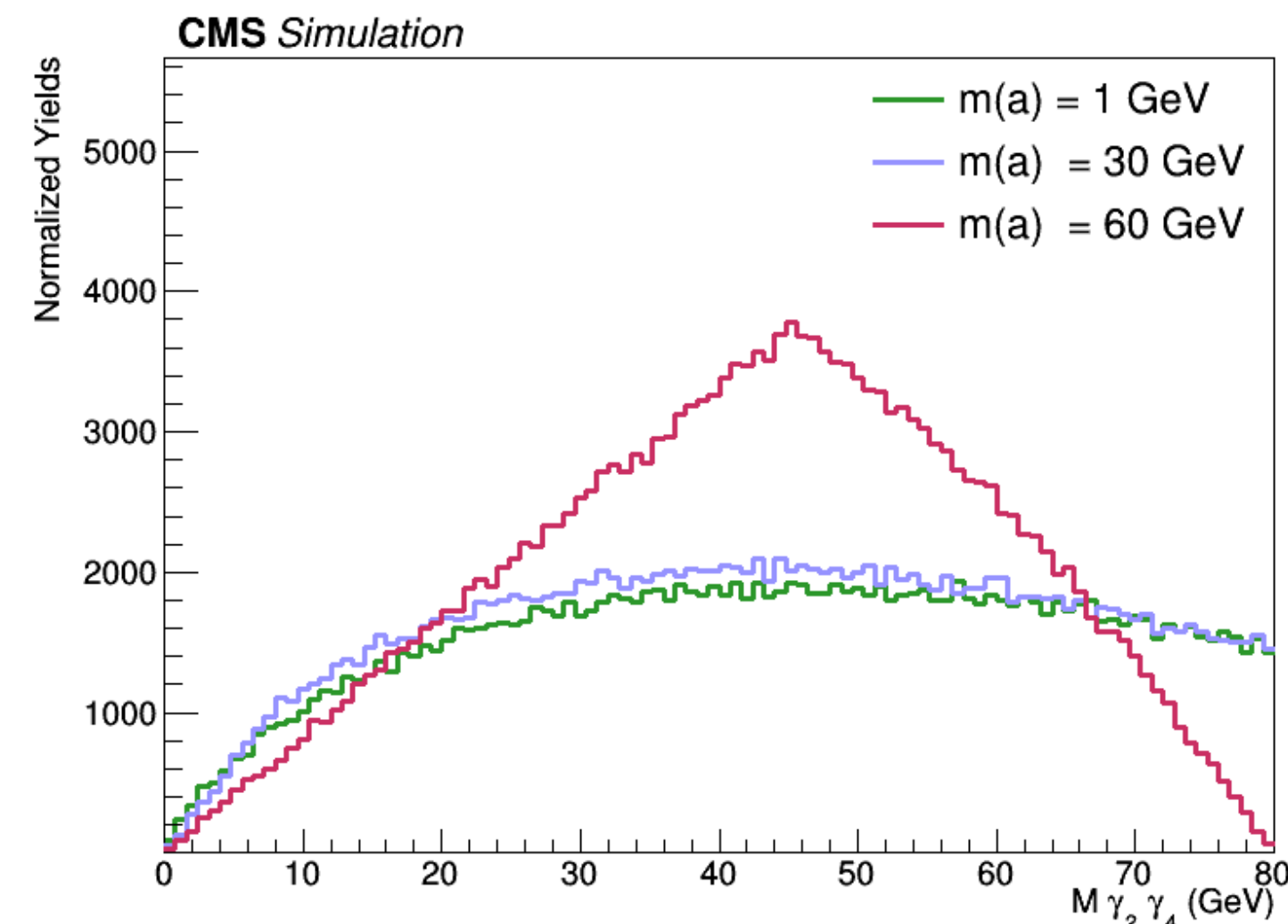
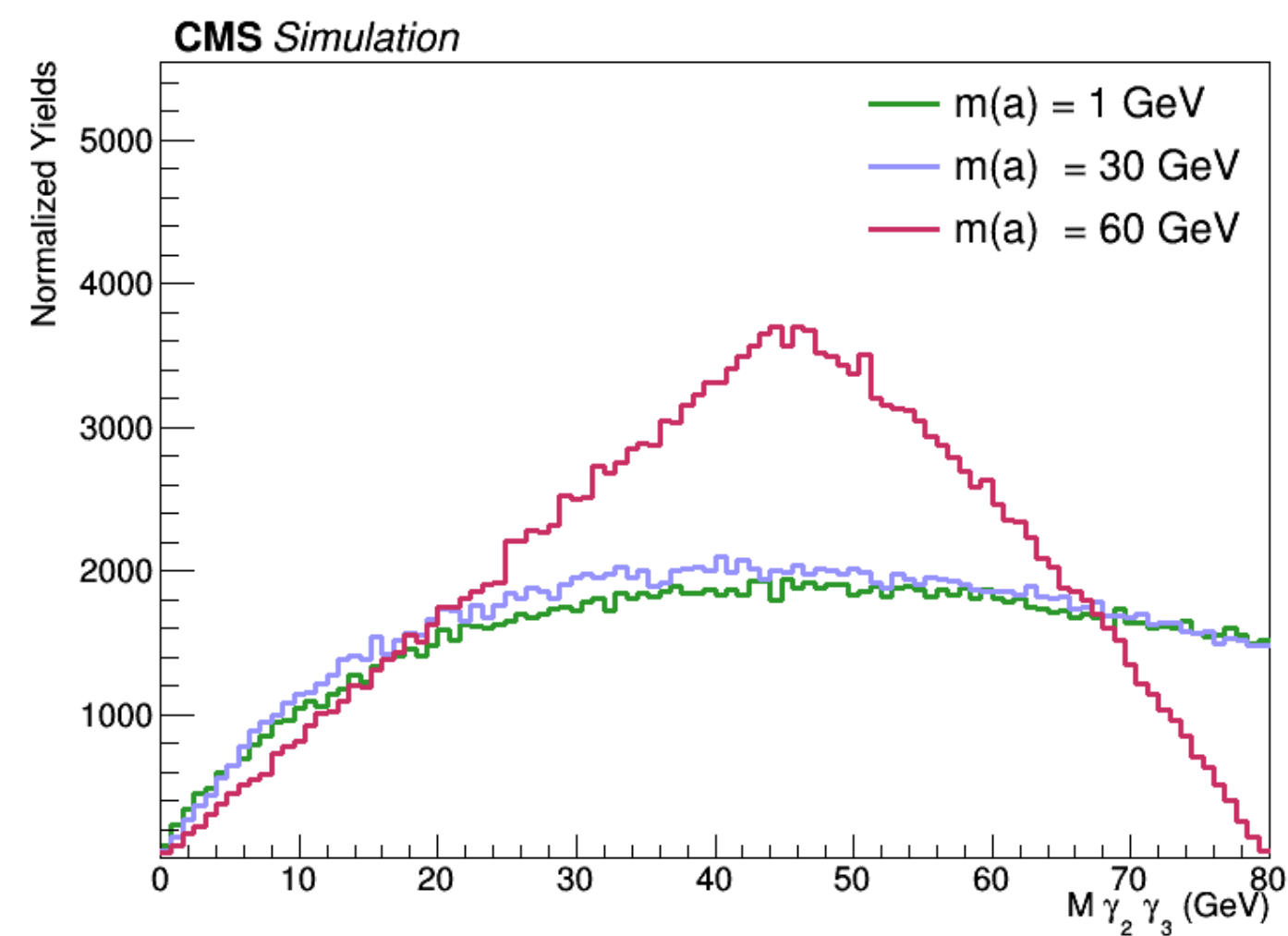
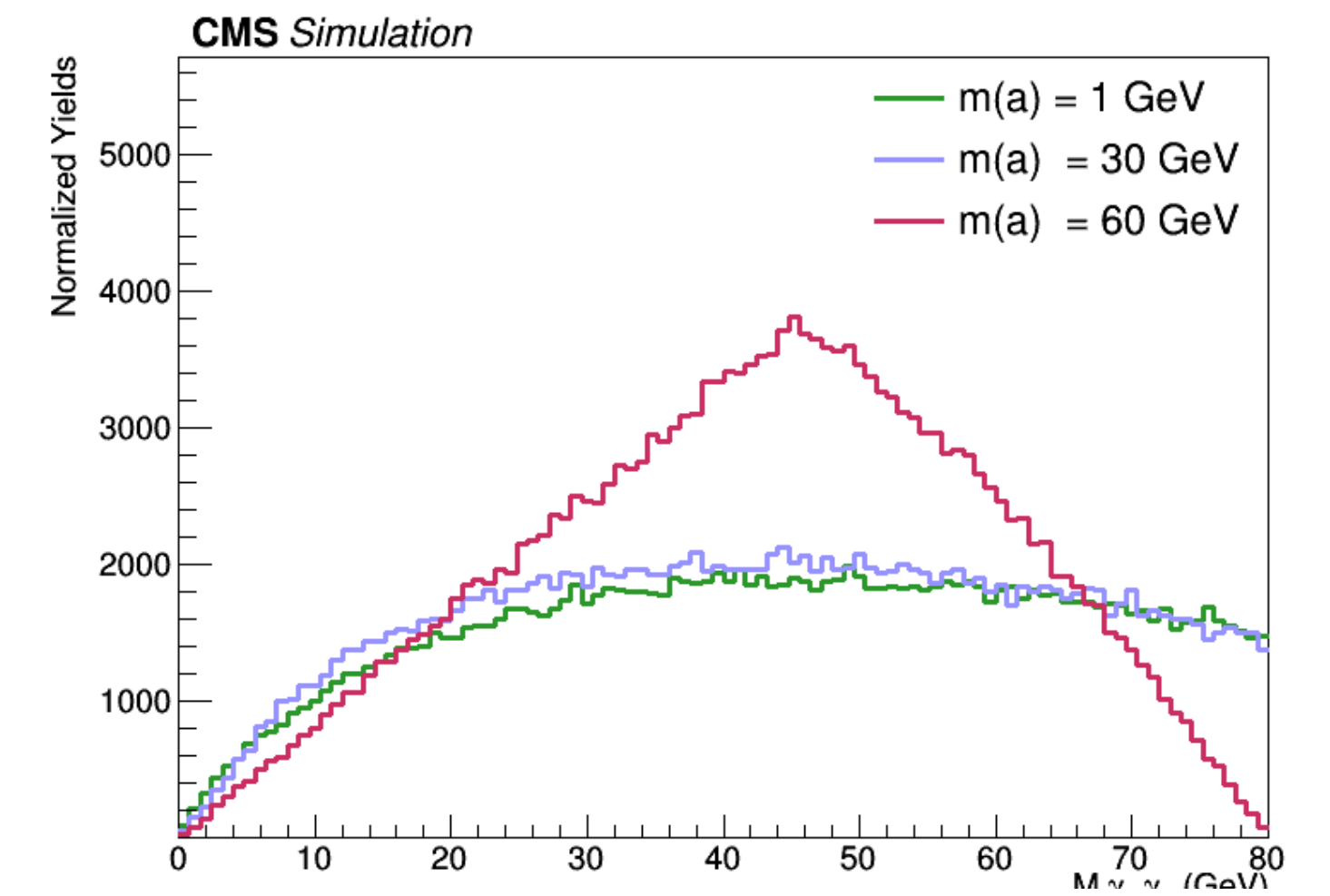
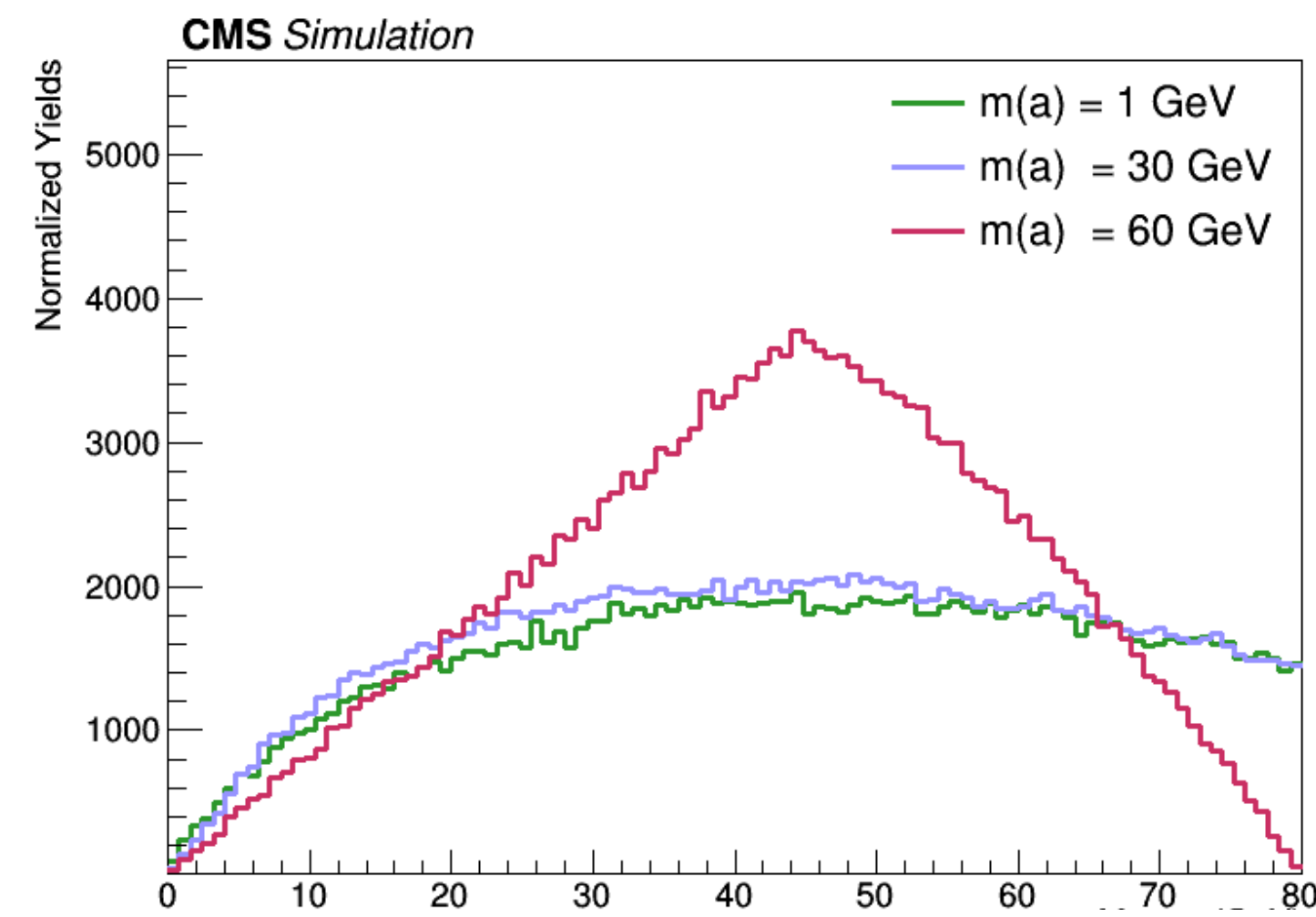
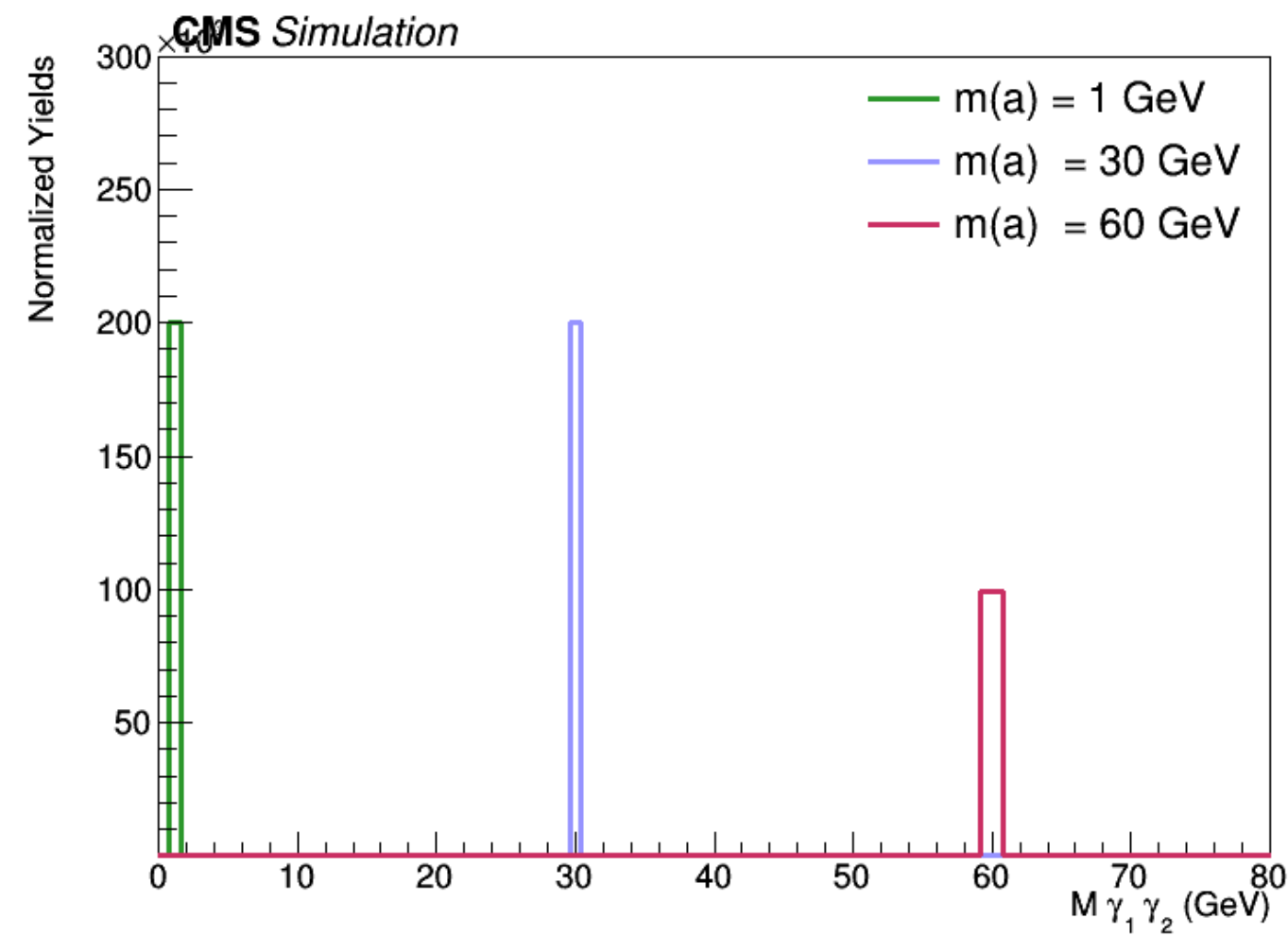
Gen level distributions



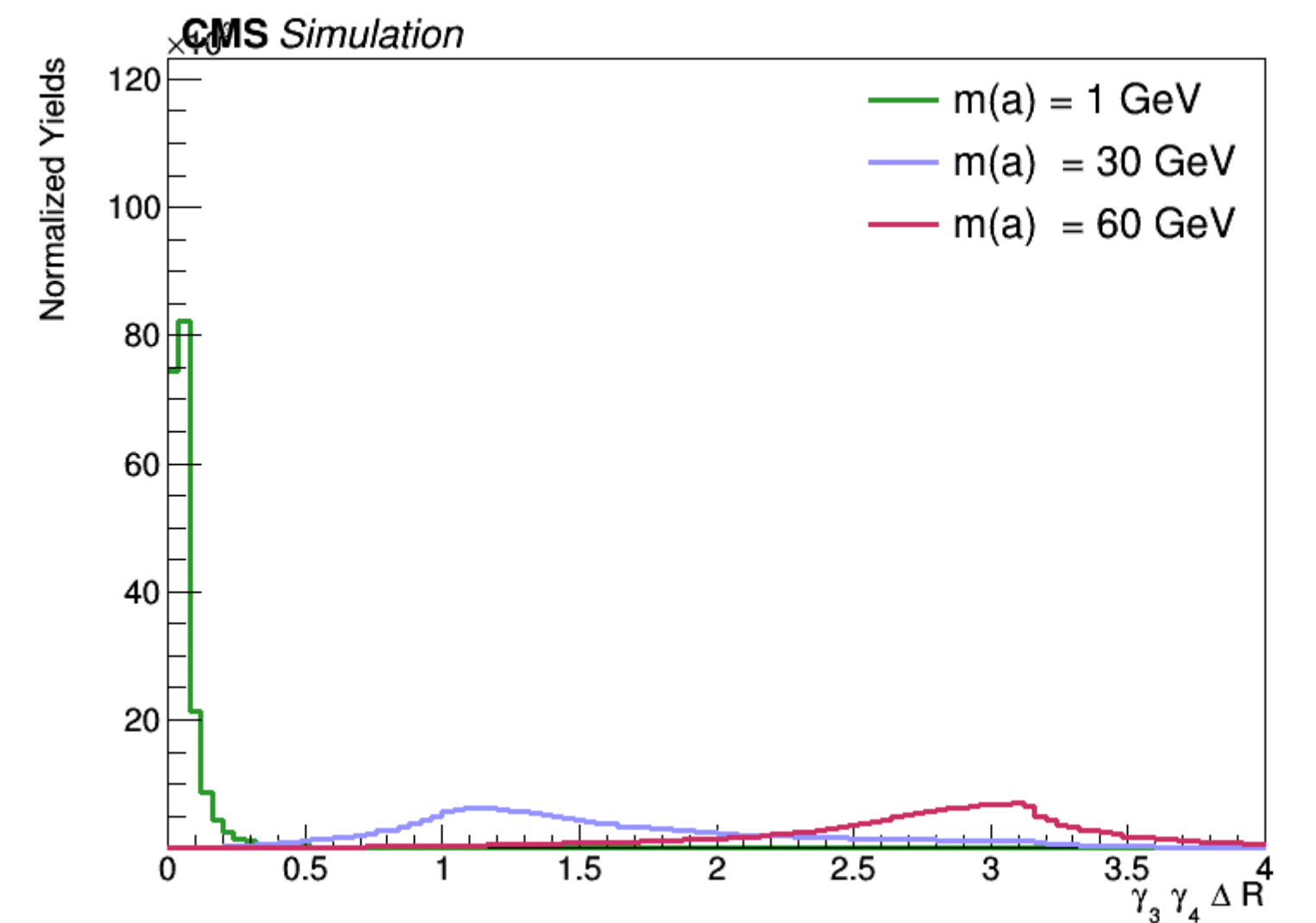
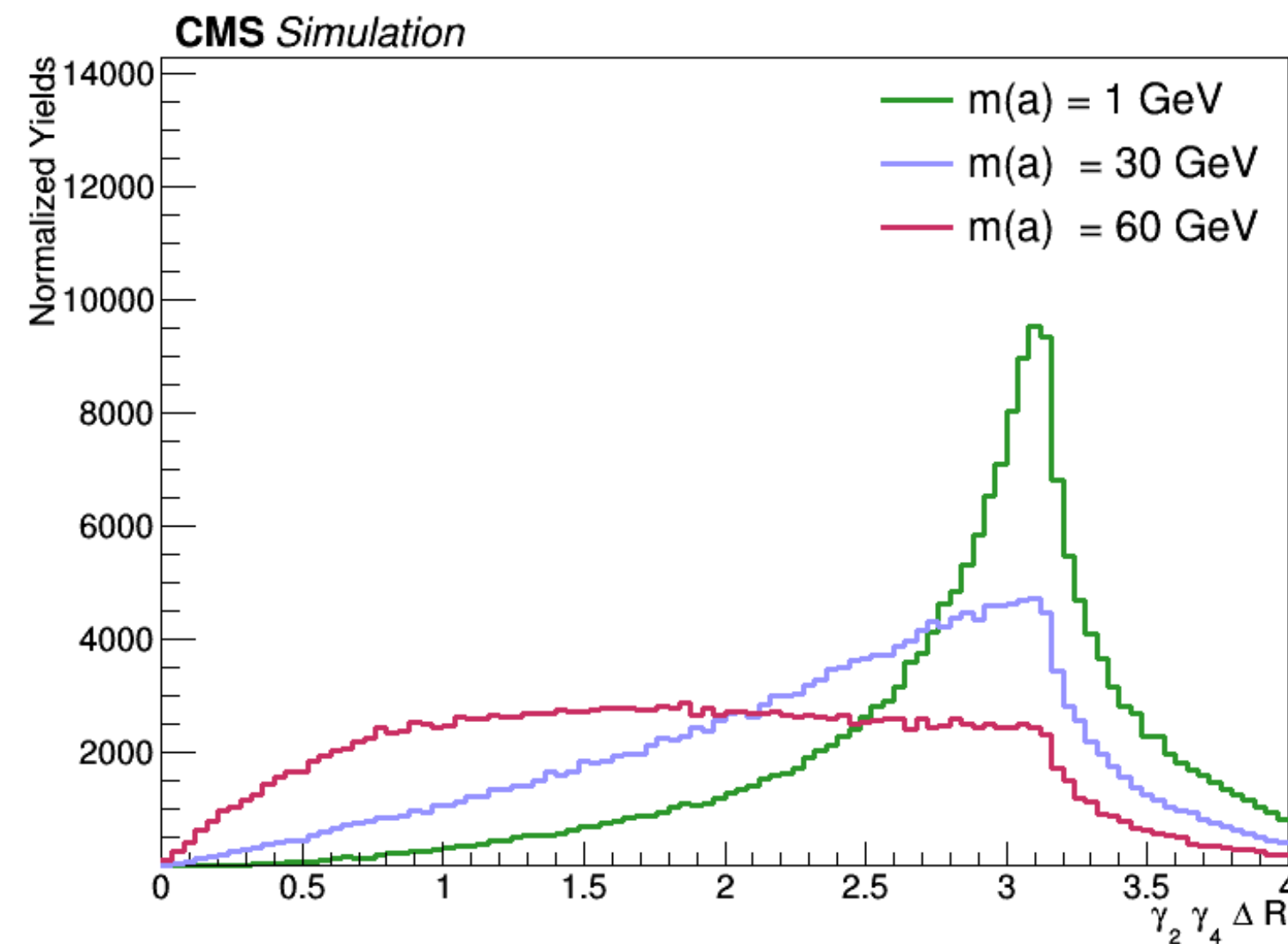
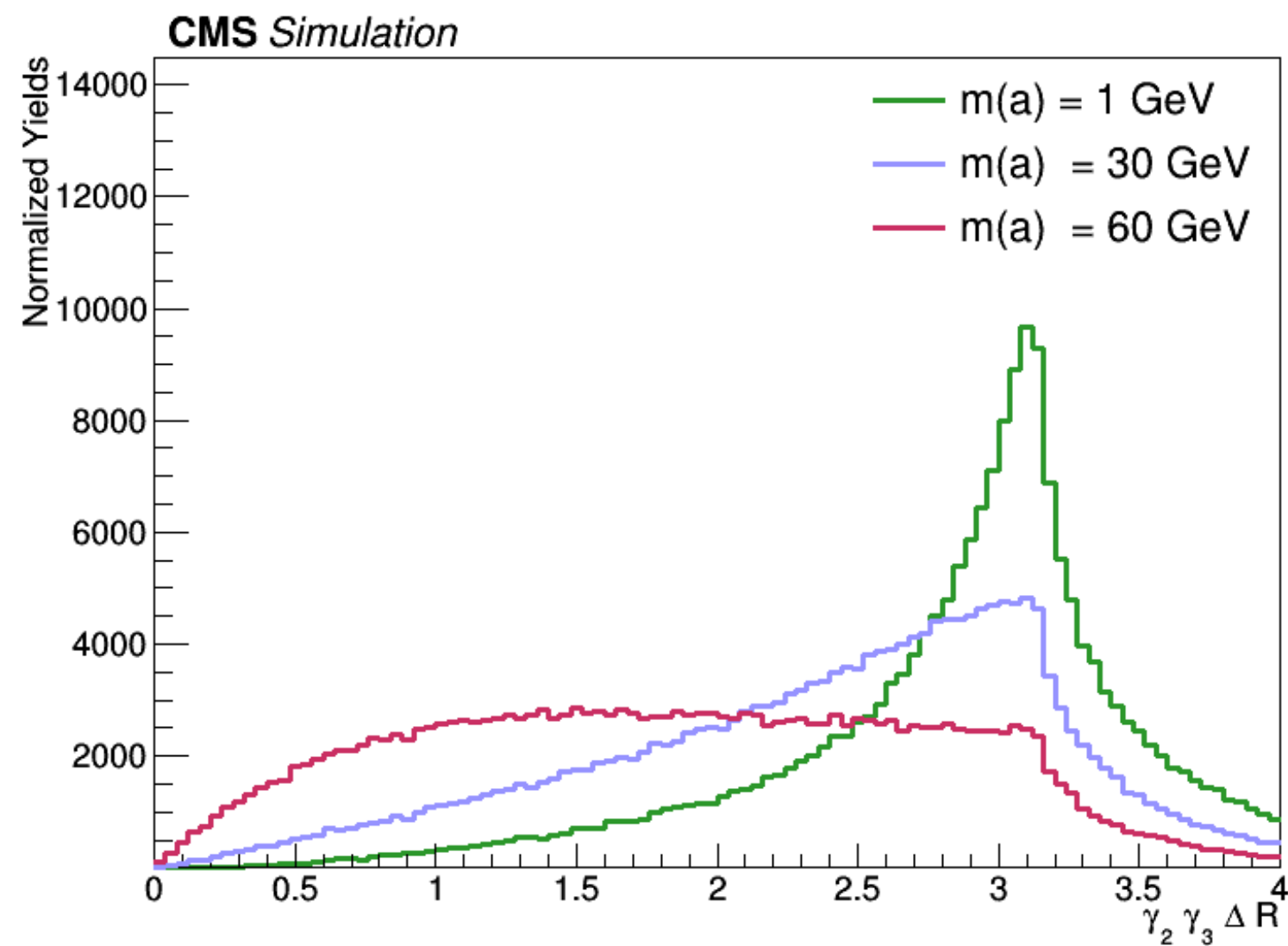
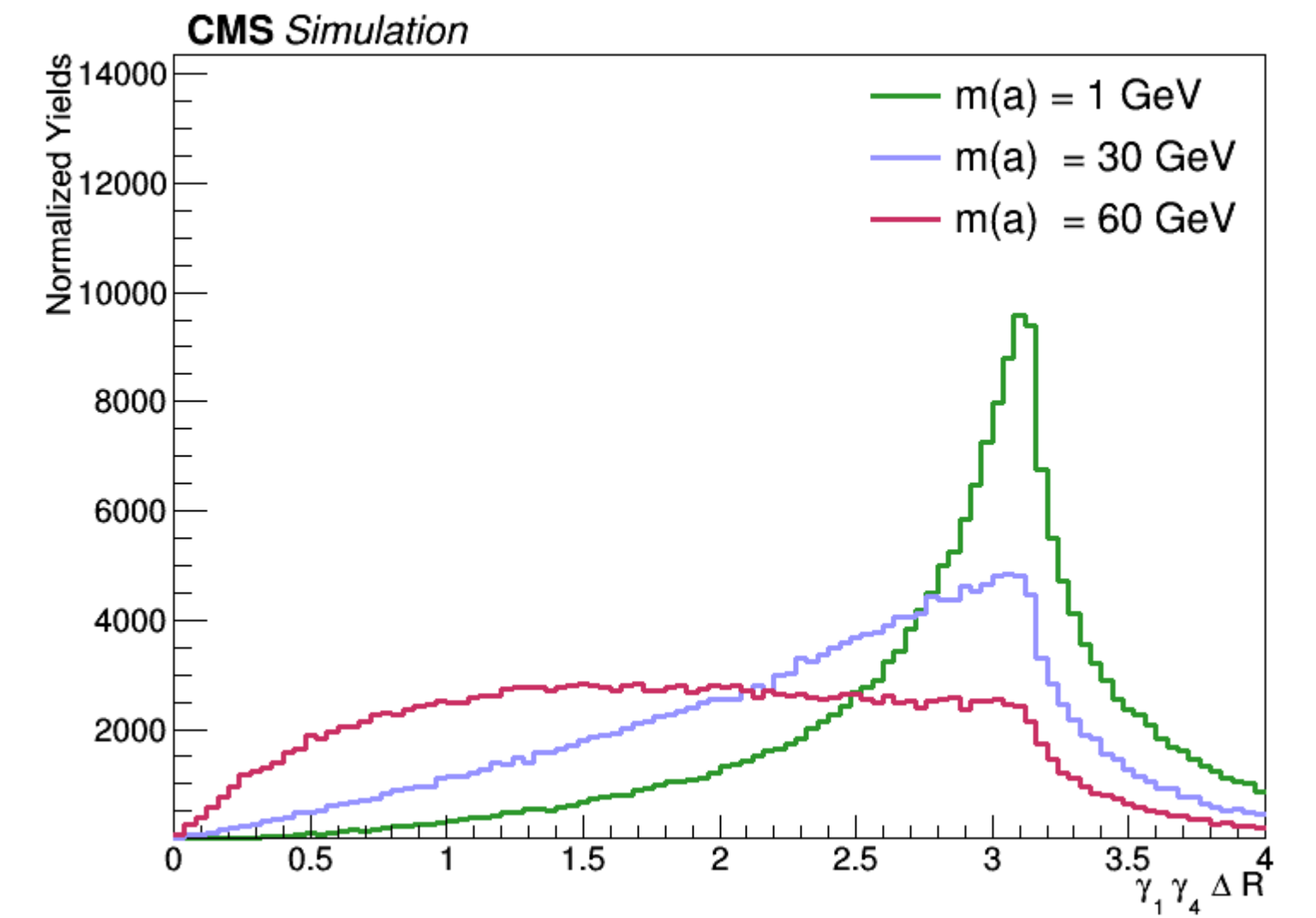
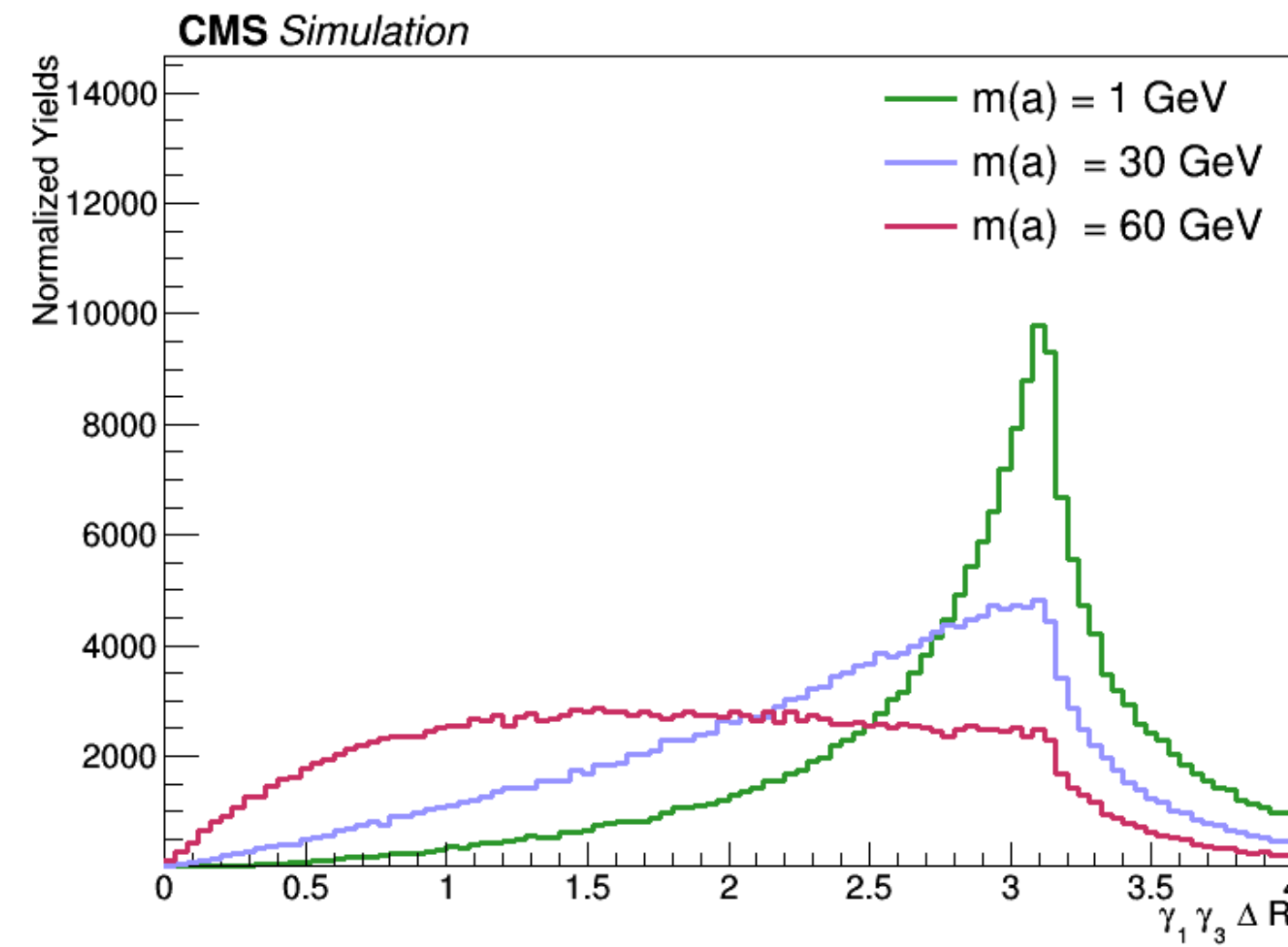
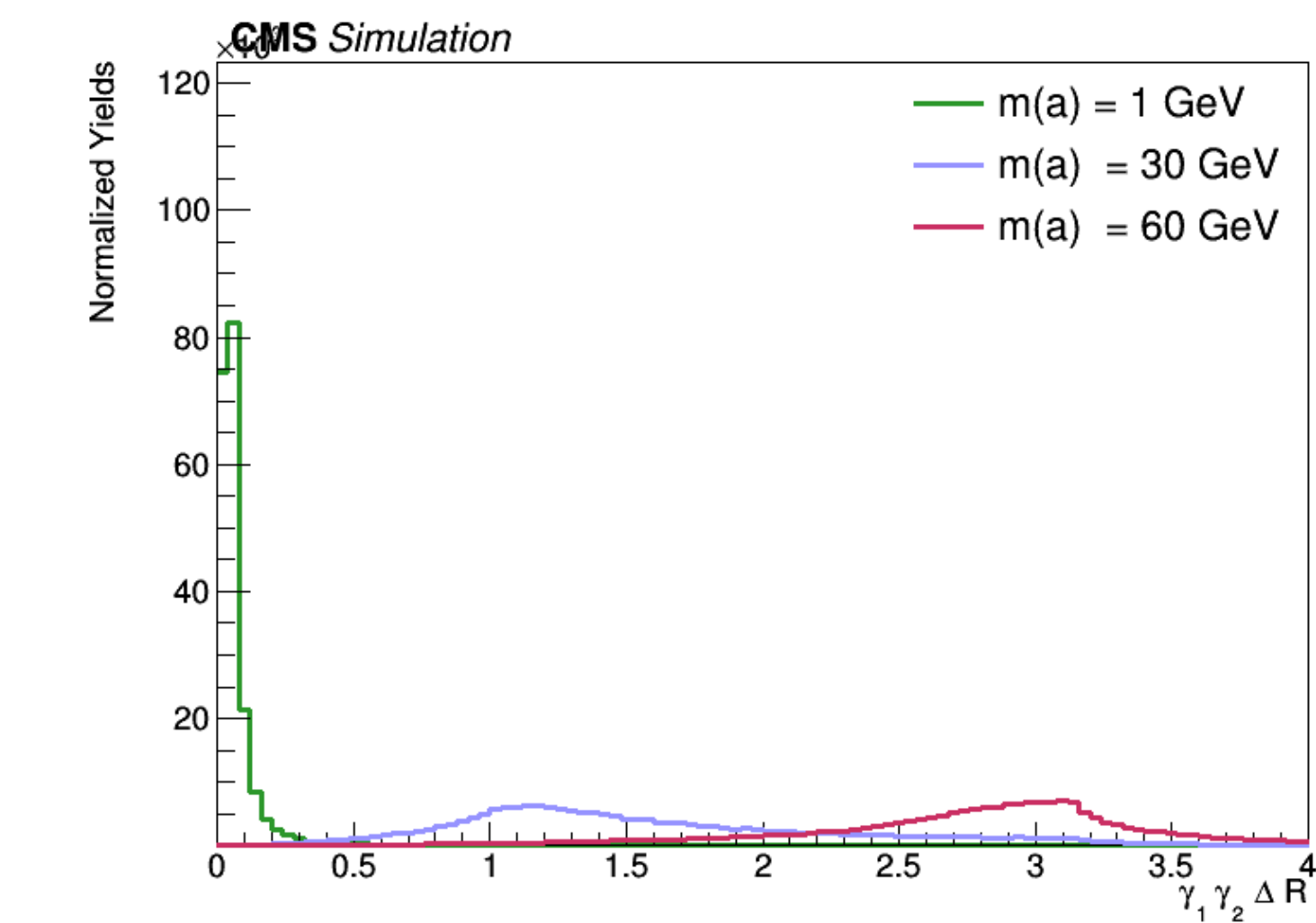
http://twamorka.web.cern.ch/twamorka/H4G_forPrelim/

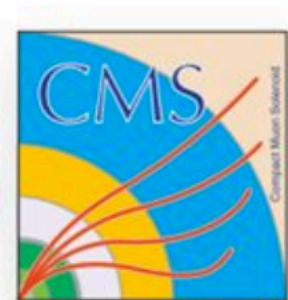
Gen level distributions

γ_1, γ_2 come from a_1 and γ_3, γ_4 come from a_2



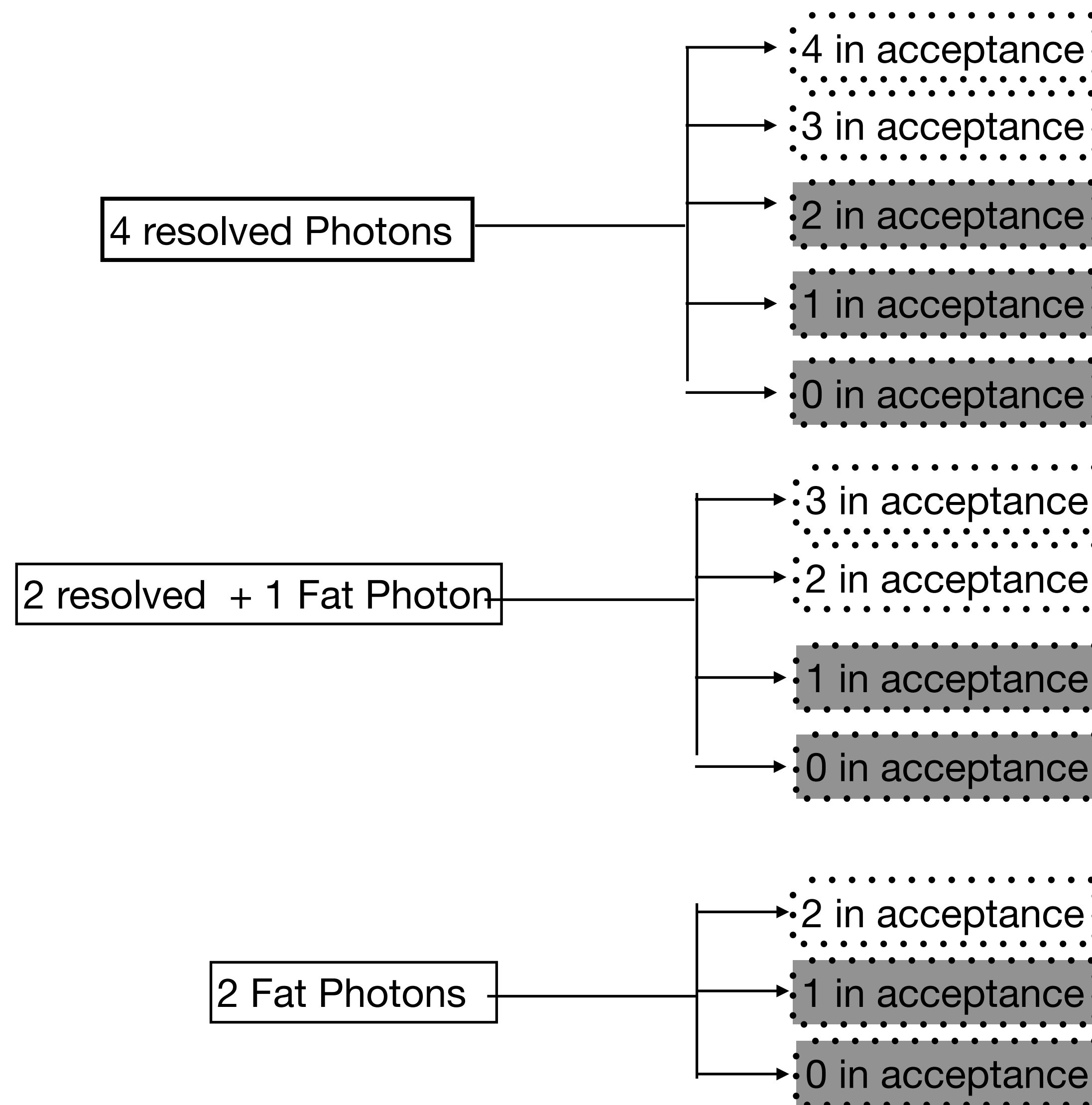
Gen level distributions



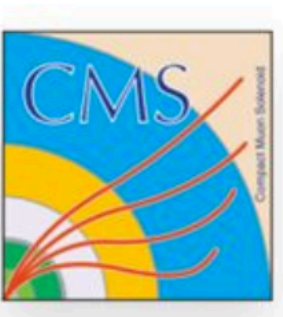


Categorization Process

- Start with 4 photons
- Identify the two photons coming from the same “a”
- Calculate deltaR b/w those 2 photons
- If 0 photon pairs w/ $\text{deltaR} < 0.3 \rightarrow$ **4 resolved**
- If 1 photon pair w/ $\text{deltaR} < 0.3 \rightarrow$ **2 resolved + 1 fat**
- If 2 photon pairs w/ $\text{deltaR} < 0.3 \rightarrow$ **2 fat**



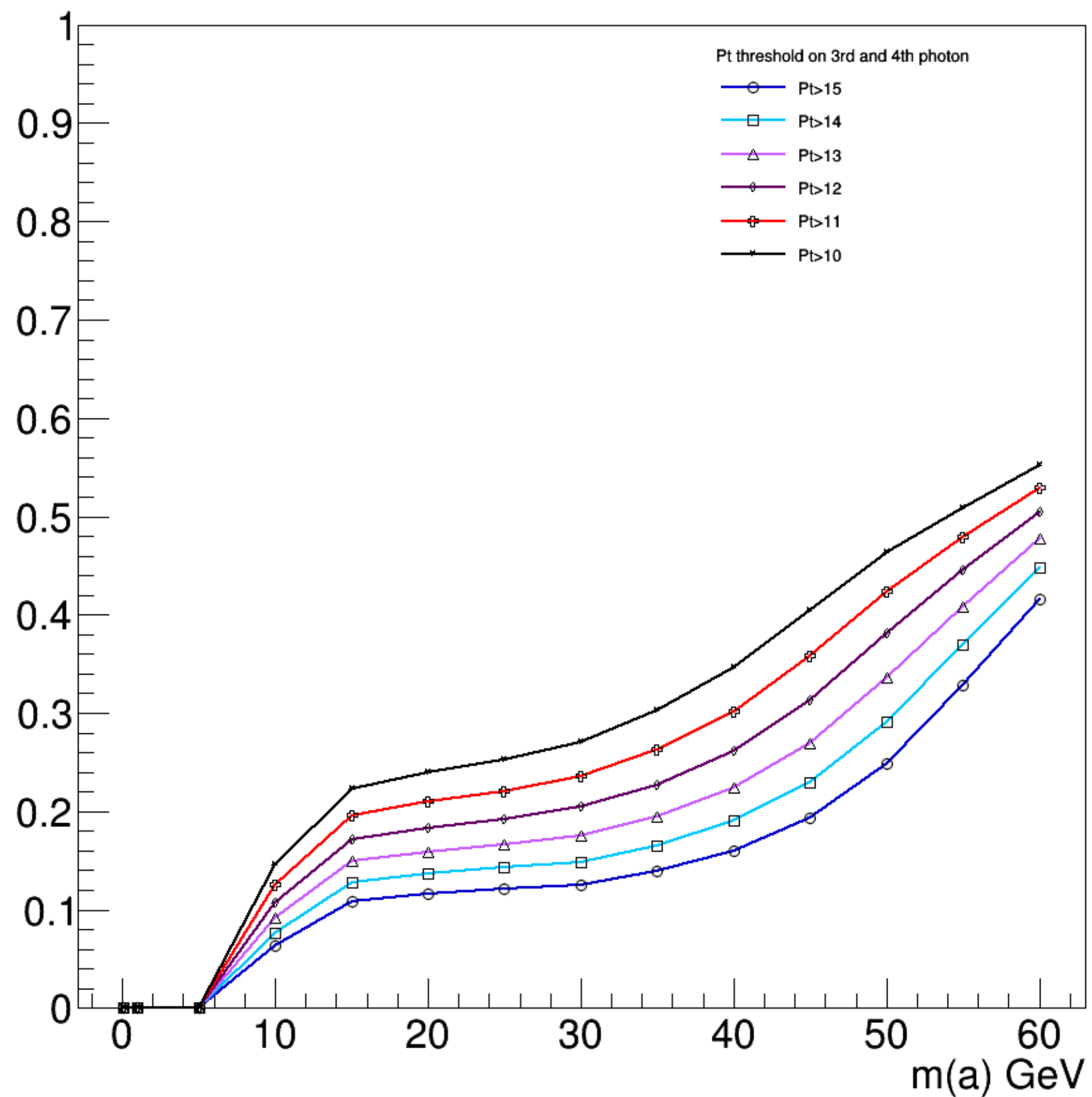
Classified as Others



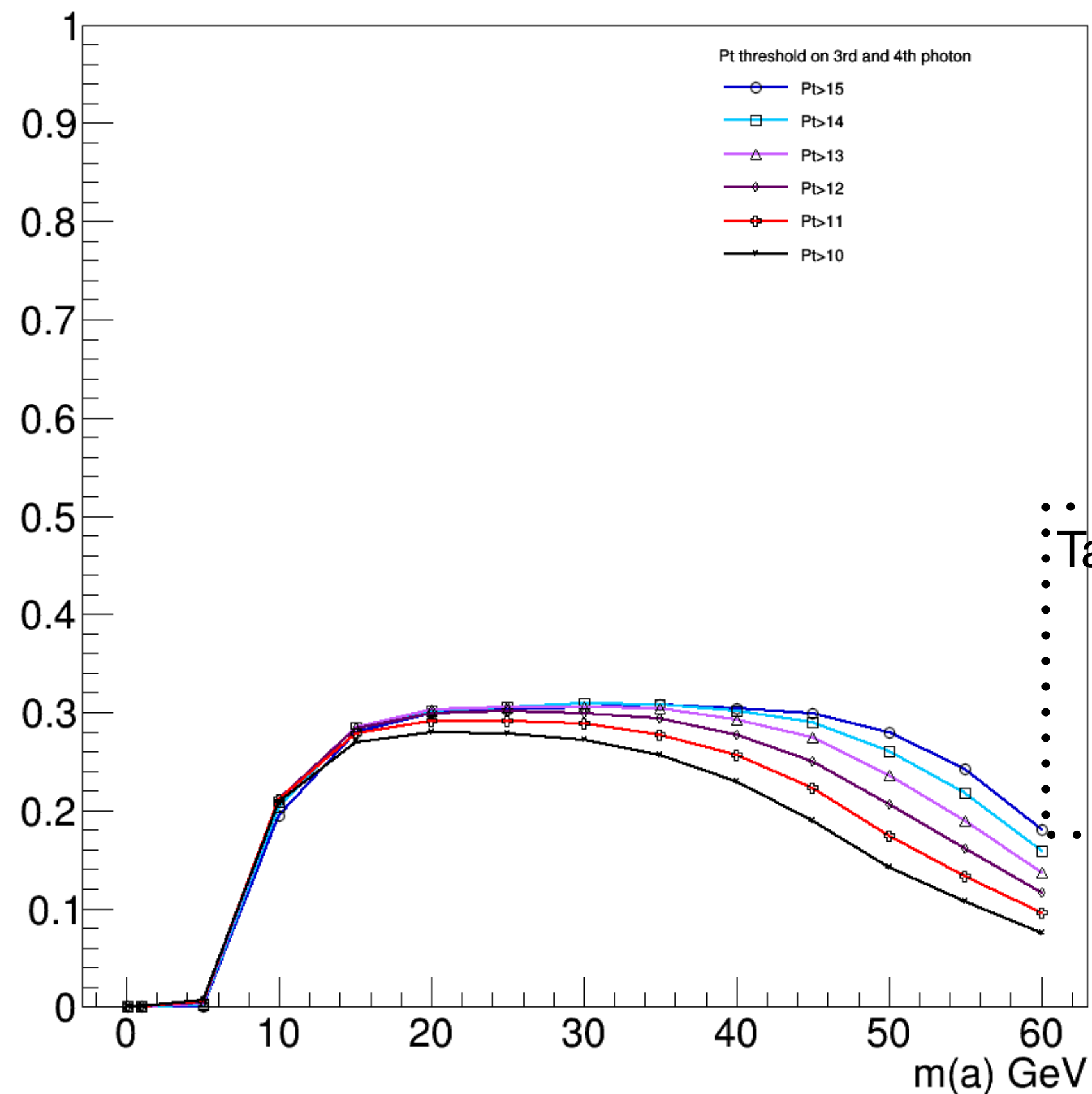
4 Resolved γ 's

- Eta acceptance — all 4 γ 's must have $|\eta| < 2.5$ (because photons need to be in ECAL region)
- Pt acceptance — γ Pt > 15, this pt threshold can be lowered for γ_3 and γ_4

4 resolved photons -- all in acceptance



4 resolved photons -- 3 in acceptance

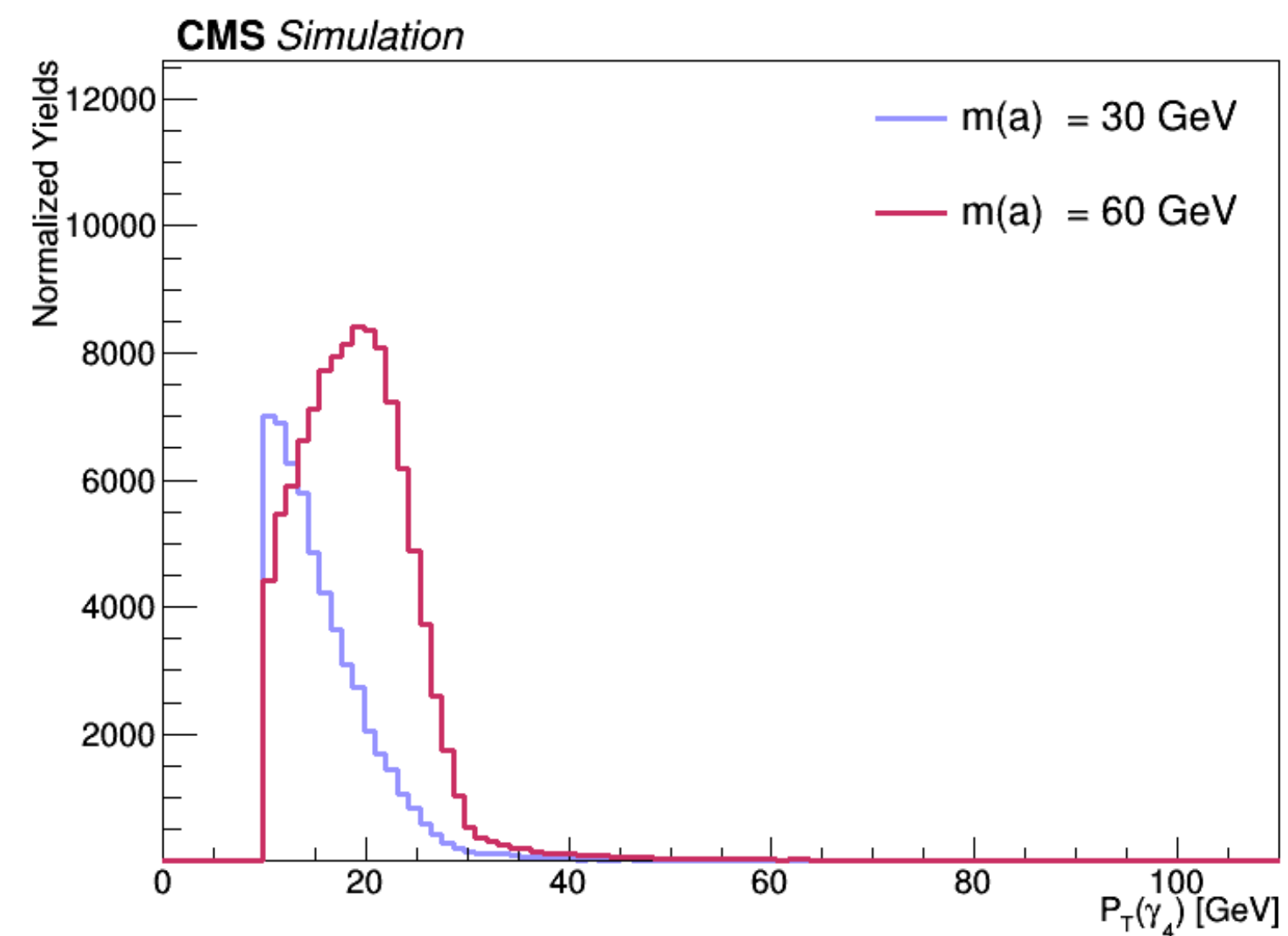
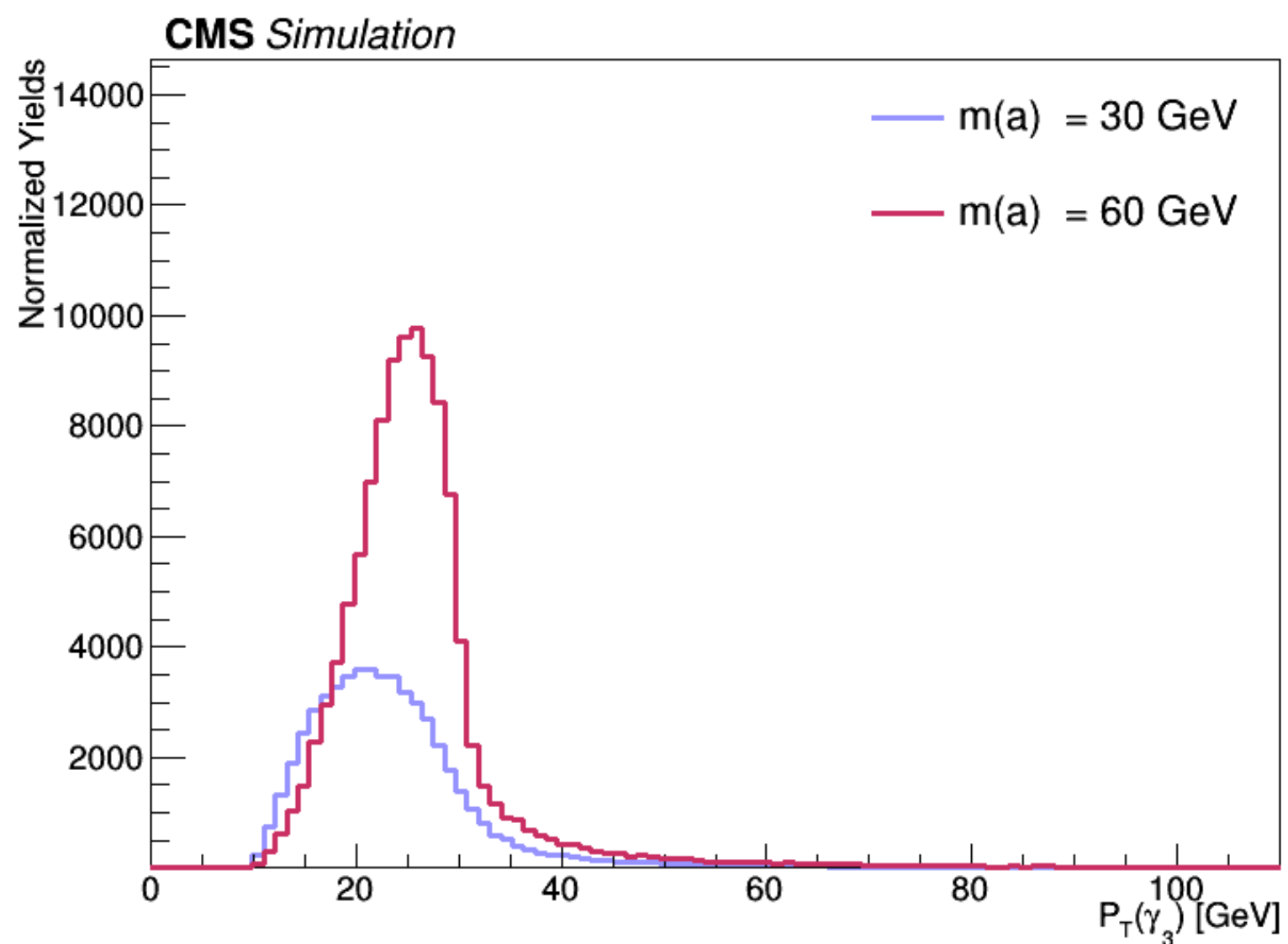
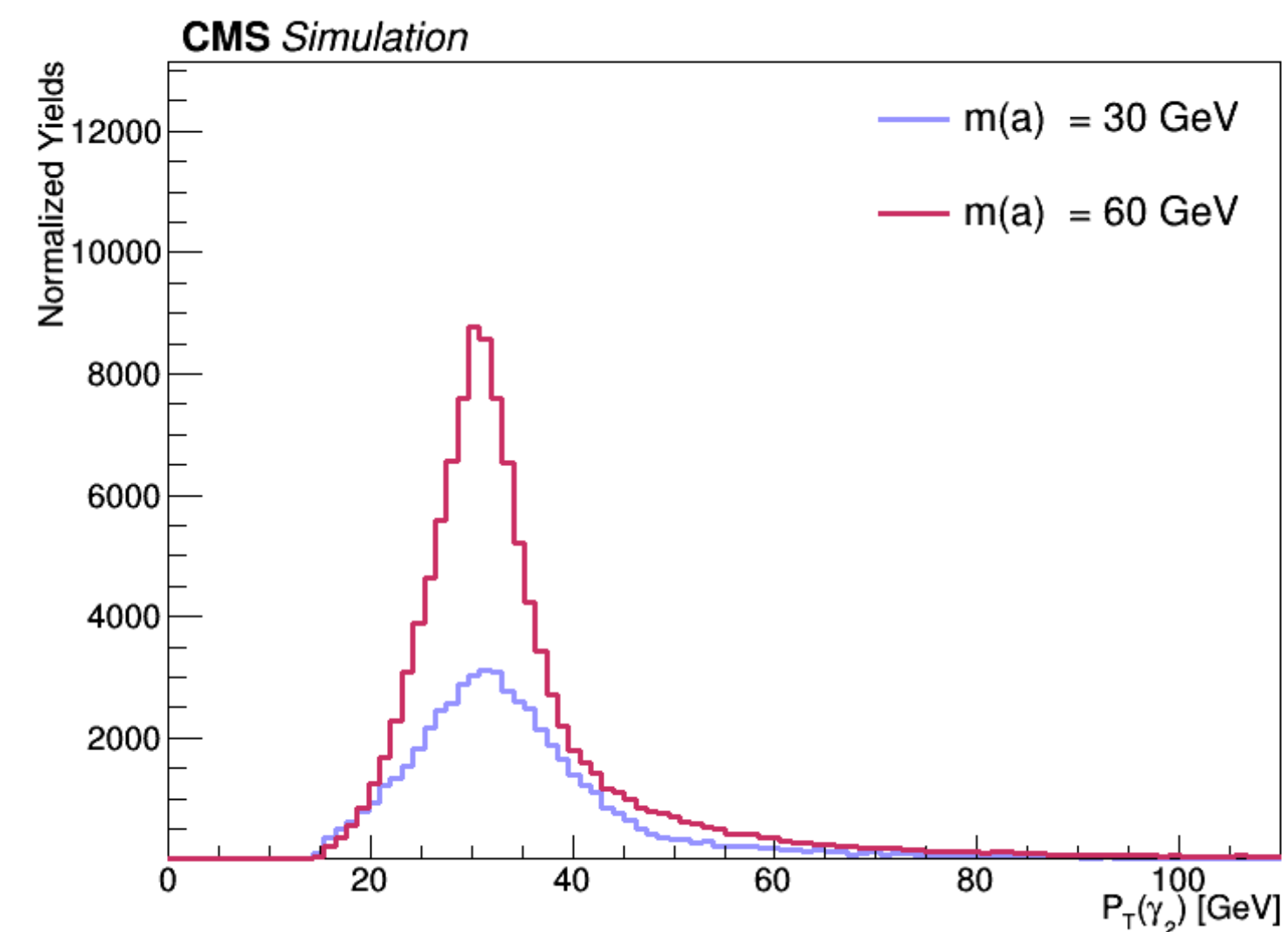
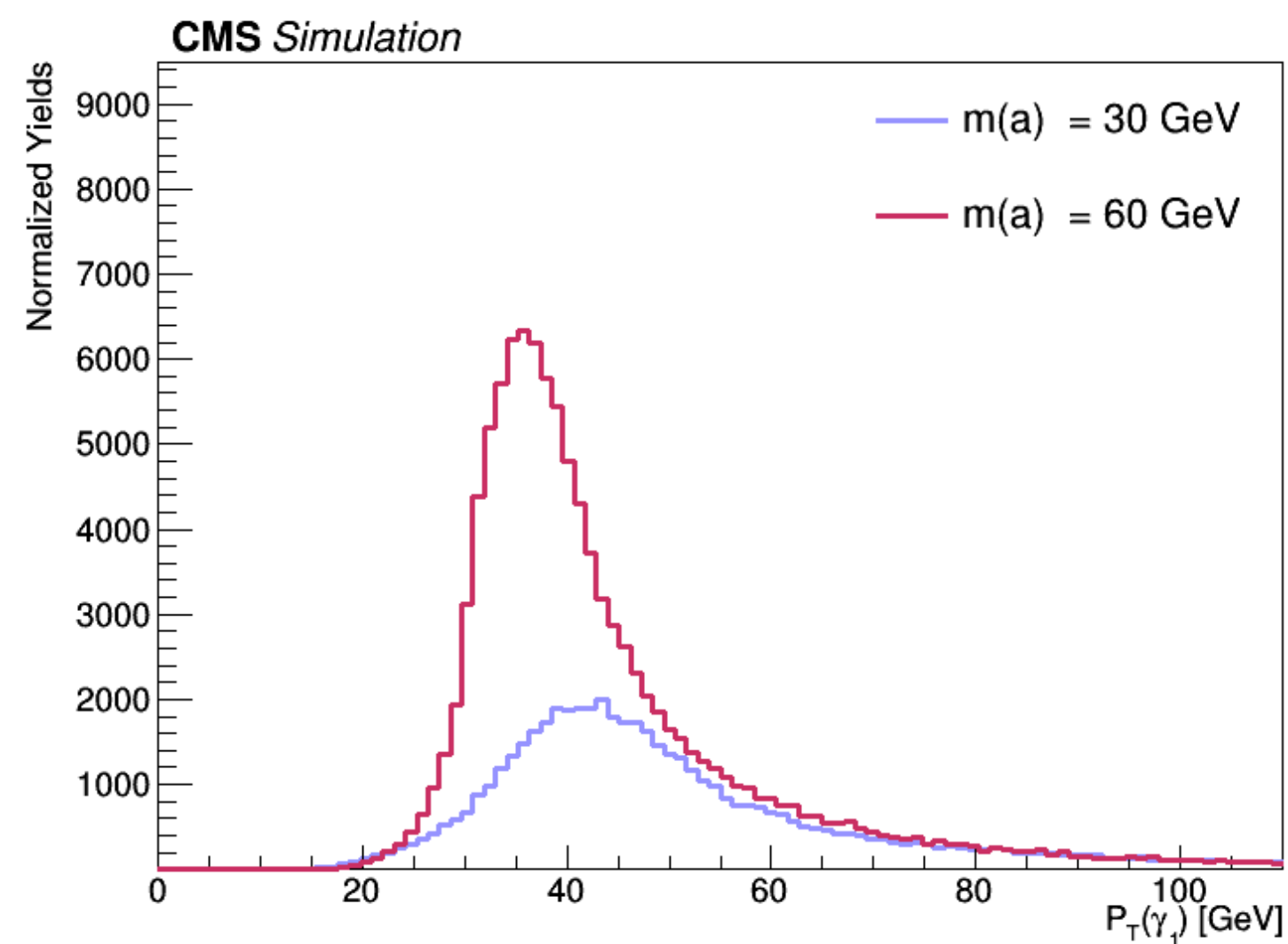


- Different cases:
 - All 4 γ 's in acceptance (4A)
 - 3 γ 's in acceptance (3A)
 - 2 γ 's in acceptance (2A)
 - 1 γ in acceptance (1A)
 - 0 γ 's in acceptance (0A)
- } Not of interest

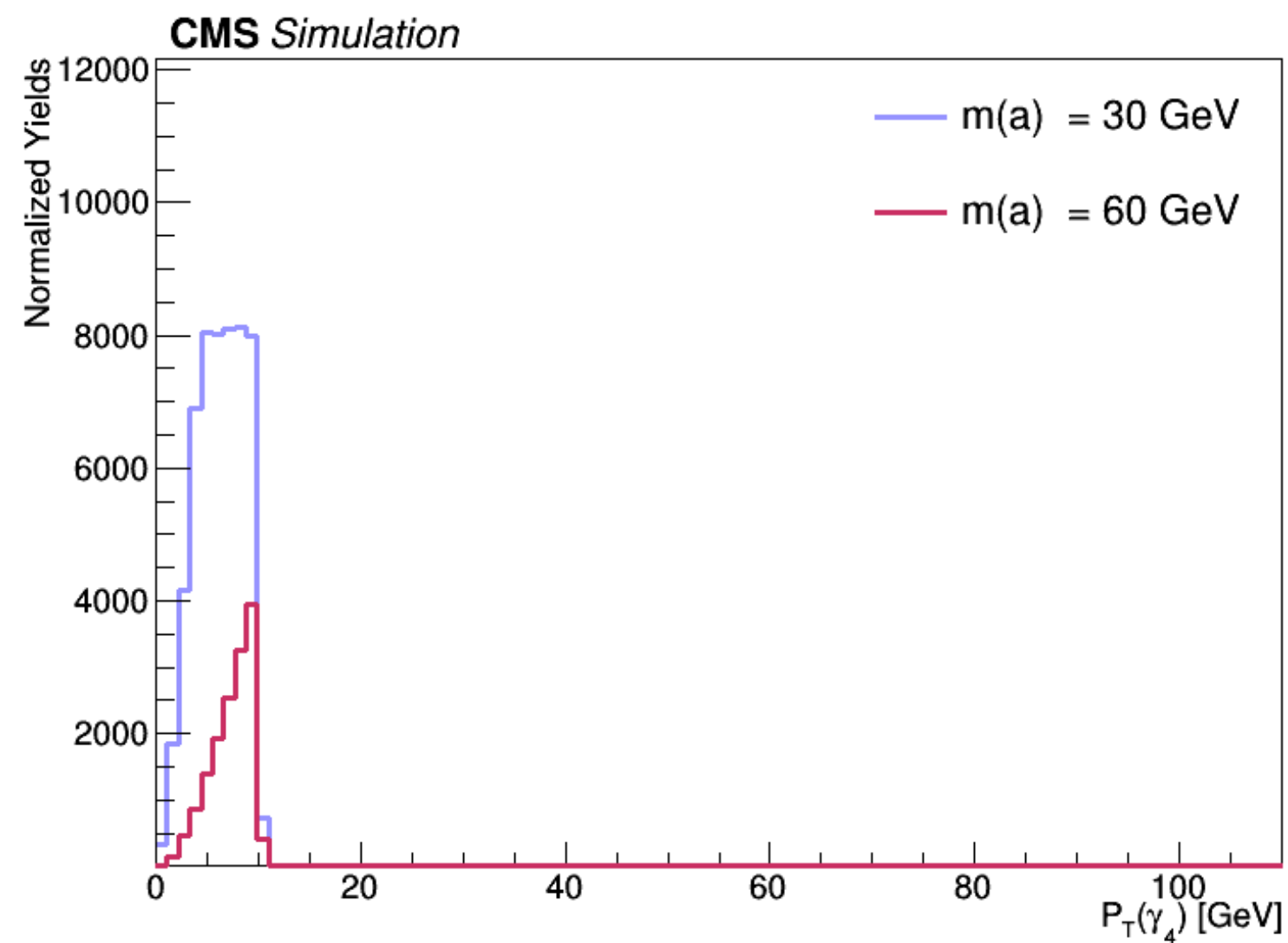
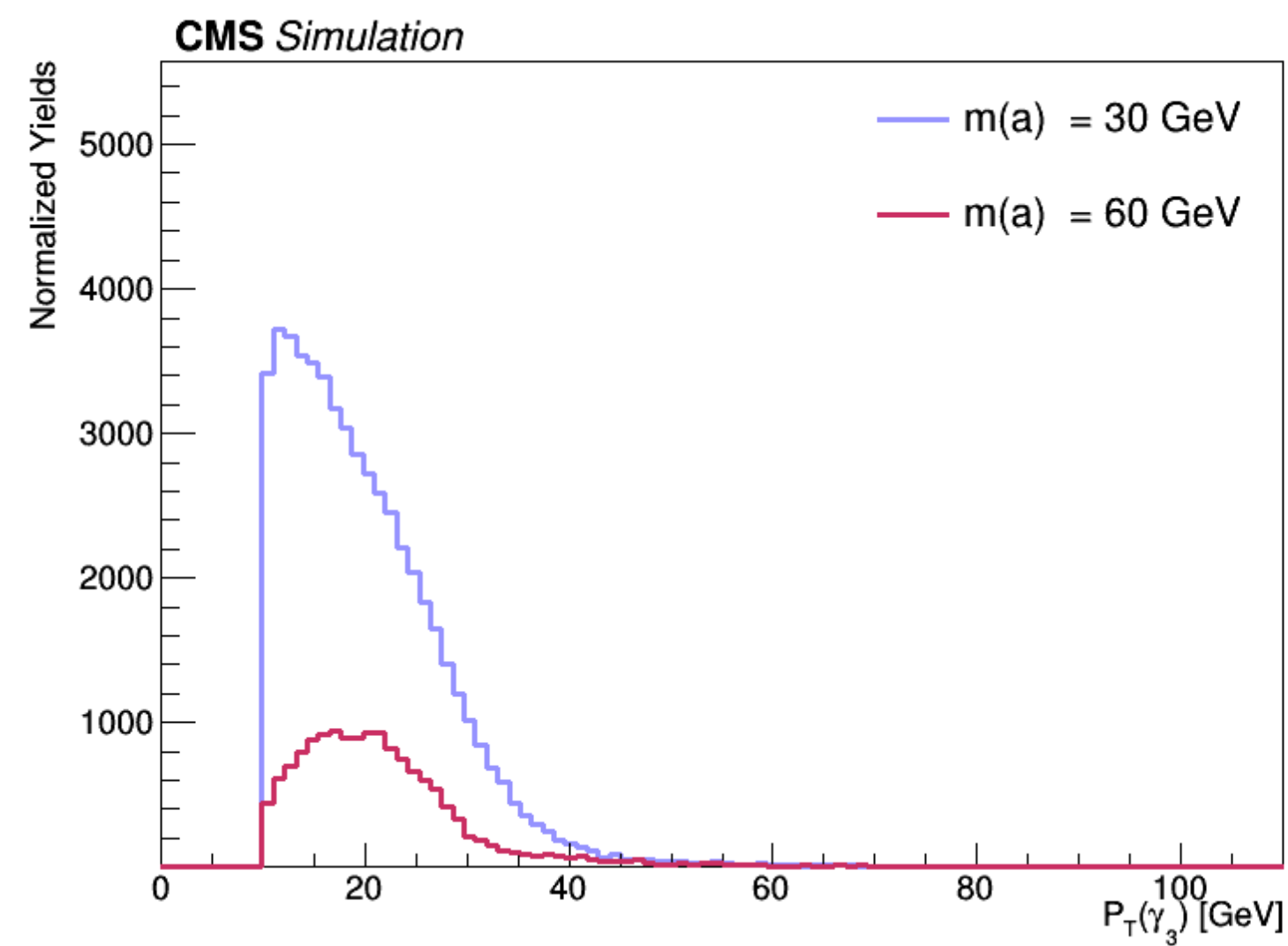
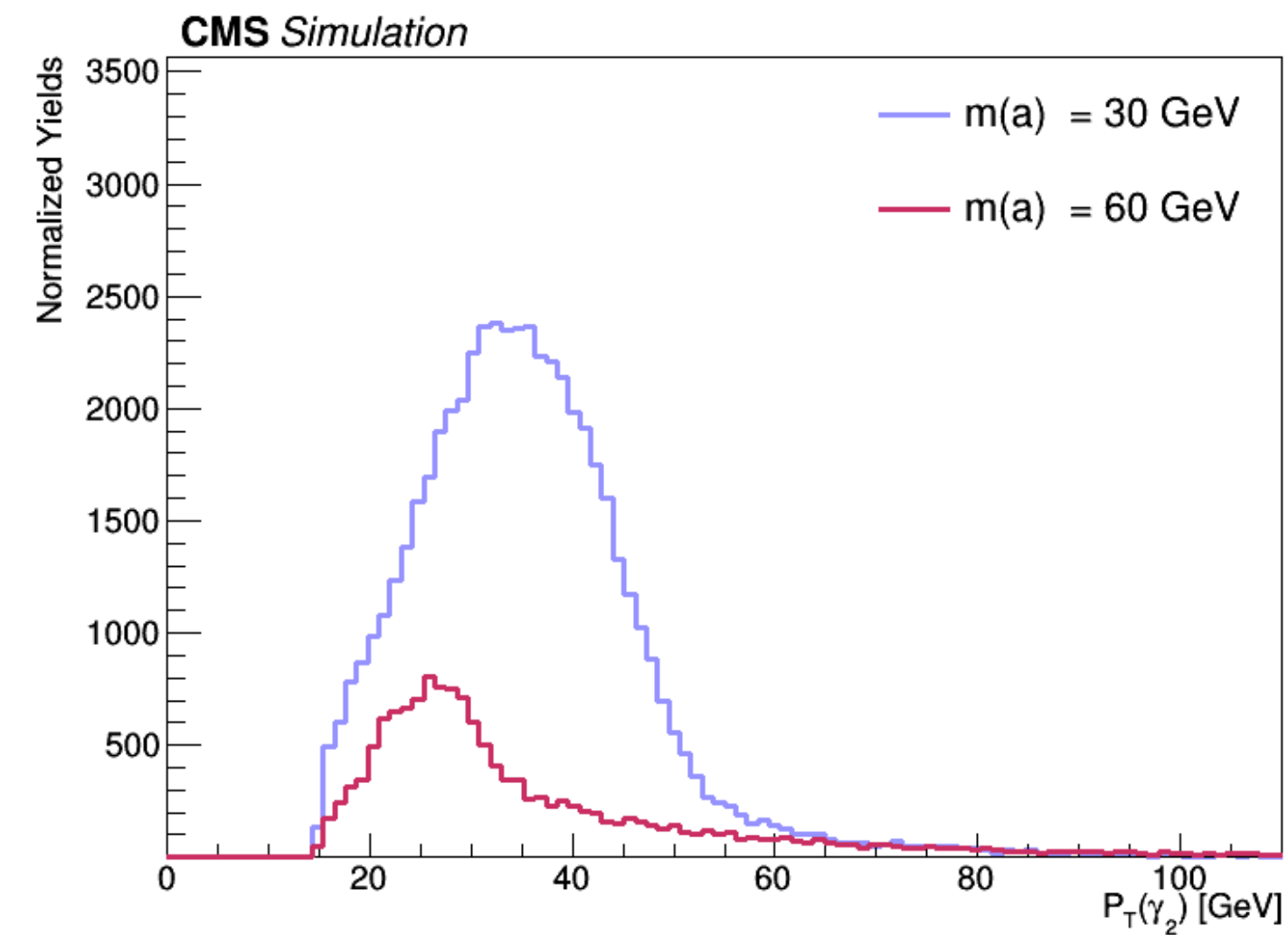
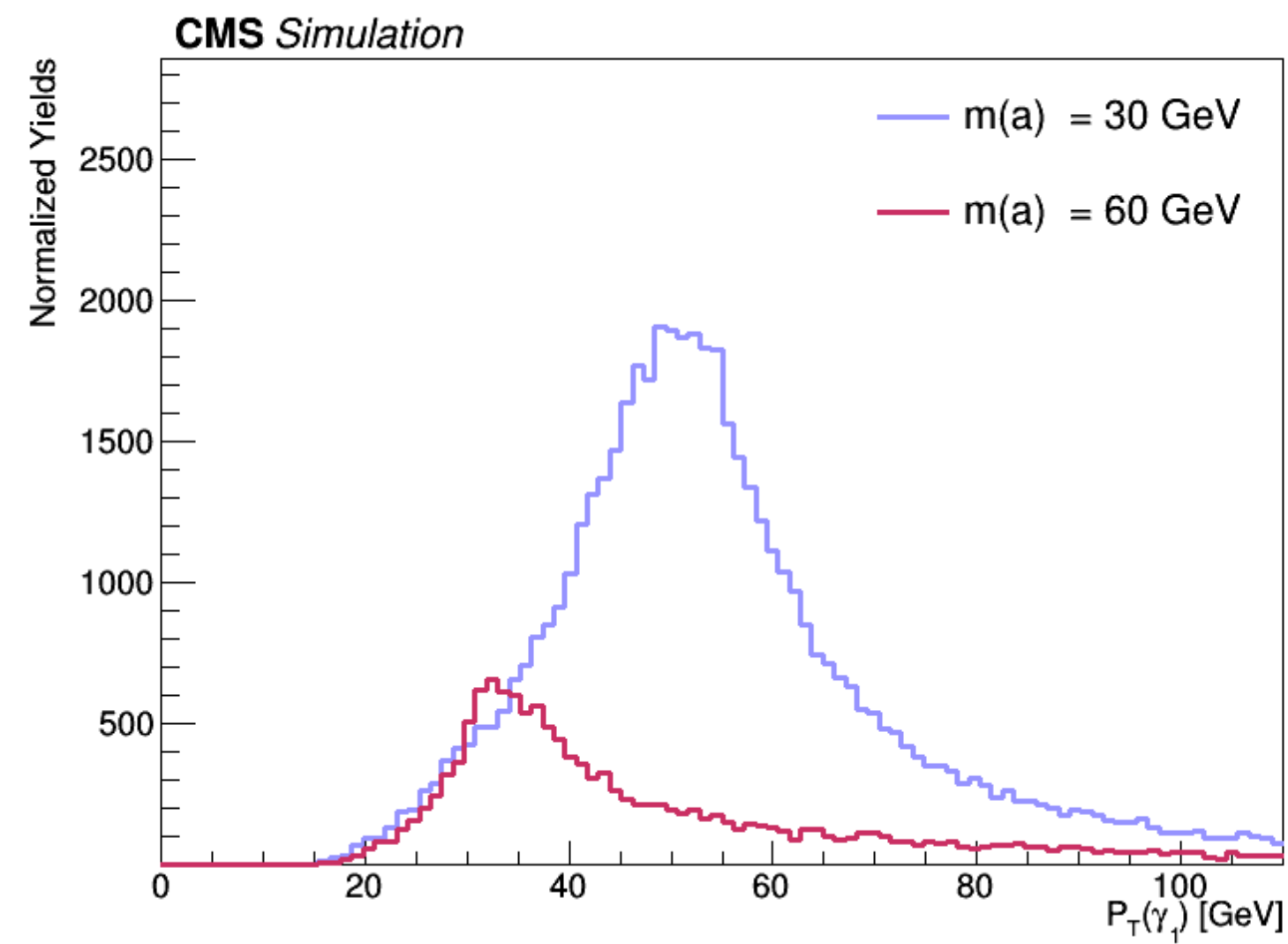
Take away from the plots:

- As the pt threshold on 3rd and 4th photon is decreased, the efficiency of the 4A case goes up and that of 3A goes down

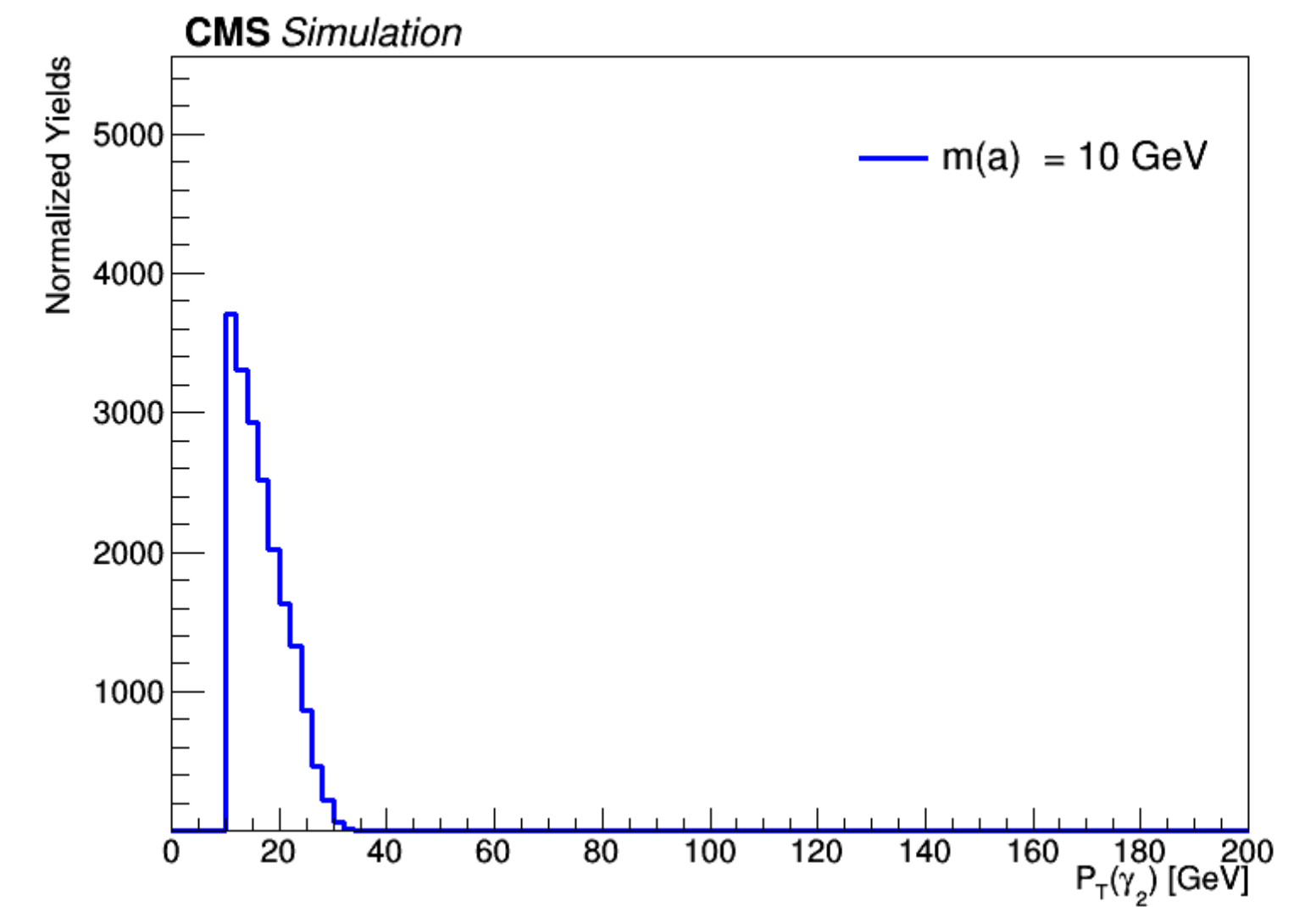
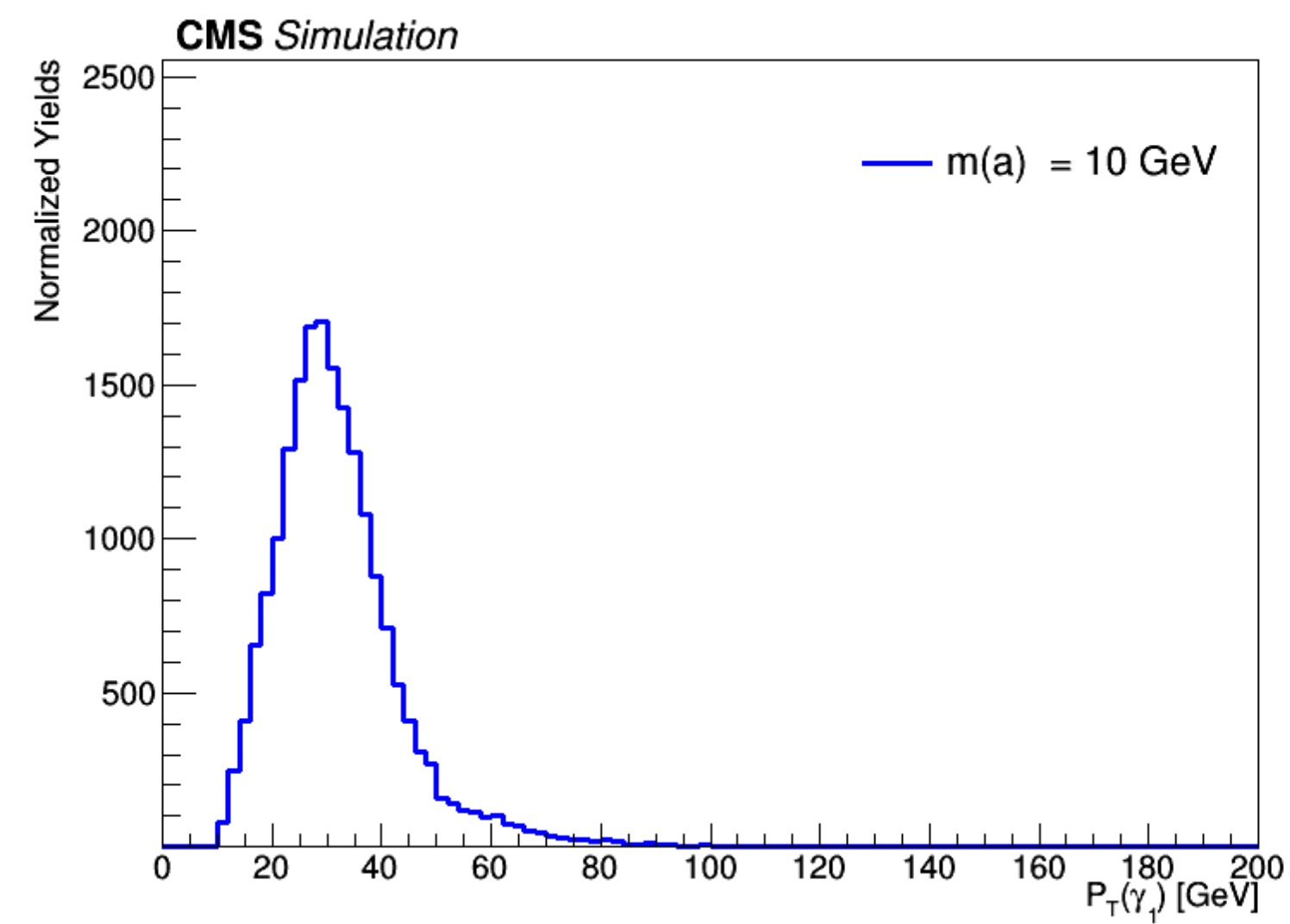
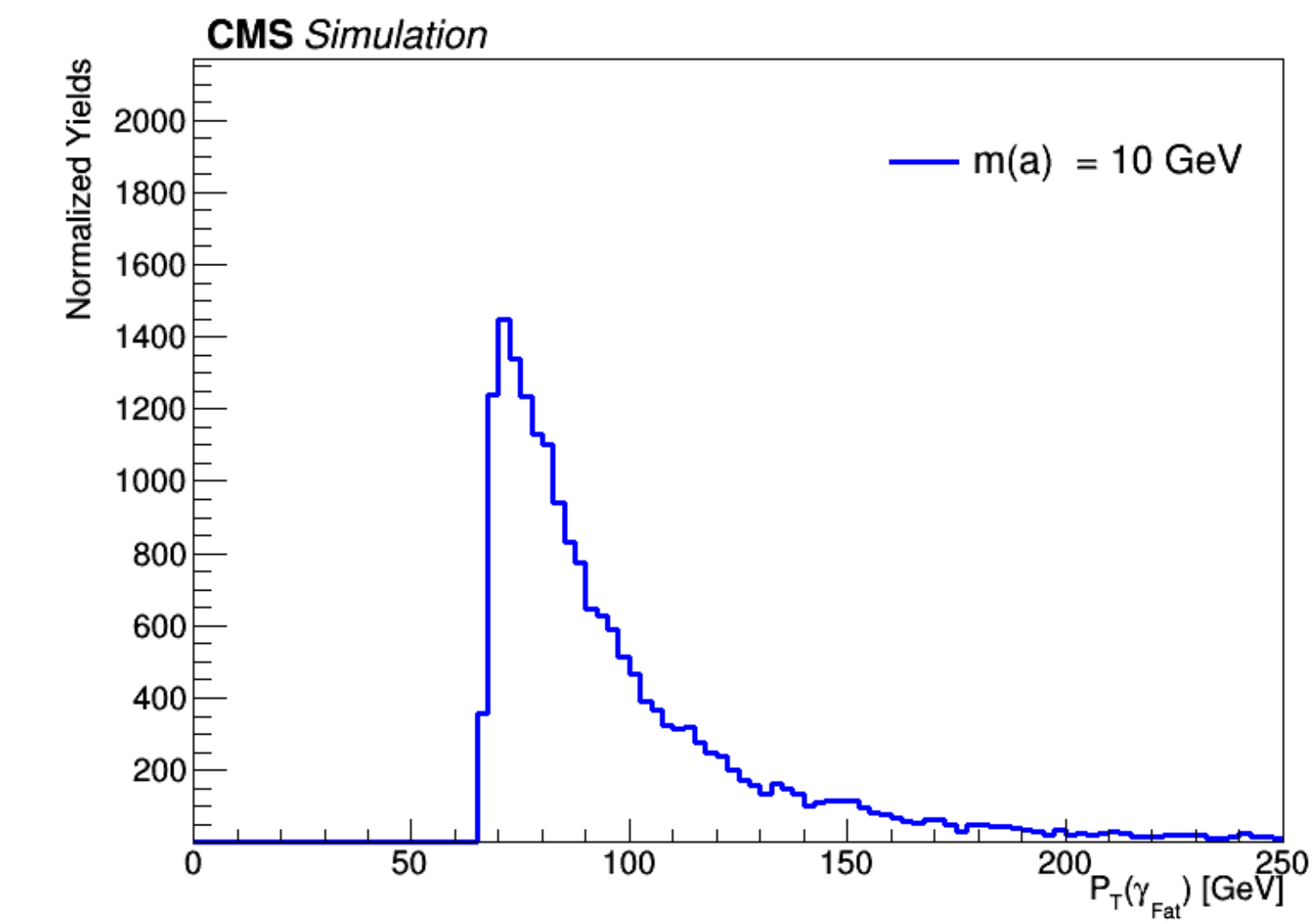
4 Resolved γ 's : 4 in acceptance

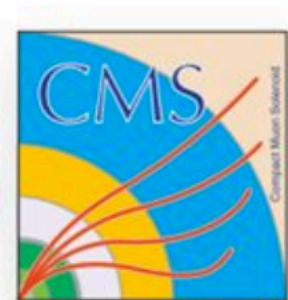


4 Resolved γ 's : 3 in acceptance

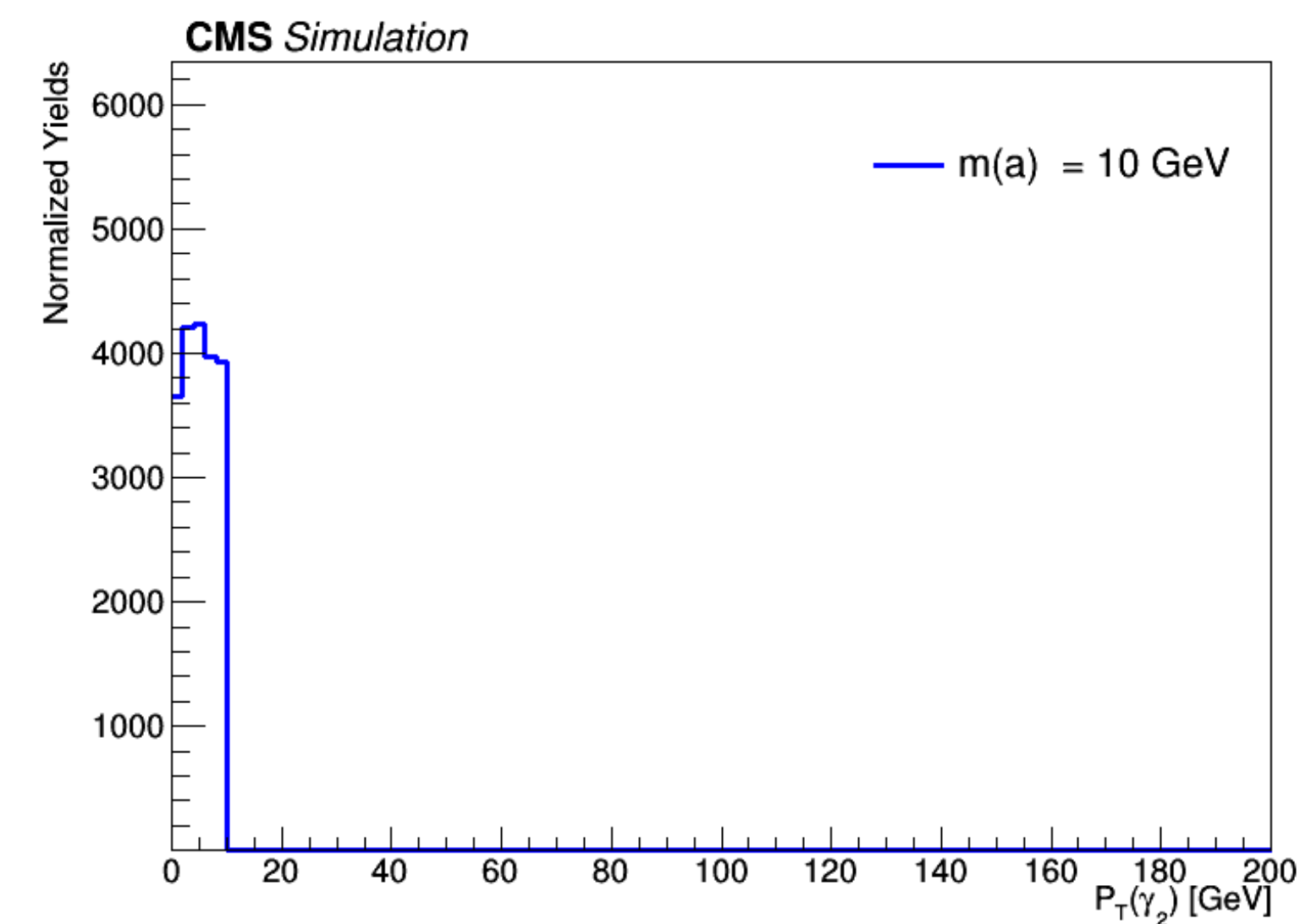
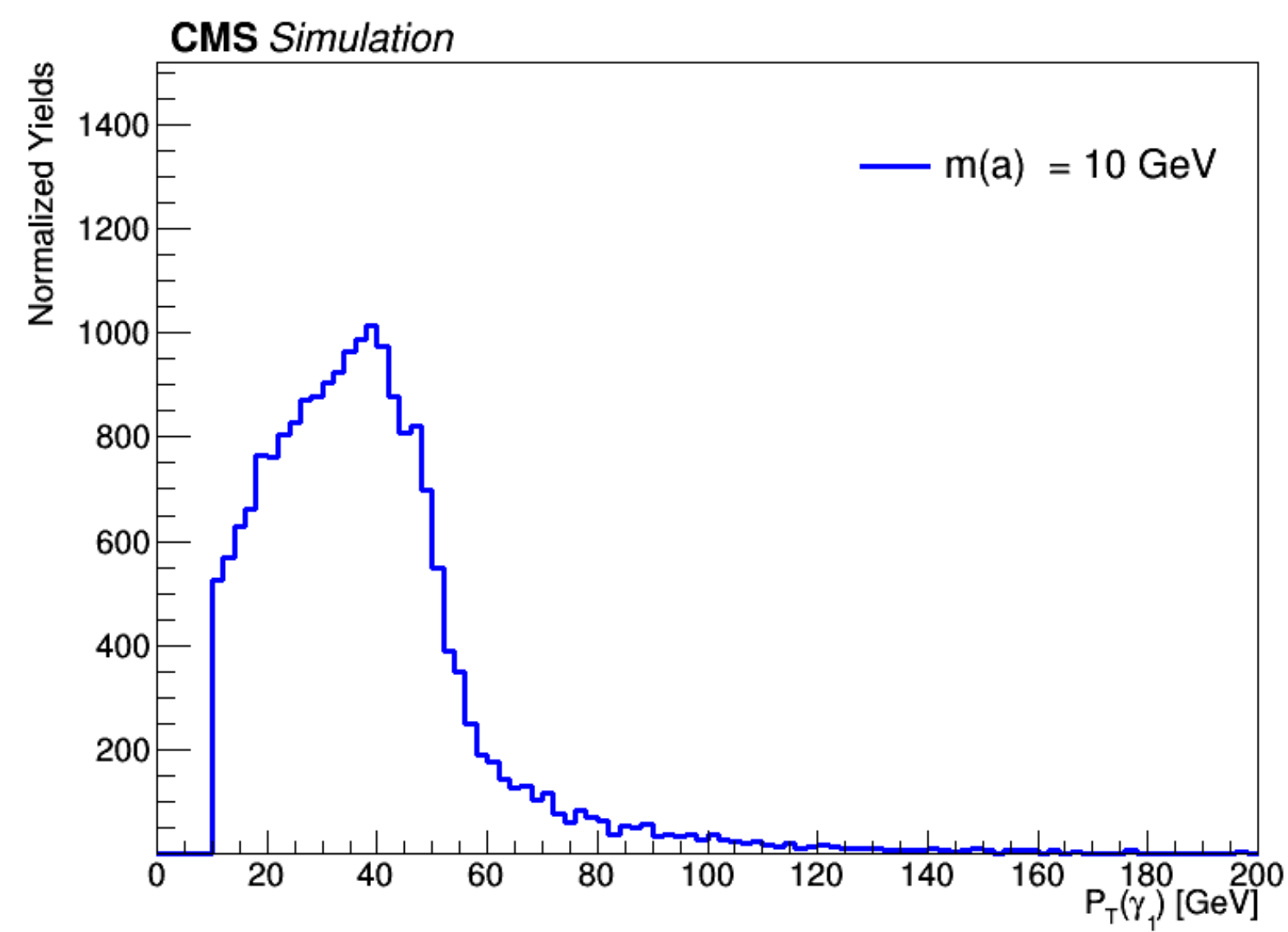
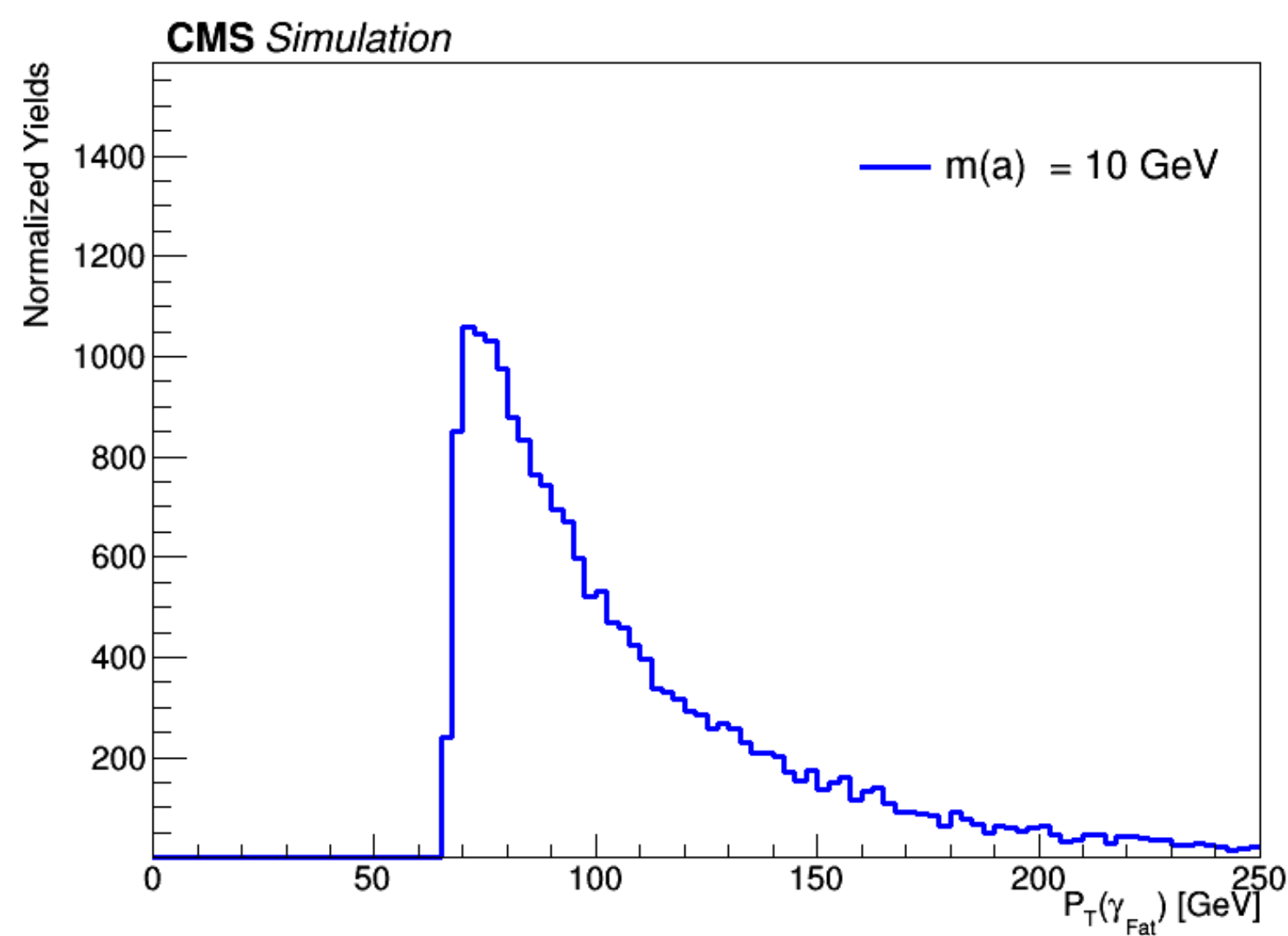


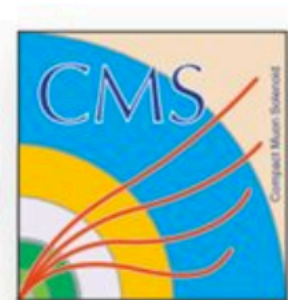
2 Resolved γ 's + 1 Fat : All in acceptance





2 Resolved γ 's + 1 Fat : 1 Missing





2 Fat γ 's : All in acceptance

