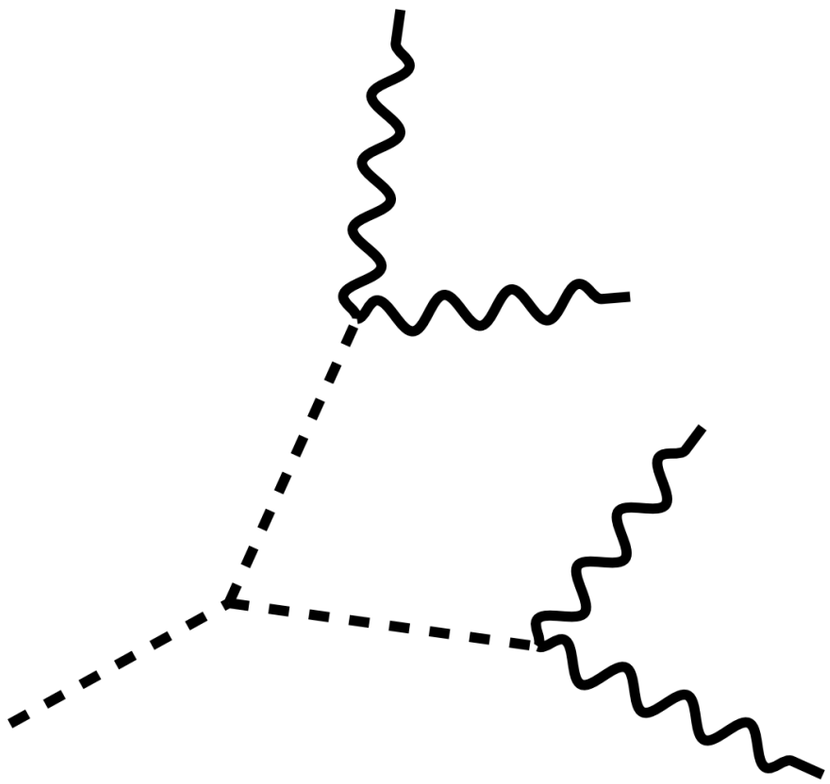
h(125)→aa→γγγγ



Gen-level studies for 2018 Data Parking

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- The HLT paths we are using currently are the two low mass paths:
  - **HLT_Diphoton30PV_18PV_R9Id_AND_IsoCaloId_AND_HE10p0_R9Id_DoublePixelVeto_Mass55_v7**
  - **HLT_Diphoton30EB_18EB_R9Id_OR_IsoCaloId_AND_HE10p0_R9Id_DoublePixelVeto_Mass55_v7**

- The L1 seeds are:
- An OR of these L1 seeds is applied

L1_SingleEG30	L1_SingleIsoEG28
L1_SingleEG32	L1_SingleIsoEG30
L1_SingleEG34	L1_SingleIsoEG32
L1_SingleEG36	L1_SingleIsoEG34
L1_SingleEG38	L1_SingleIsoEG36
L1_SingleEG40	L1_DoubleEG_15_10
L1_SingleIsoEG22er	L1_DoubleEG_18_17
L1_SingleIsoEG24er	L1_DoubleEG_20_18
L1_SingleIsoEG26er	L1_DoubleEG_22_10
L1_SingleIsoEG28er	L1_DoubleEG_22_12
L1_SingleIsoEG30er	L1_DoubleEG_22_15
L1_SingleIsoEG32er	L1_DoubleEG_23_10
L1_SingleIsoEG34er	L1_DoubleEG_24_17
L1_SingleIsoEG24	L1_DoubleEG_25_12
L1_SingleIsoEG26	

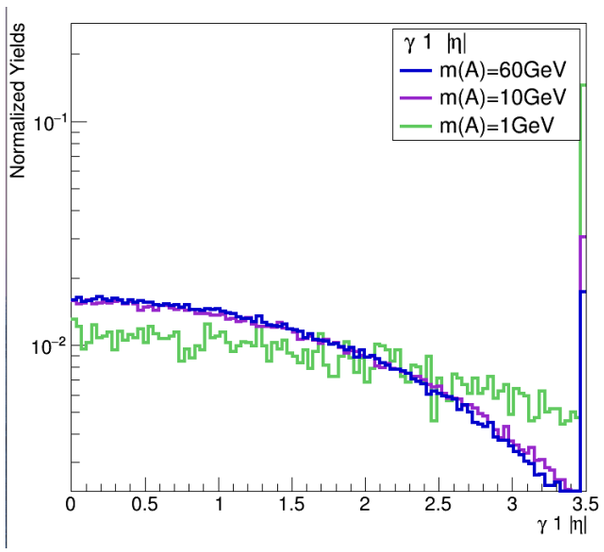
- The plots in the following slides are made for gen-level final state photons which have descended from the pseudo scalar “a”.

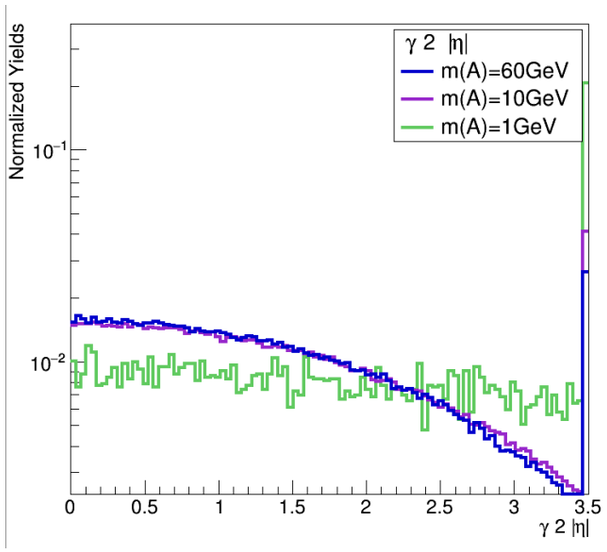
- Since there are always 4 photons, we look at the deltaR between each of the 6 photon pairs.

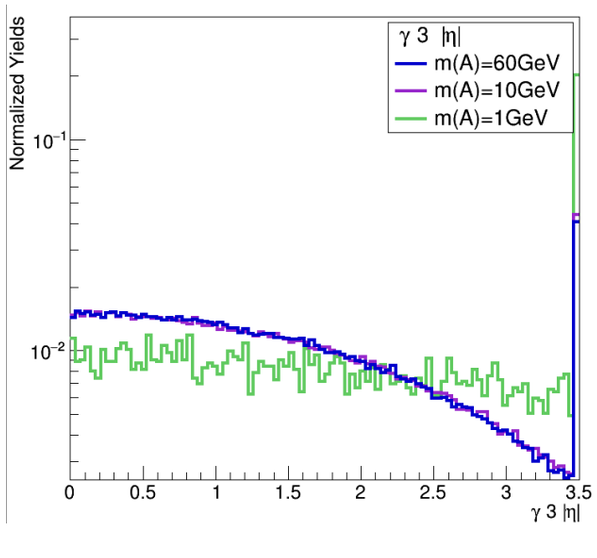
- We define 3 categories:
  - No pairs found with deltaR < 0.1 —> 4 Photon Category (all isolated photons)
  - 1 pair found with deltaR < 0.1 —> 3 Photon Category(1 Fat Photon + 2 Isolated Photons)
  - 2 pairs found with deltaR < 0.1 —>2 Photon Category (2 Fat Photons)

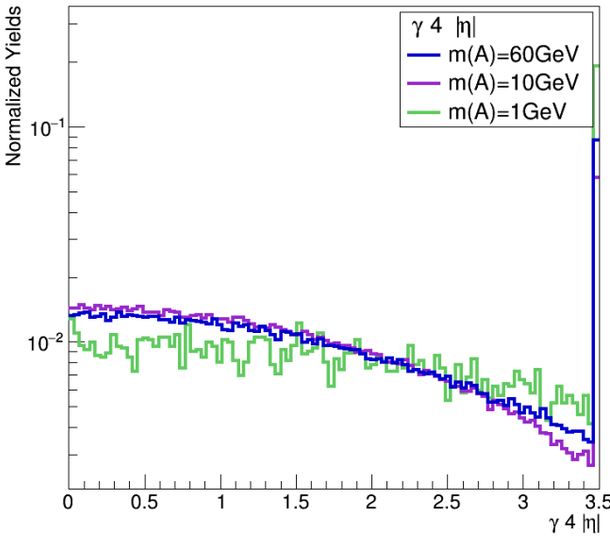
- Shown in the following slides are the distributions for 60 GeV, 10 GeV and 1 GeV
- All plots are normalized to 1
- Overflow bin is also shown

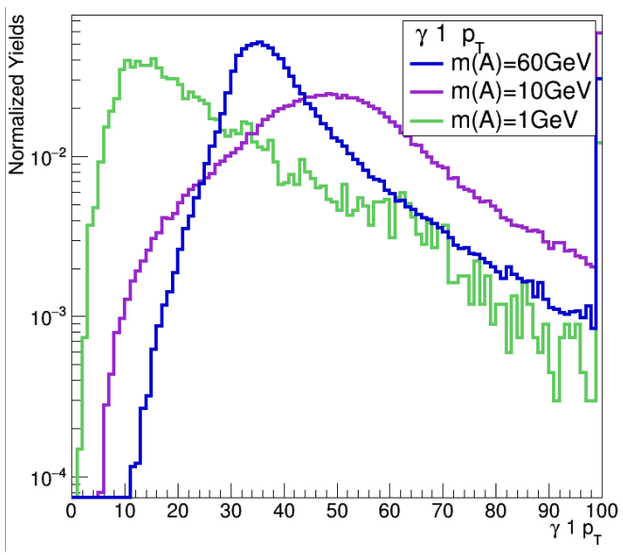
4 Gamma Category : 4 Isolated photon case

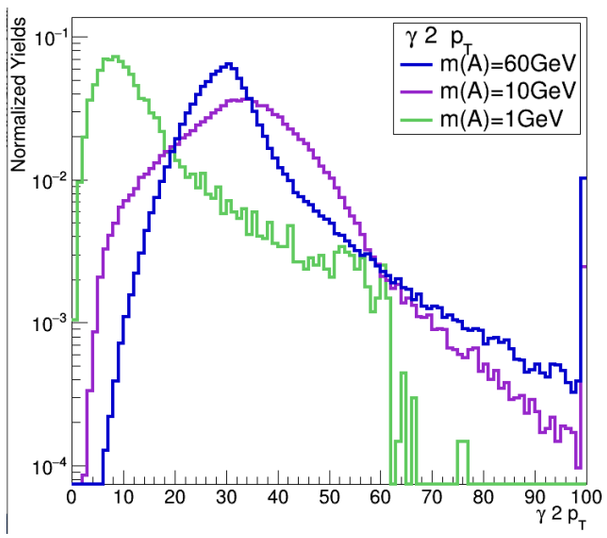


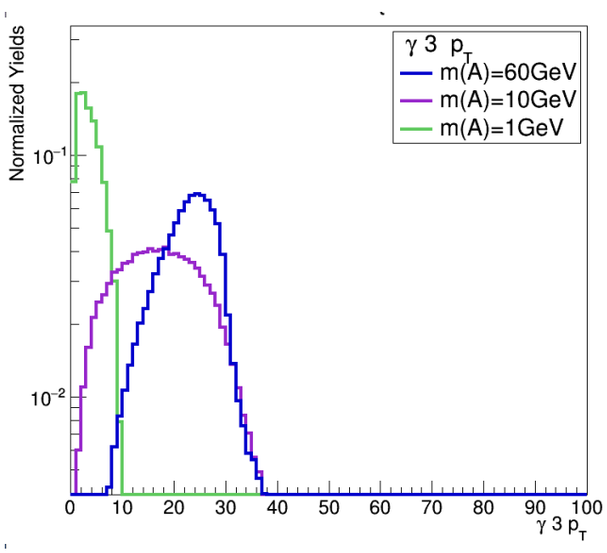


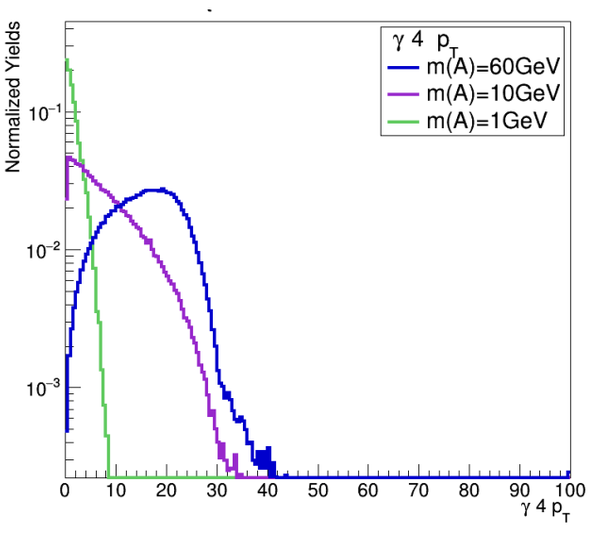




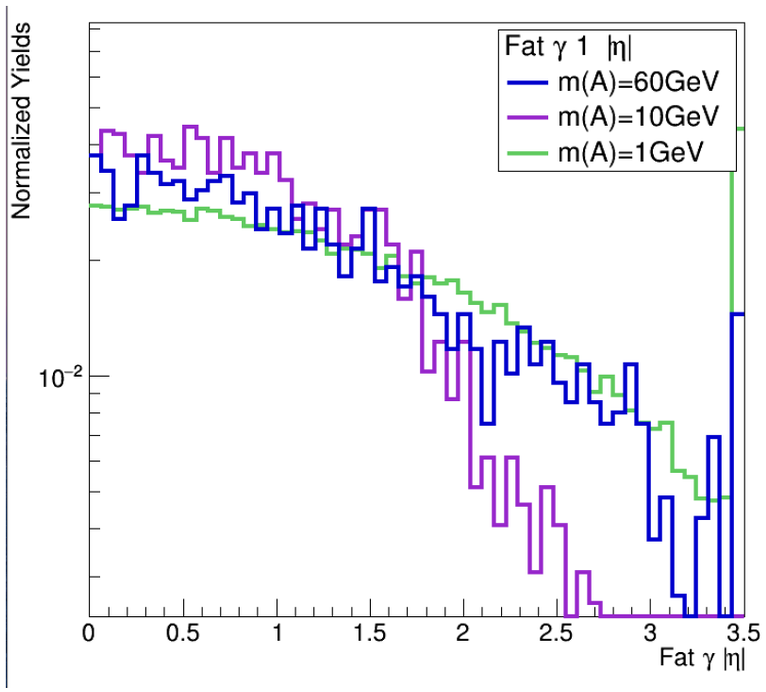


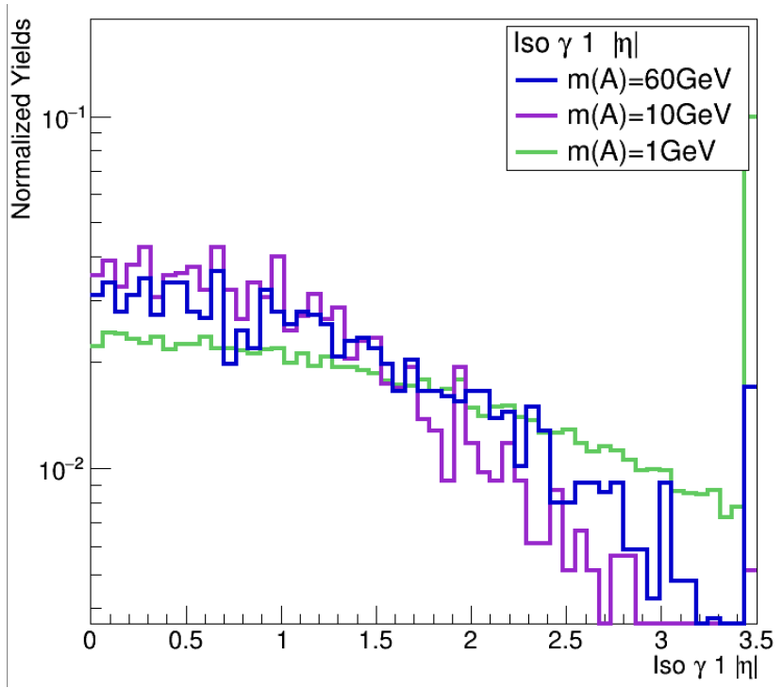


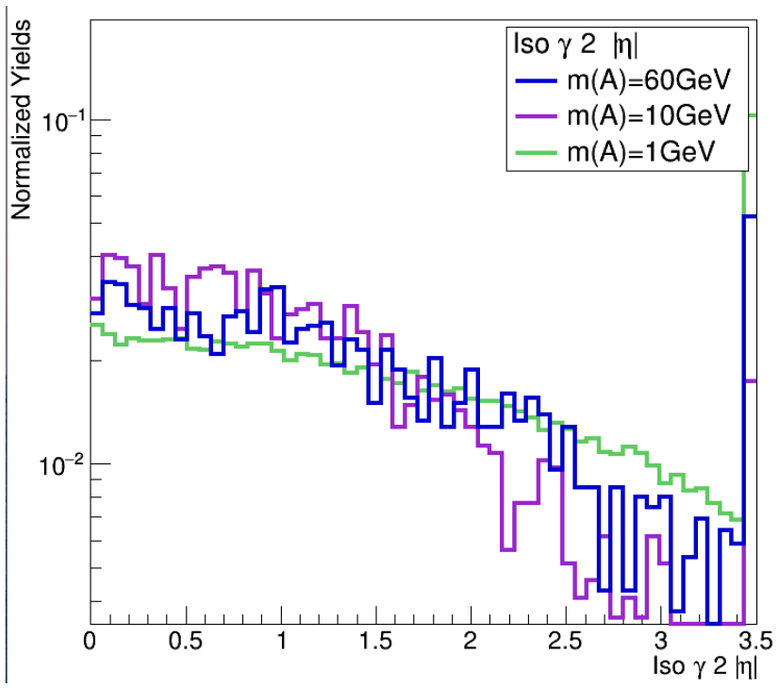


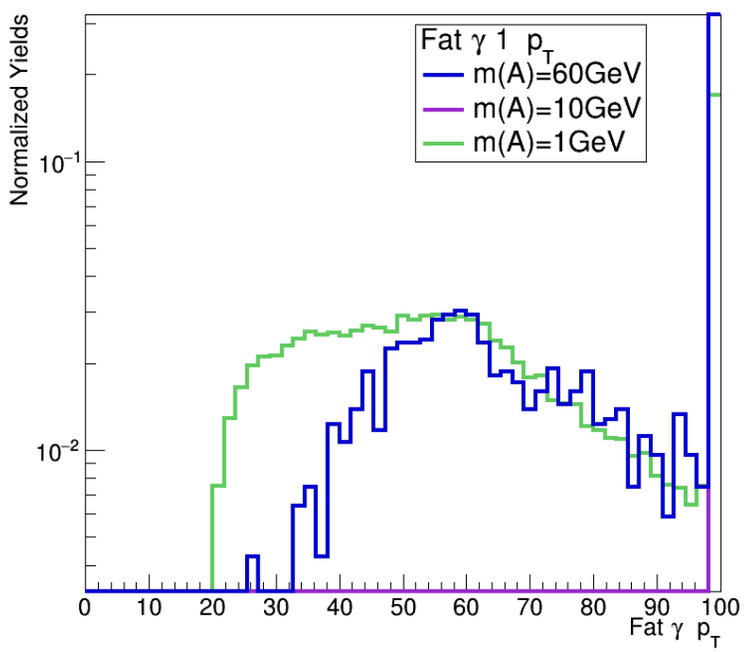


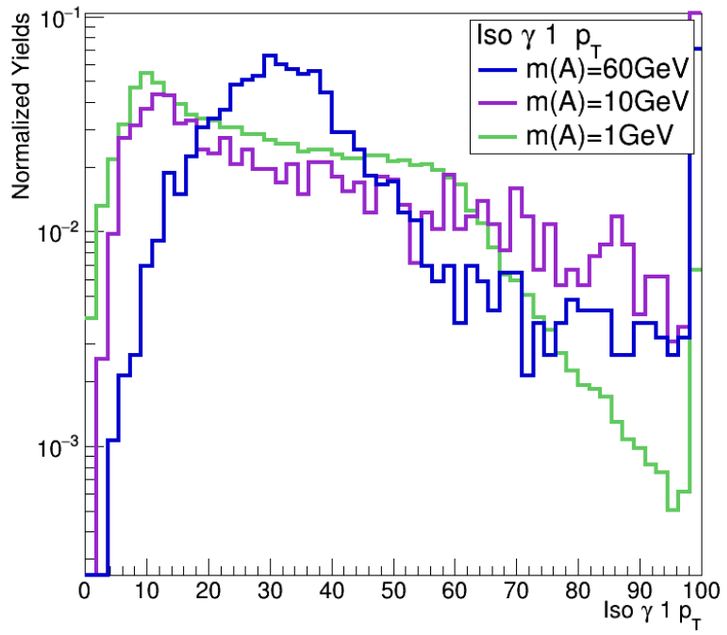
3 Gamma Category : 2 Isolated photons + 2 merged photons case

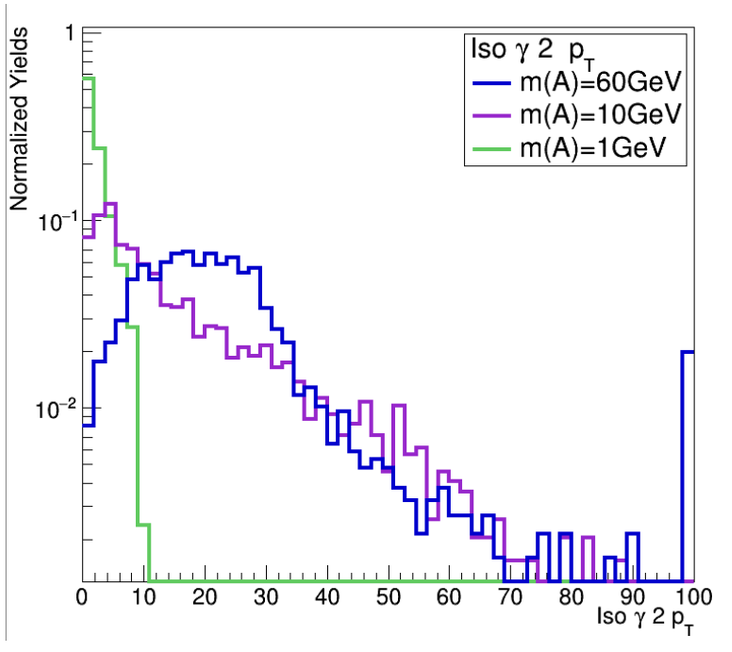












2 Gamma Category : 2 pairs of merged photons case