Angular and Energy conditioning

9.12.2021

BIB-AE Angular photon progress

Some preliminary Post Processing

- Angular BIB-AE training over full range: 10-100GeV and 30-90 degrees has been ongoing
- Have started a test Post Processing run on Epoch 43
- Using 6 convolutional layers (specific detail for Sascha: used MMD_HitKS2)
- Have 20, 60, 90 GeV 40(not for 20 GeV), 60, 90 degree validation showers from Engin
- Plots I show here are from epoch 85 of PP. I have looked at a couple of earlier ones, and have seen some modest improvement over time- so could still improve
- Have yet to do full epoch scans- however from what I have seen BIB-AE training seems MUCH more stable than GAN training and distributions fluctuate much less from epoch to epoch

Brief aside: Maxwell can be a lot slower at weekends!

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rw-r--r-- 1 mckeownp flc 267M  3. Dez 19:03 check_3D_M_BiBAEBatchS_Energy_Angle_P_None_C_BatchSV2Core_CL_Default_30x30x60Thresh_Reset_PP_KLD001_L512_24_Photon_505100_uniform_NO_CONSTRAINER_PP_43.pth
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rw-r--r-- 1 mckeownp flc 270M  4. Dez 10:52 check_3D_M_BiBAEBatchS_Energy_Angle_P_None_C_BatchSV2Core_CL_Default_30x30x60Thresh_Reset_PP_KLD001_L512_24_Photon_505100_uniform_NO_CONSTRAINER_PP_45.pth
rw-r--r-- 1 mckeownp flc 270M  4. Dez 18:32 check_3D_M_BiBAEBatchS_Energy_Angle_P_None_C_BatchSV2Core_CL_Default_30x30x60Thresh_Reset_PP_KLD001_L512_24_Photon_505100_uniform_NO_CONSTRAINER_PP_46.pth
rw-r--r-- 1 mckeownp flc 270M  5. Dez 02:26 check_3D_M_BiBAEBatchS_Energy_Angle_P_None_C_BatchSV2Core_CL_Default_30x30x60Thresh_Reset_PP_KLD001_L512_24_Photon_505100_uniform_NO_CONSTRAINER_PP_47.pth
rw-r--r-- 1 mckeownp flc 270M  5. Dez 09:28 check_3D_M_BiBAEBatchS_Energy_Angle_P_None_C_BatchSV2Core_CL_Default_30x30x60Thresh_Reset_PP_KLD001_L512_24_Photon_505100_uniform_NO_CONSTRAINER_PP_48.pth
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rw-r--r-- 1 mckeownp flc 270M  7. Dez 16:17 check_3D_M_BiBAEBatchS_Energy_Angle_P_None_C_BatchSV2Core_CL_Default_30x30x60Thresh_Reset_PP_KLD001_L512_24_Photon_505100_uniform_NO_CONSTRAINER_PP_69.pth
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- ~ 7-10x slower at the week end!

Energy sum- 20 GeV

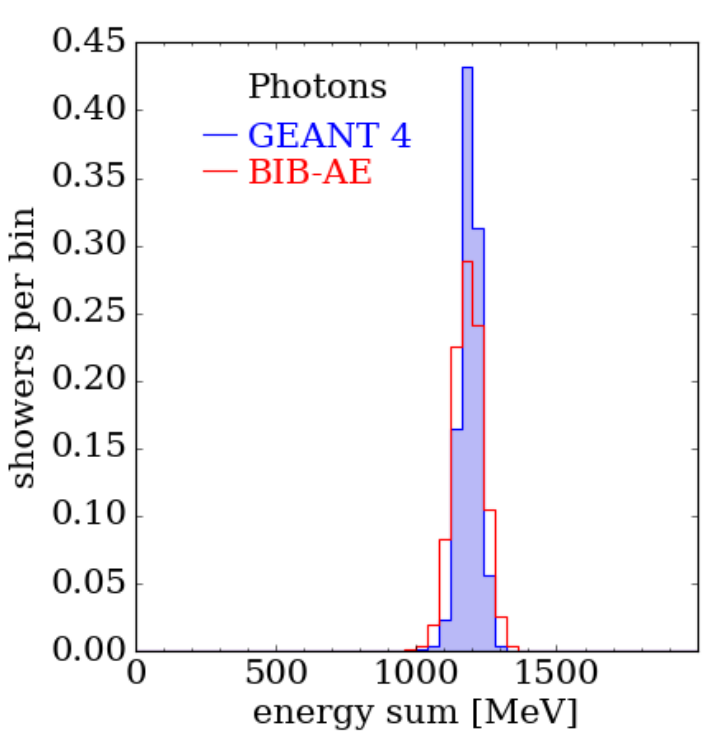
A 40 deg

A 60 deg

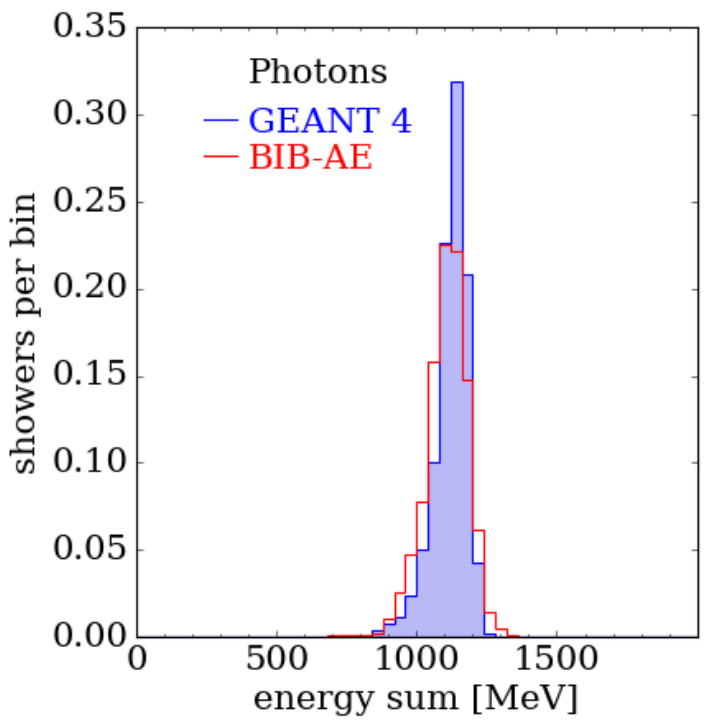
A 90 deg

Energy sum- 50 GeV

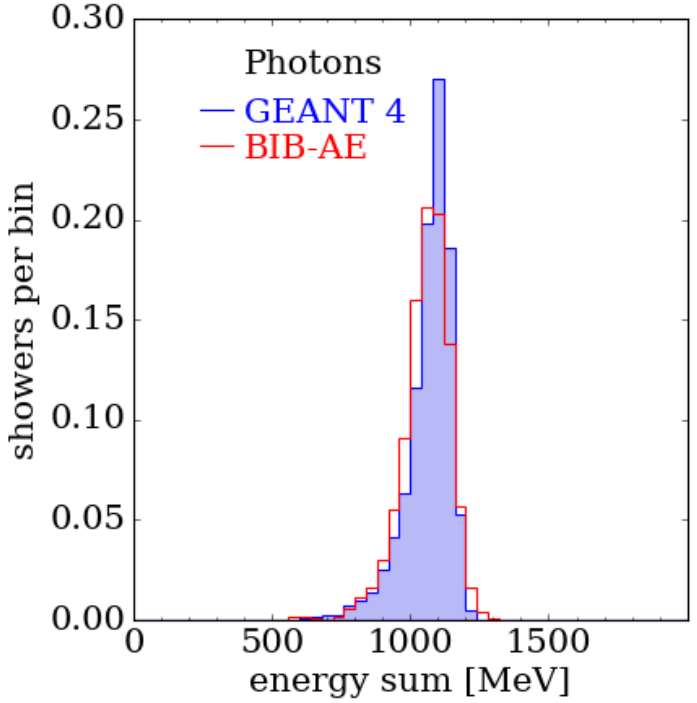
A 40 deg



A 60 deg

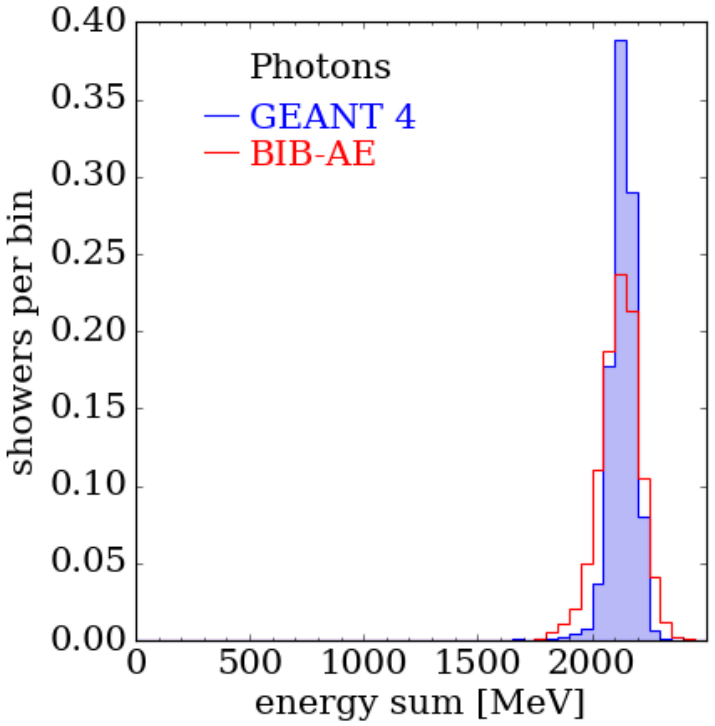


A 90 deg

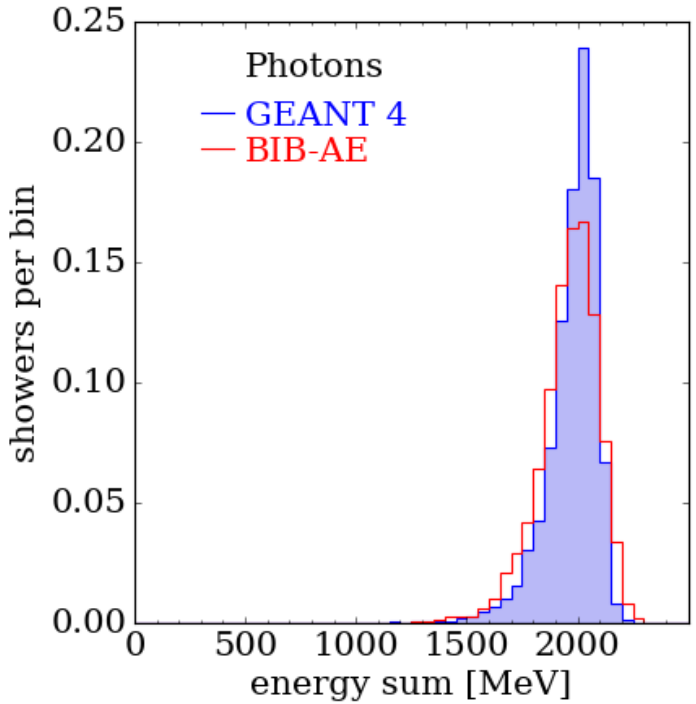


Energy sum- 90 GeV

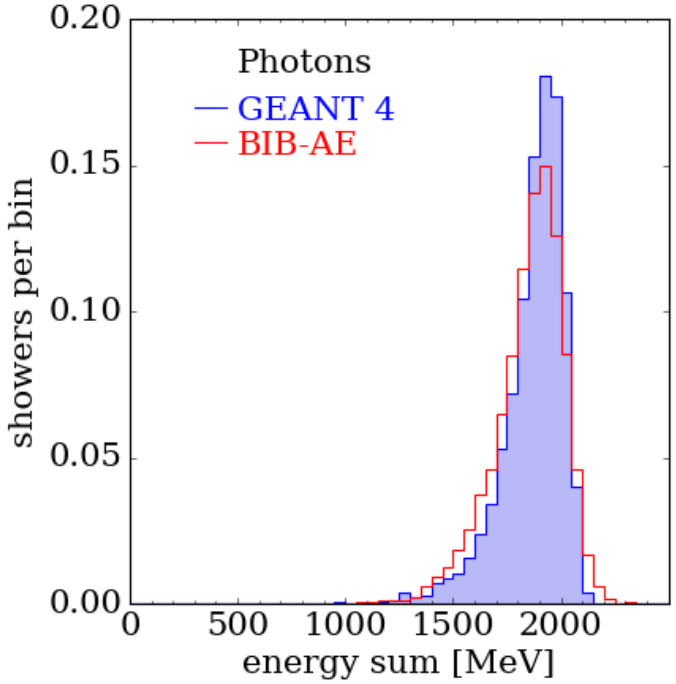
A 40 deg



A 60 deg



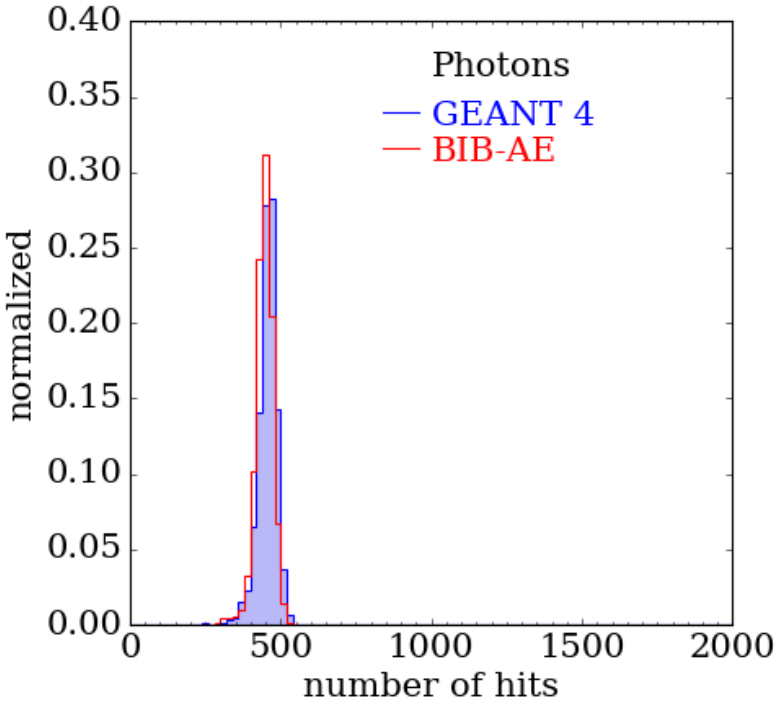
A 90 deg



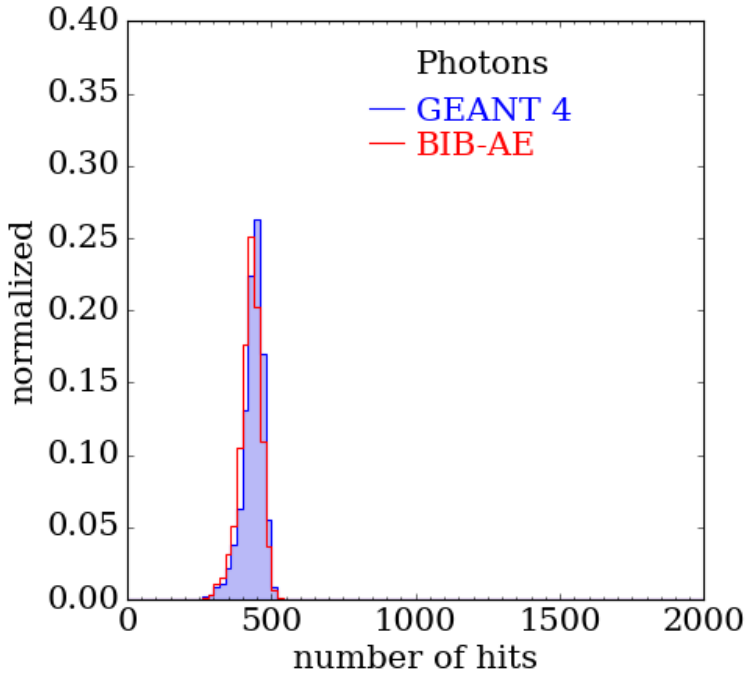
Number of hits- 20 GeV

A 40 deg

A 60 deg

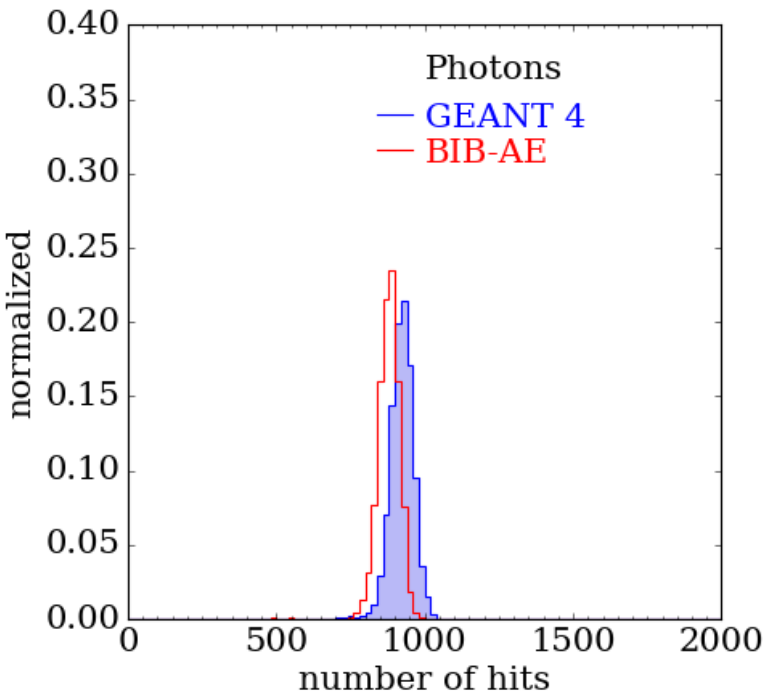


A 90 deg

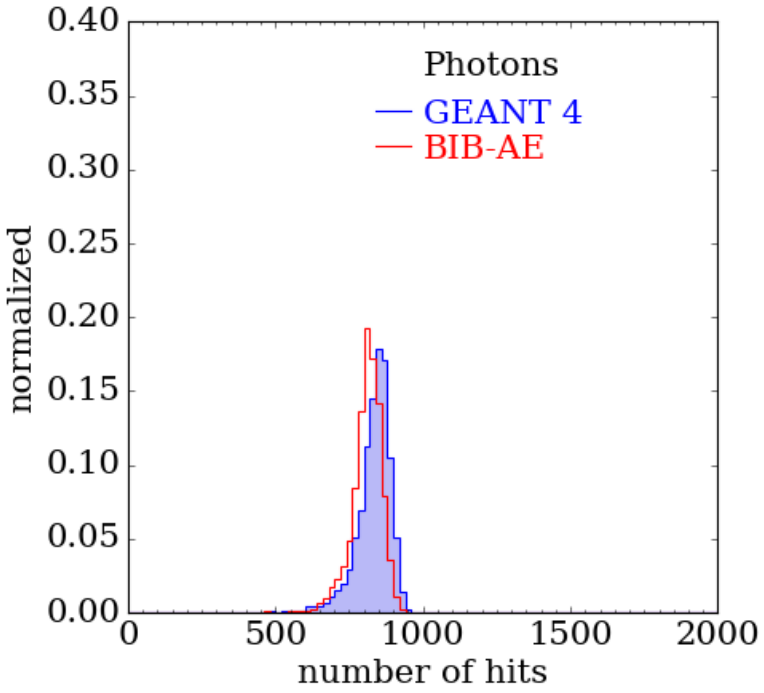


Number of hits- 50 GeV

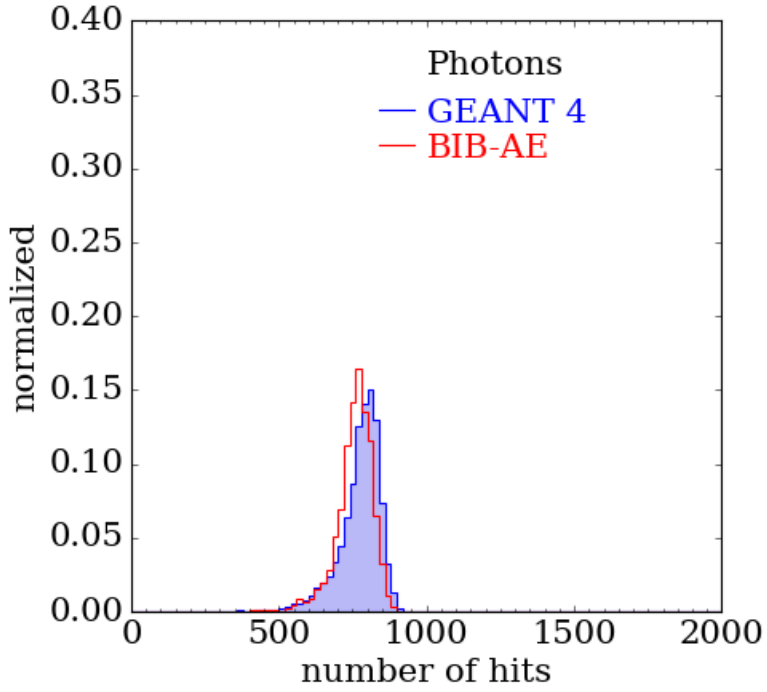
A 40 deg



A 60 deg

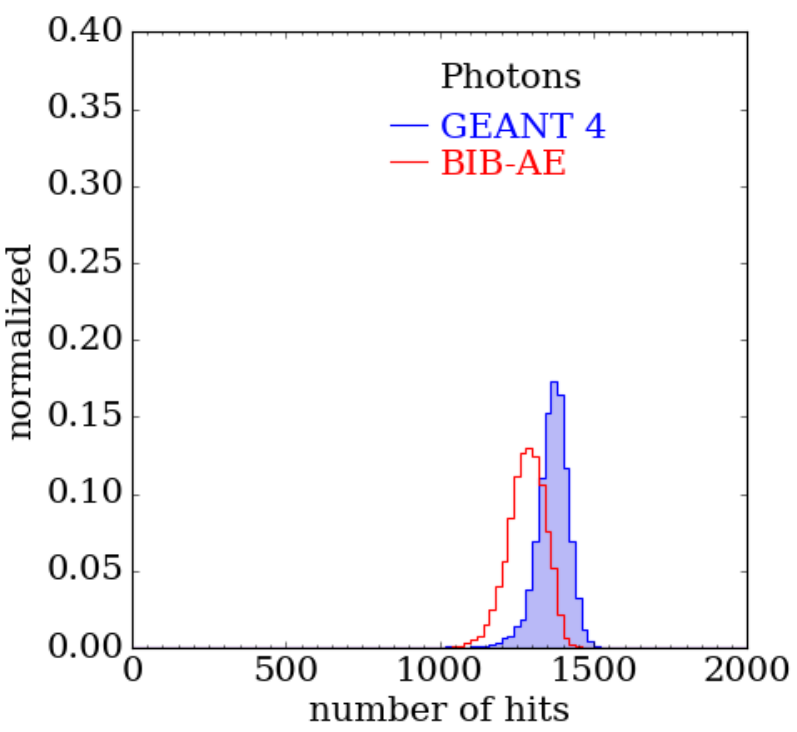


A 90 deg

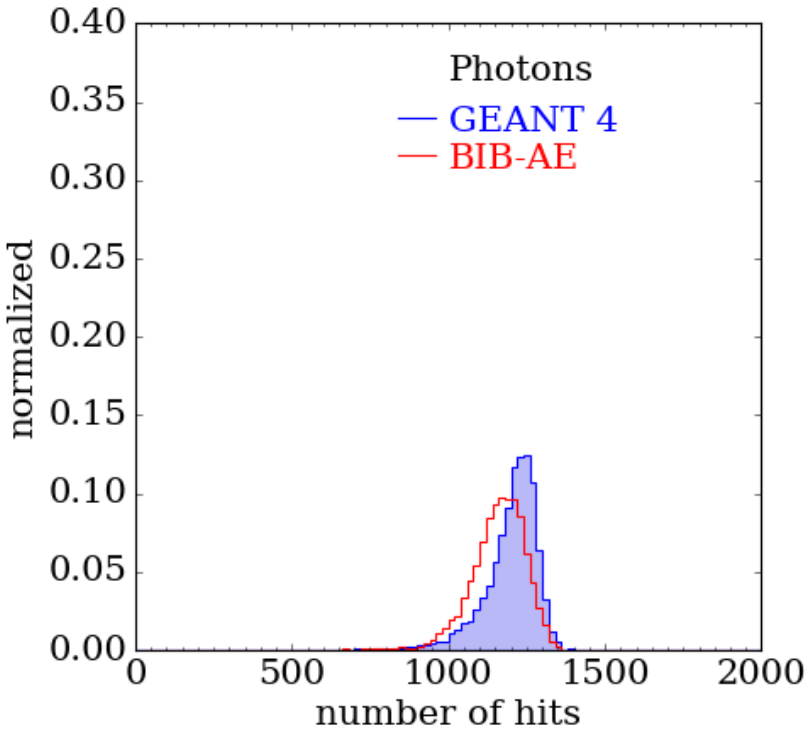


Number of hits- 90 GeV

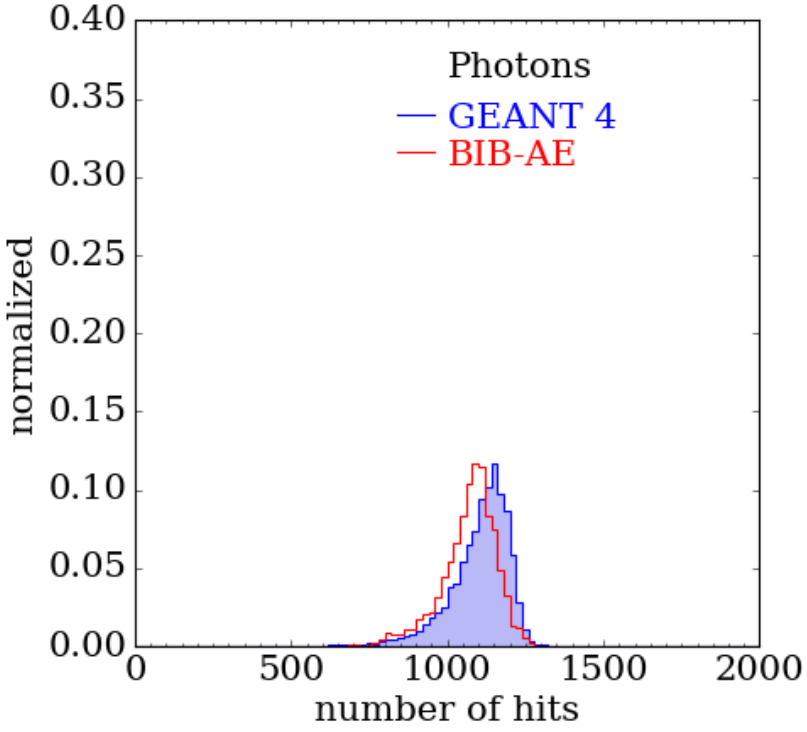
A 40 deg



A 60 deg



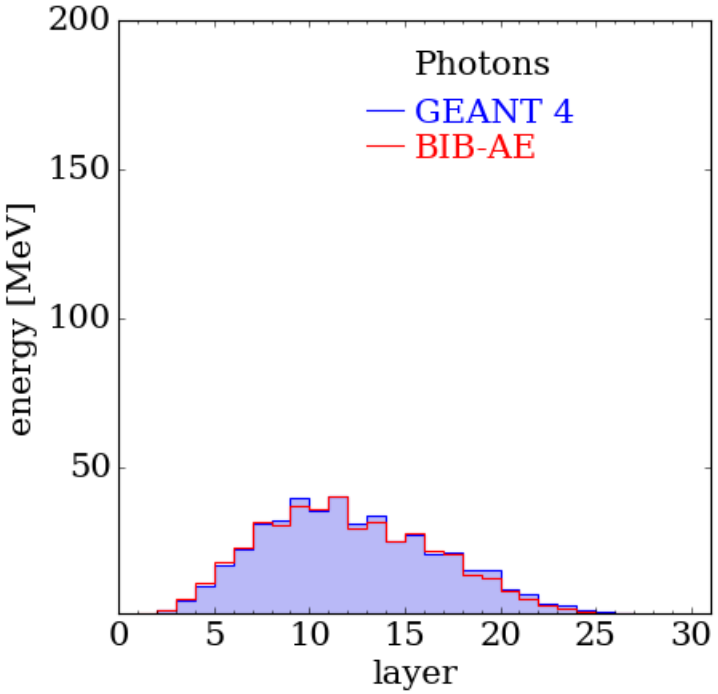
A 90 deg



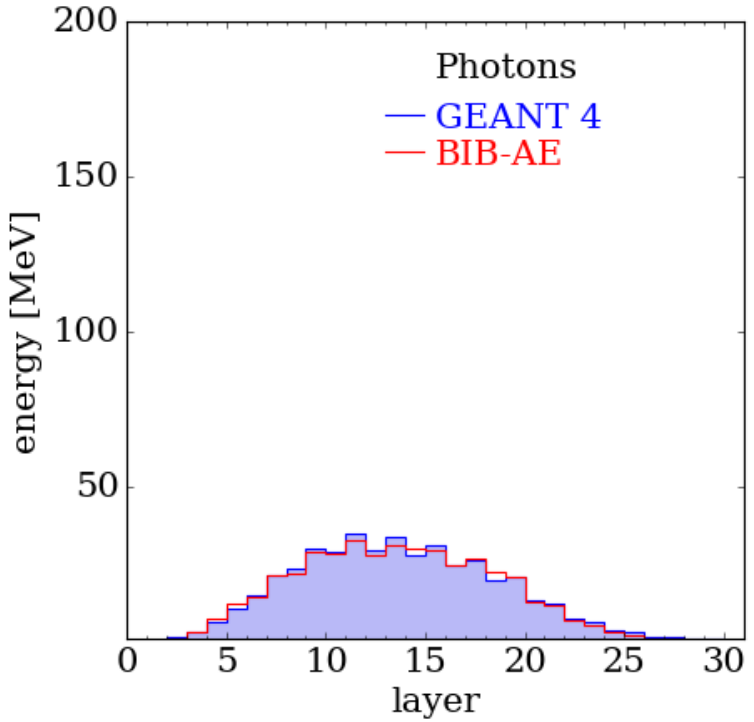
Longitudinal profile- 20 GeV

A 40 deg

A 60 deg

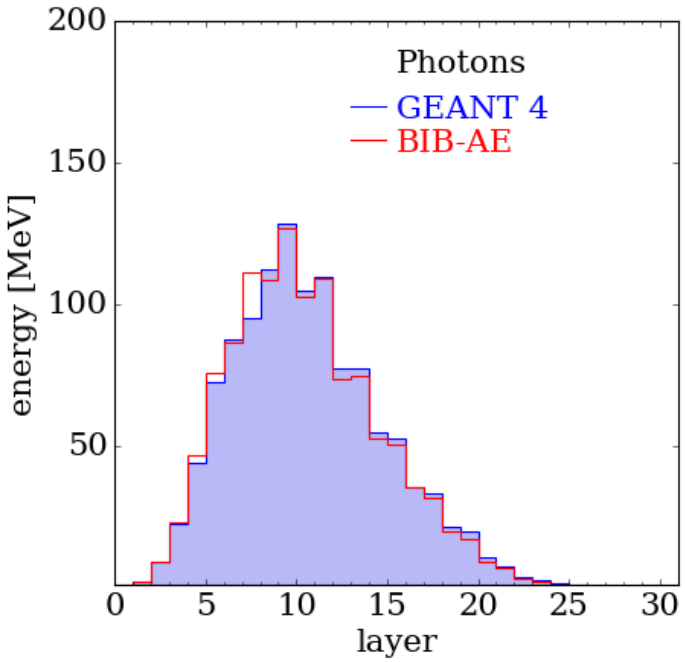


A 90 deg

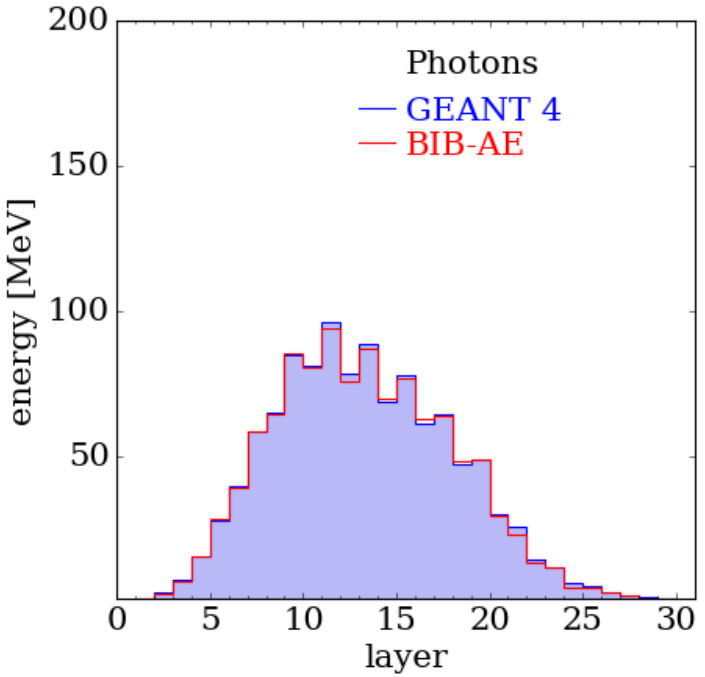


Longitudinal profile- 50 GeV

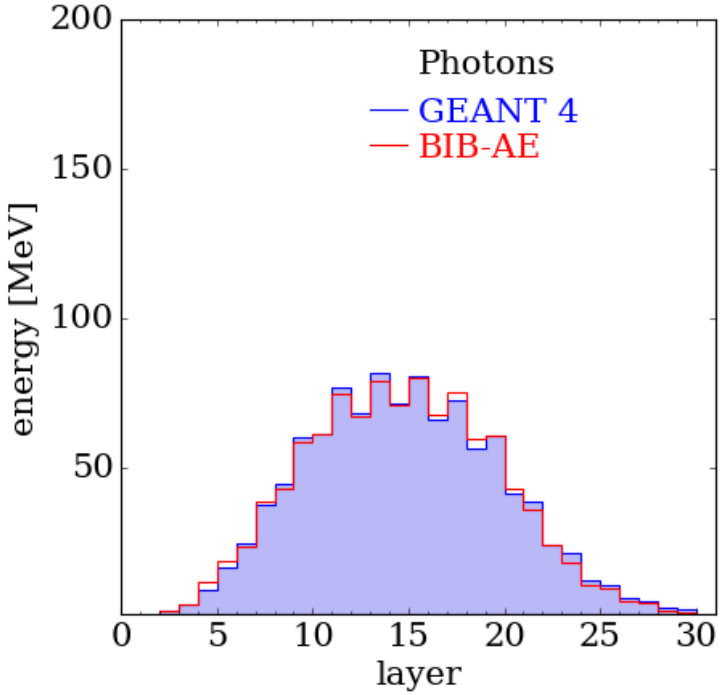
A 40 deg



A 60 deg

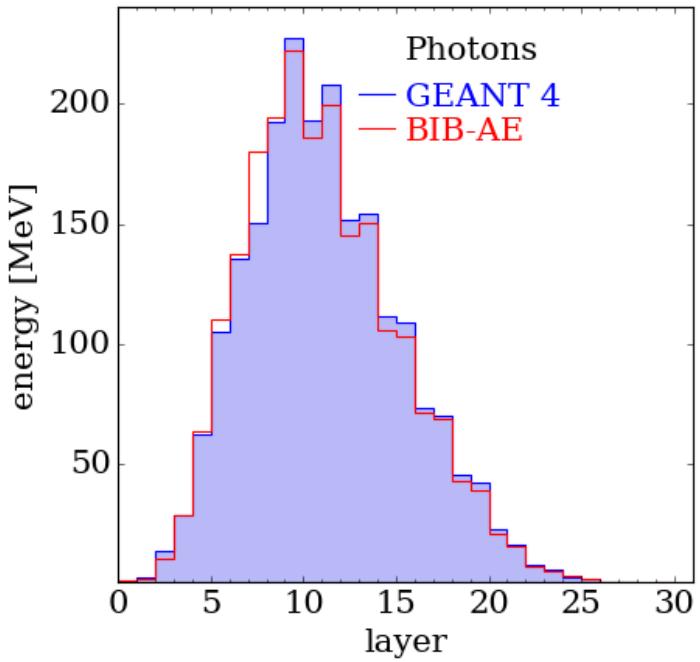


A 90 deg

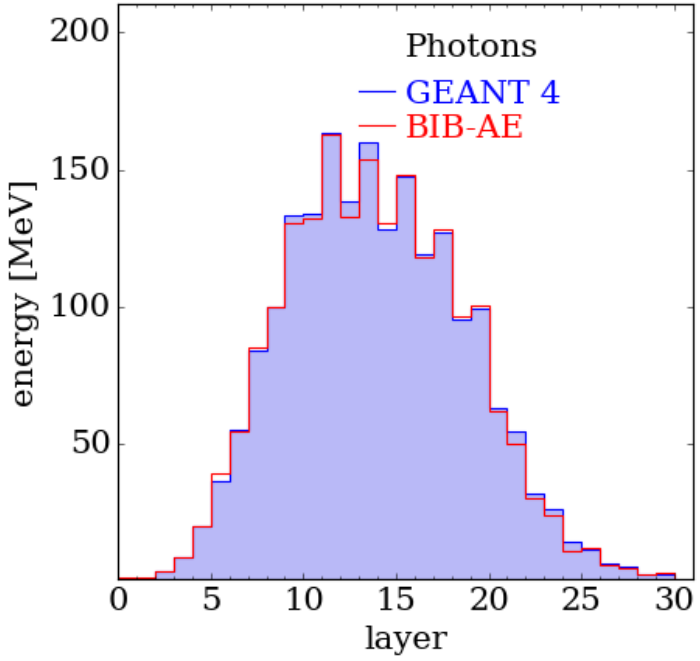


Longitudinal profile- 90 GeV

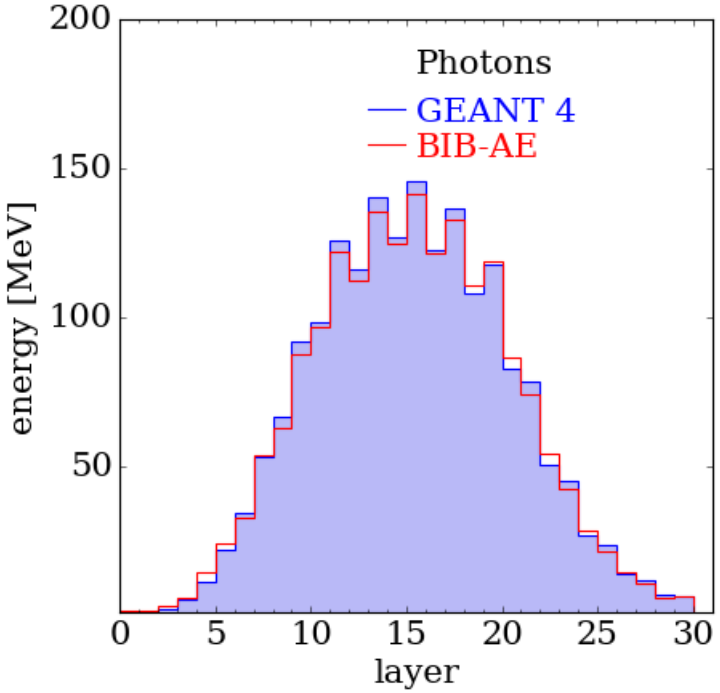
A 40 deg



A 60 deg



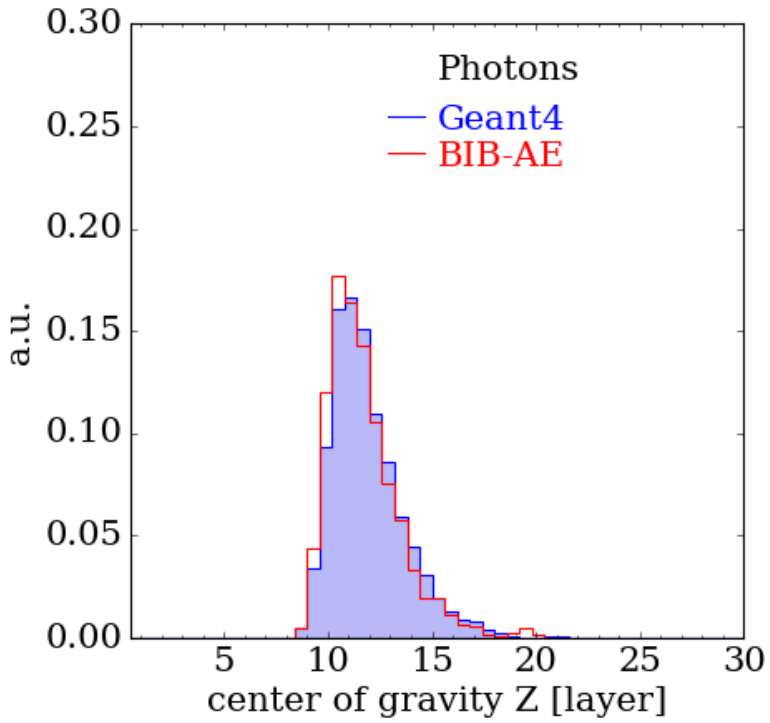
A 90 deg



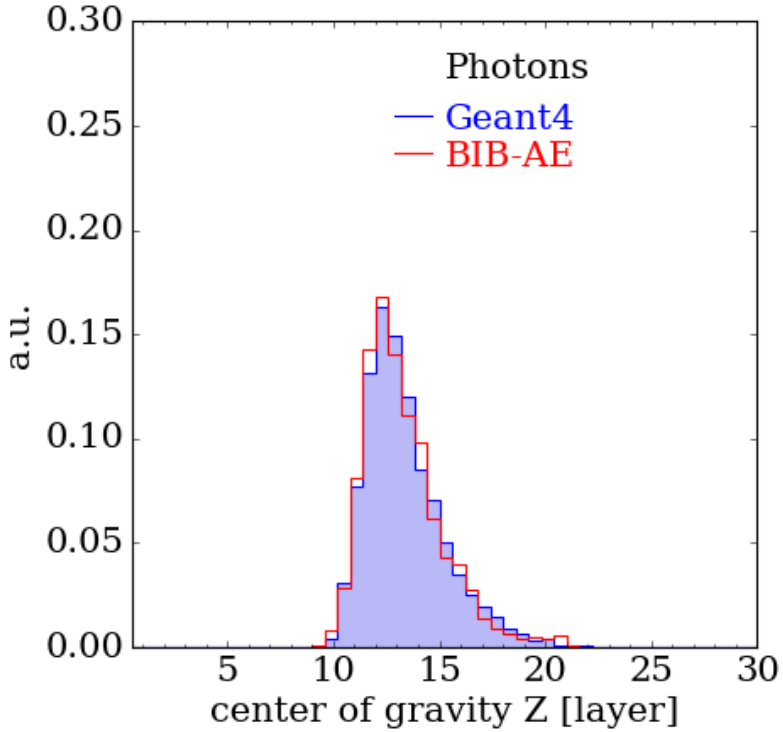
Center of gravity- 20 GeV

A 40 deg

A 60 deg

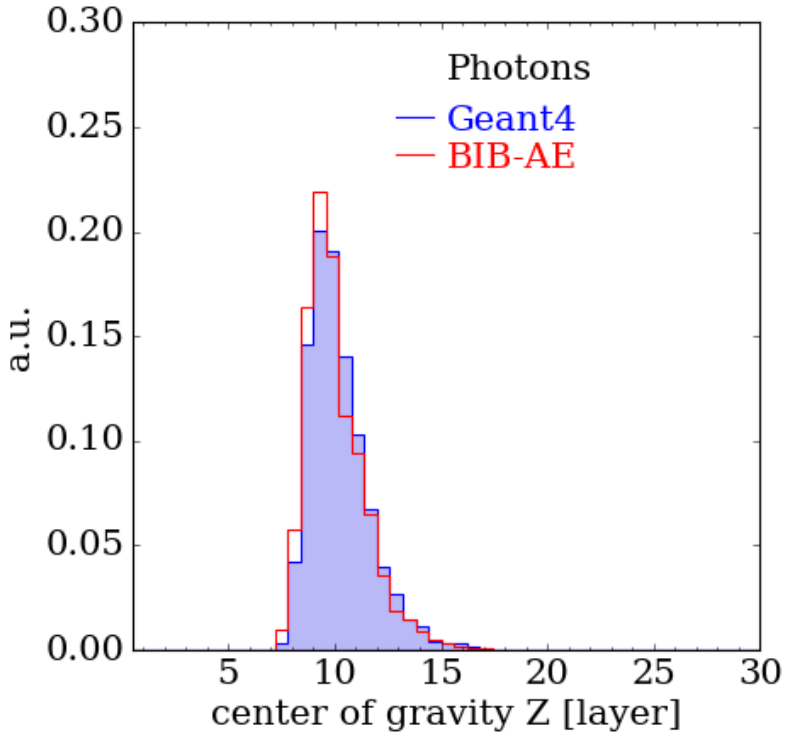


A 90 deg

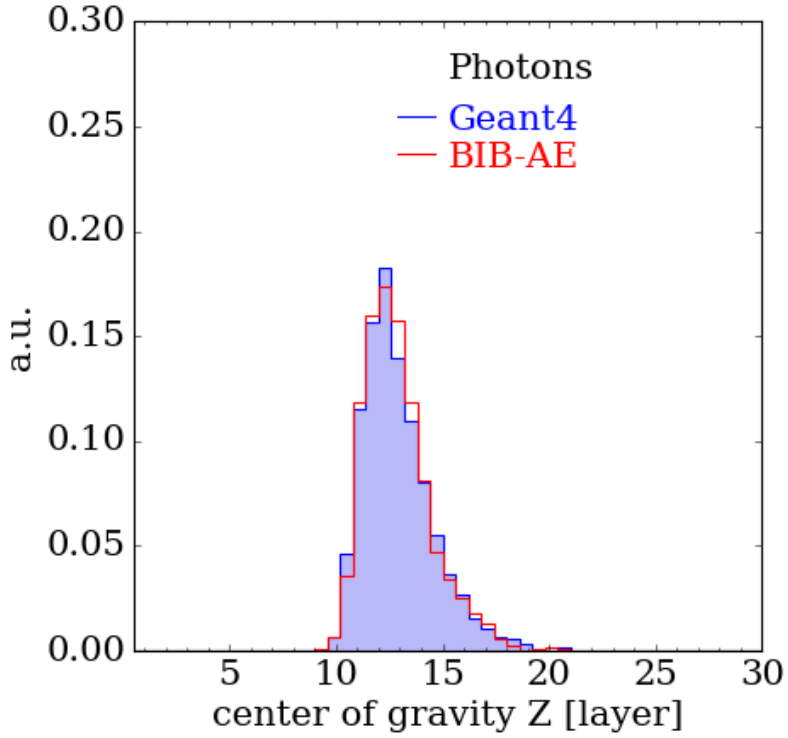


Center of gravity- 50 GeV

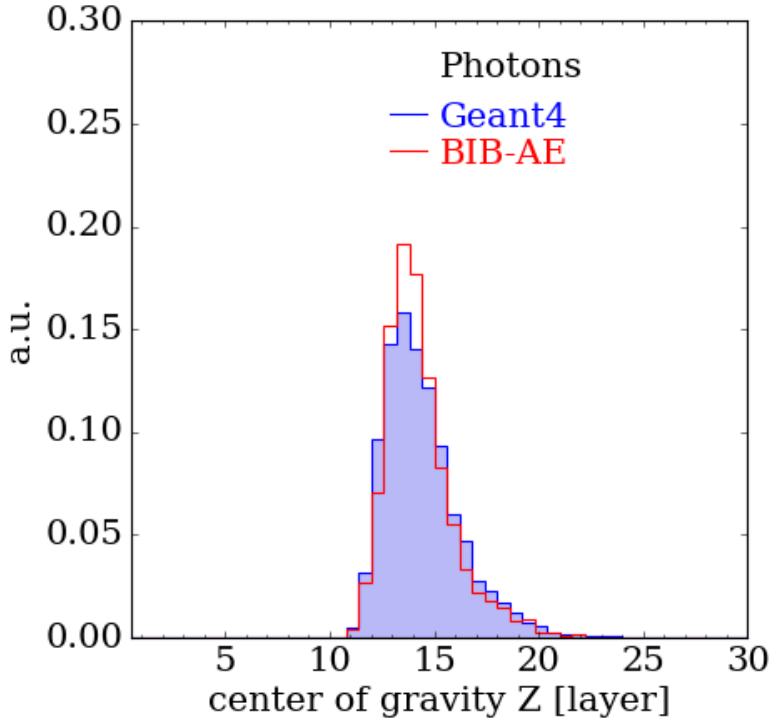
A 40 deg



A 60 deg

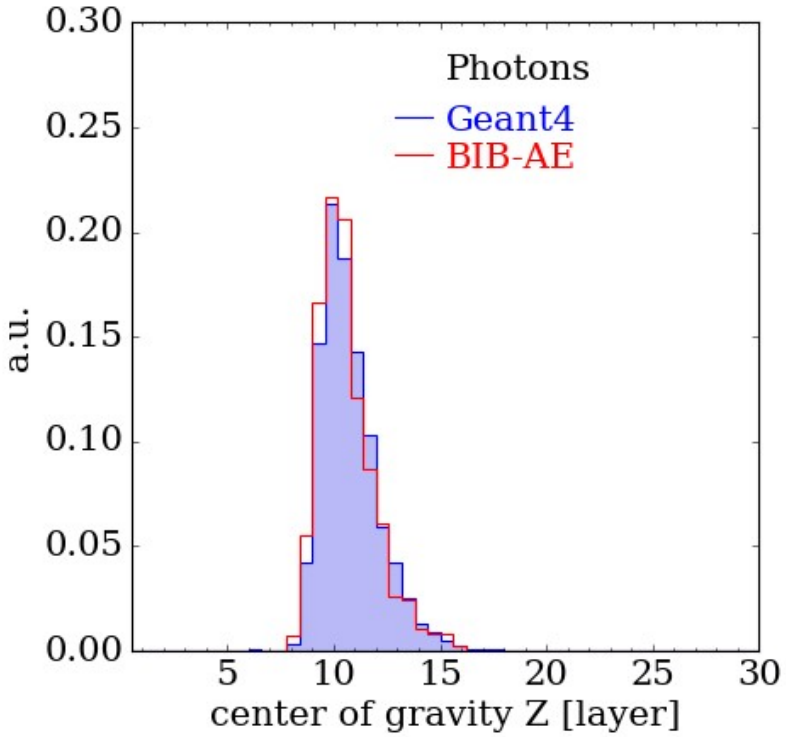


A 90 deg

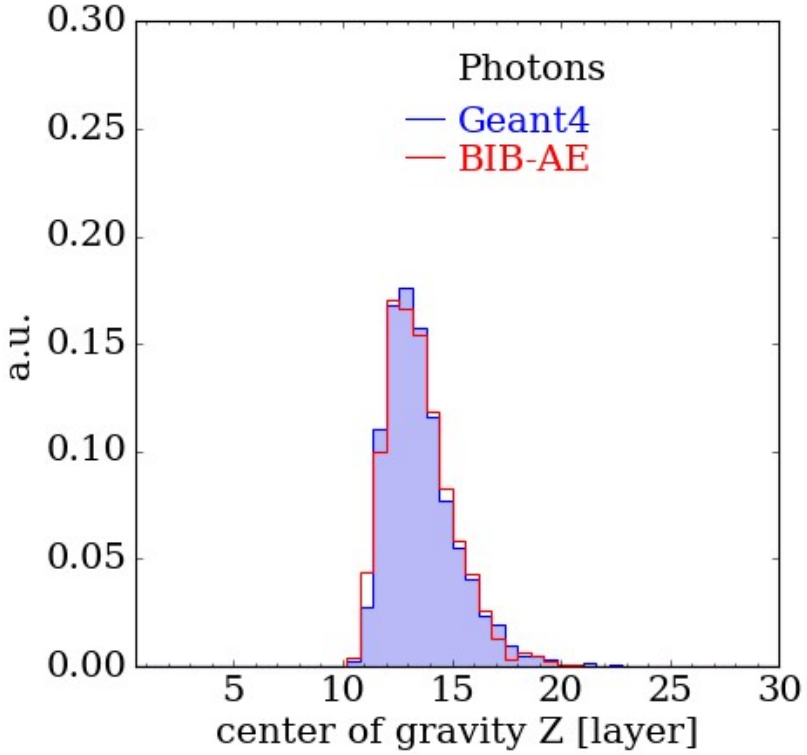


Center of gravity- 90 GeV

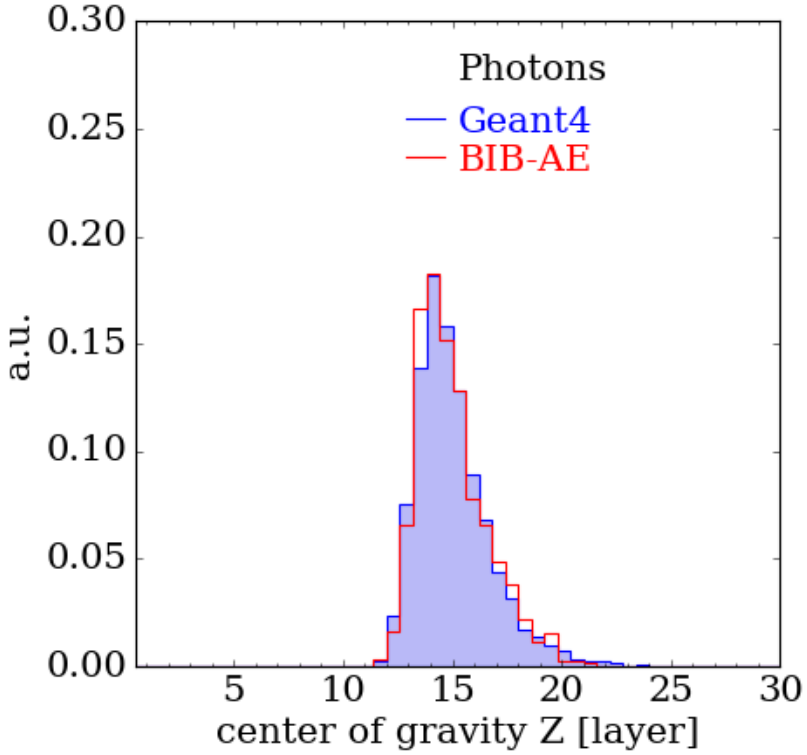
A 40 deg



A 60 deg



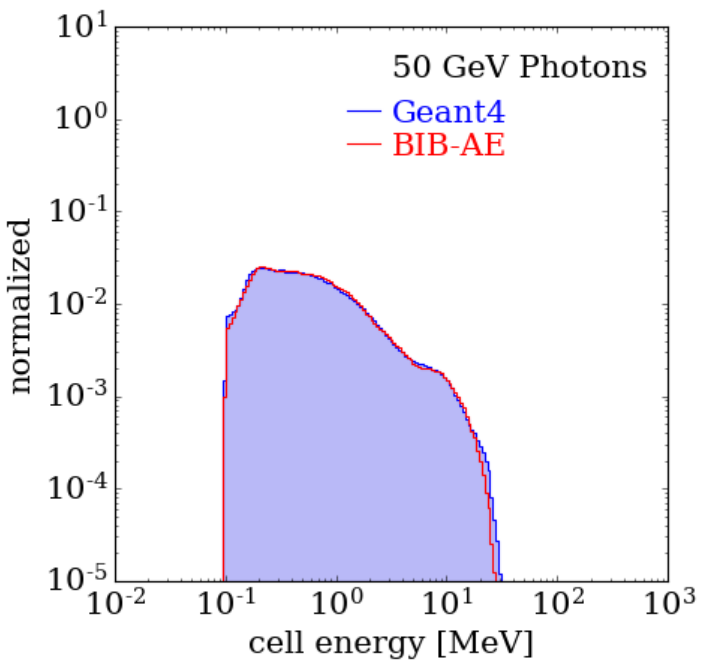
A 90 deg



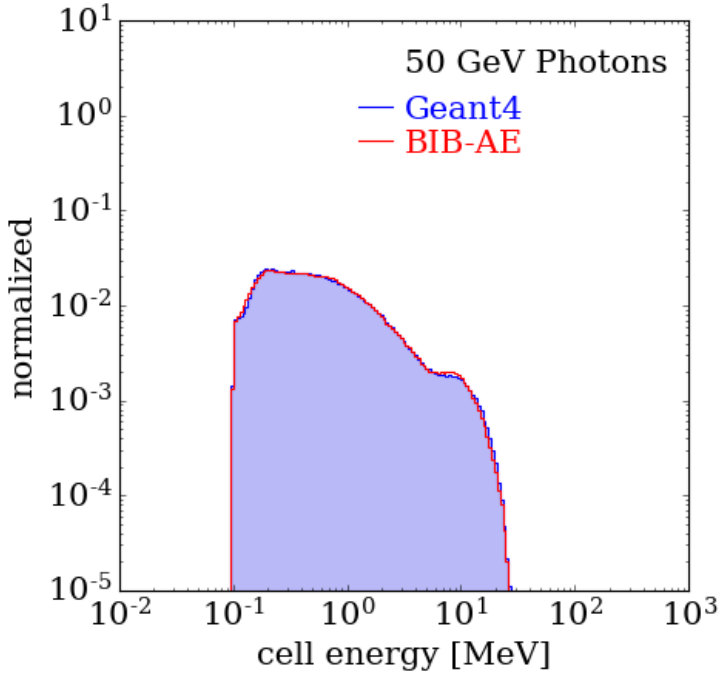
Cell energy- 20 GeV

A 40 deg

A 60 deg

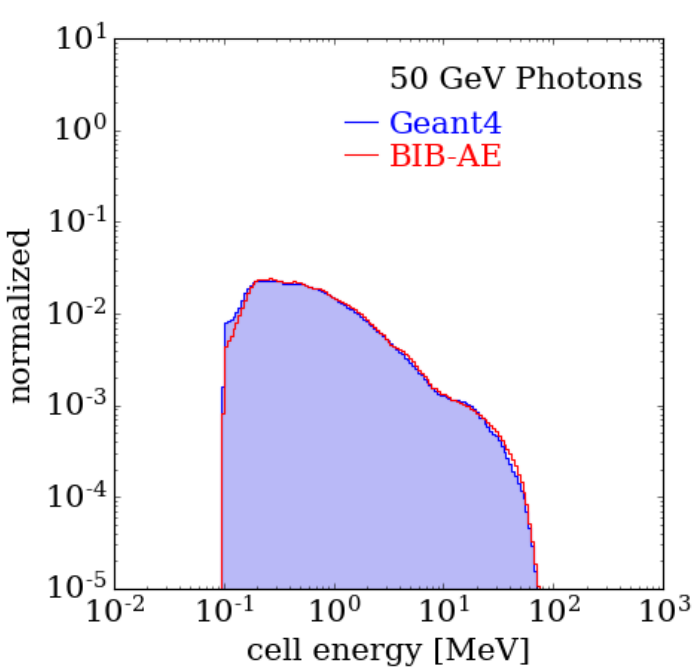


A 90 deg

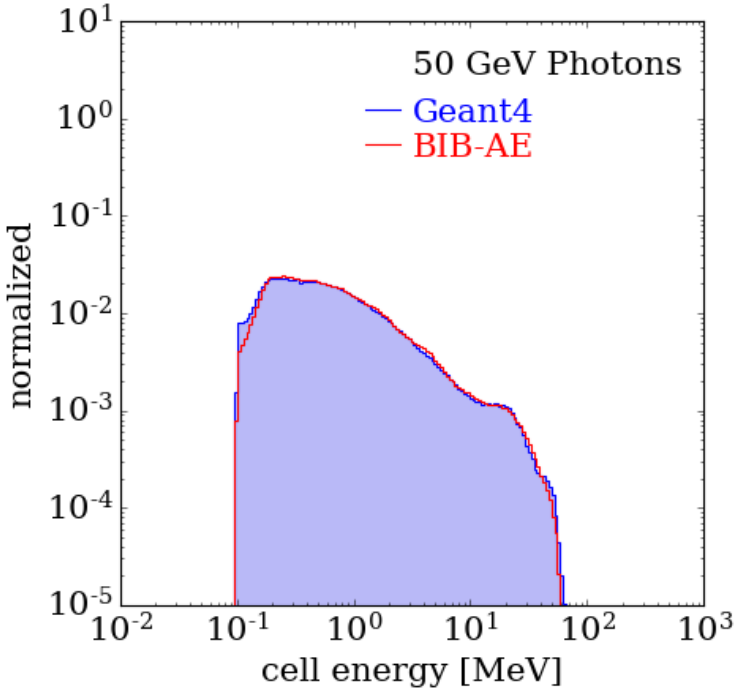


Cell energy- 50 GeV

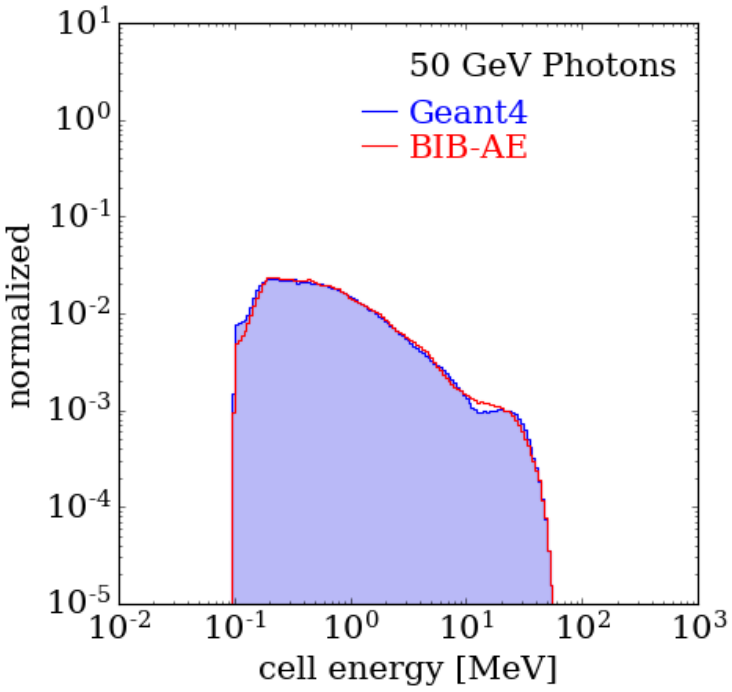
A 40 deg



A 60 deg

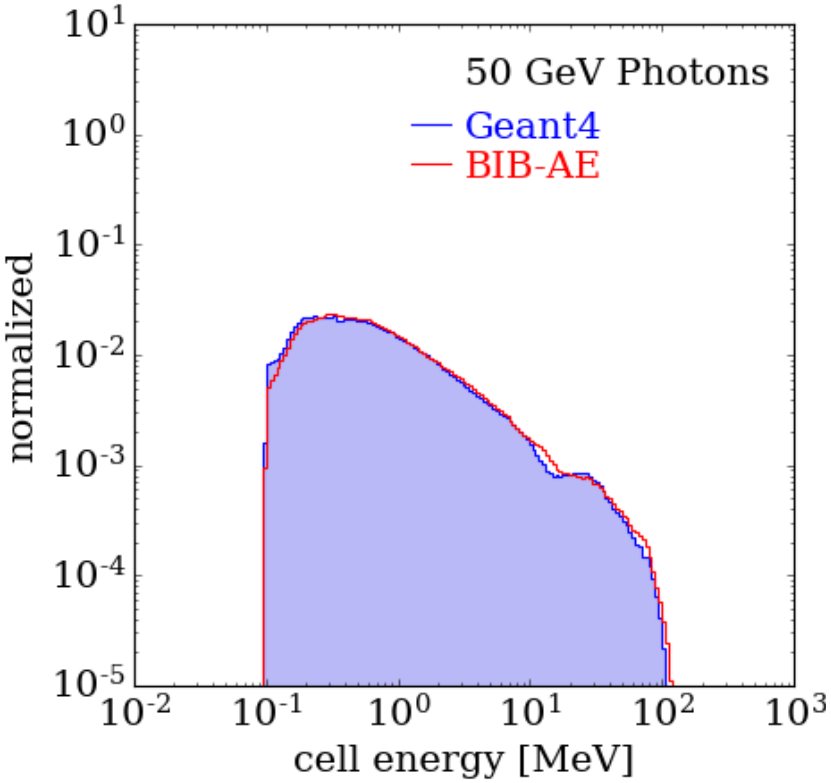


A 90 deg

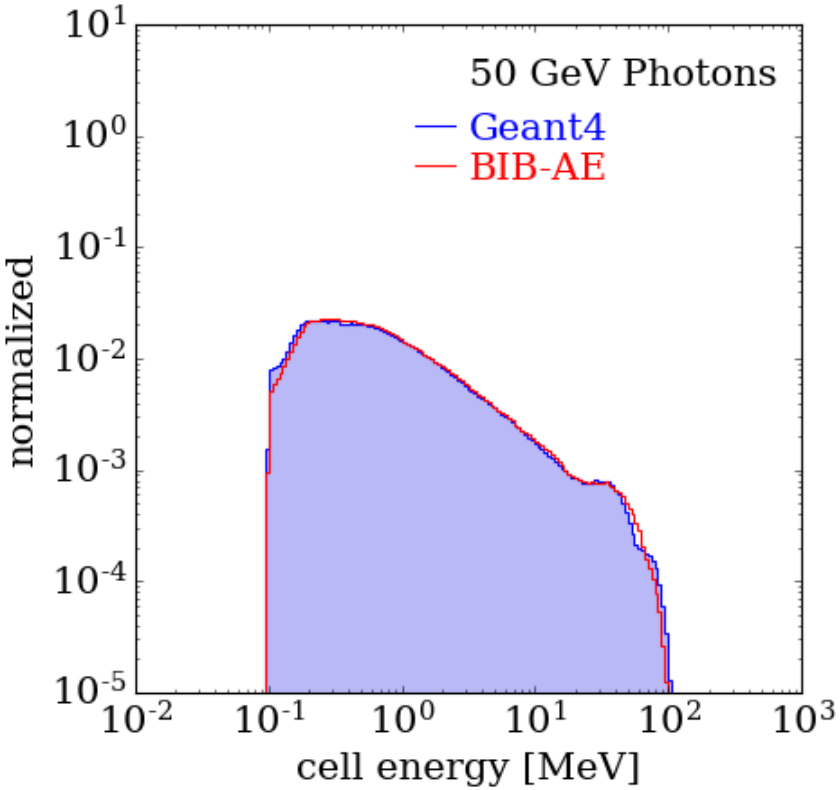


Cell energy- 90 GeV

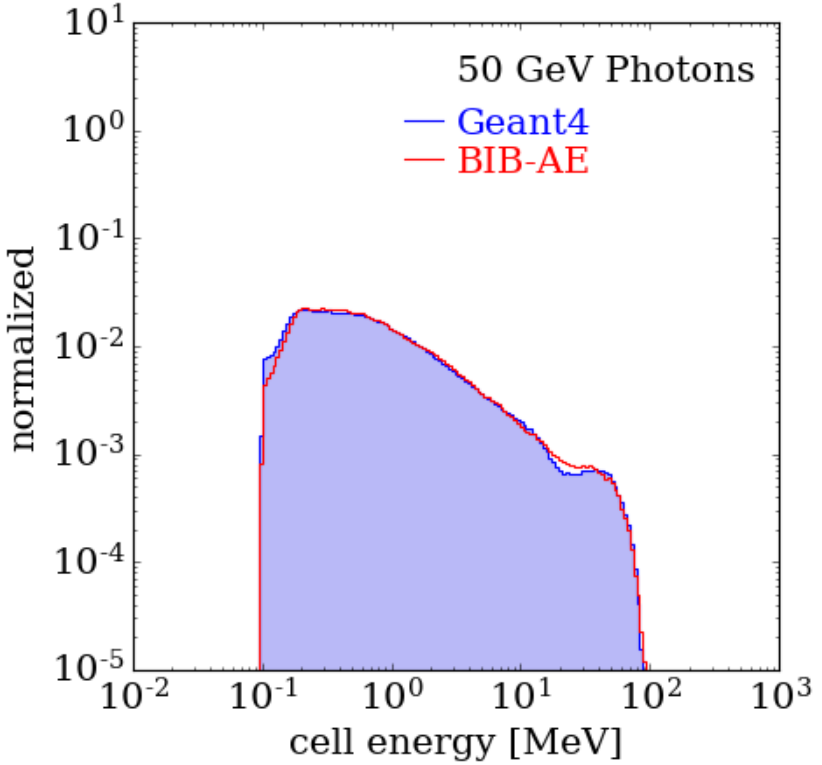
A 40 deg



A 60 deg

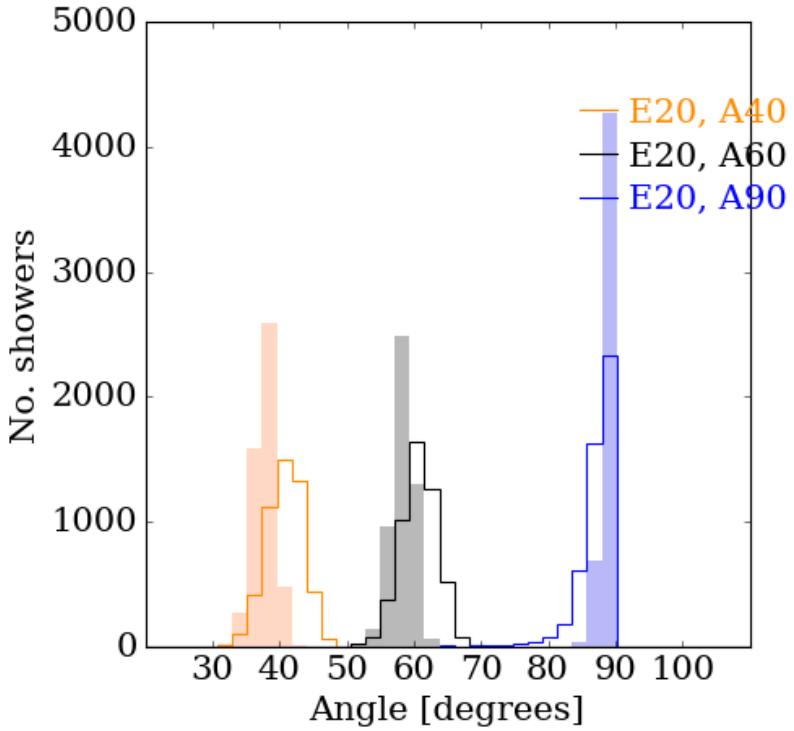


A 90 deg

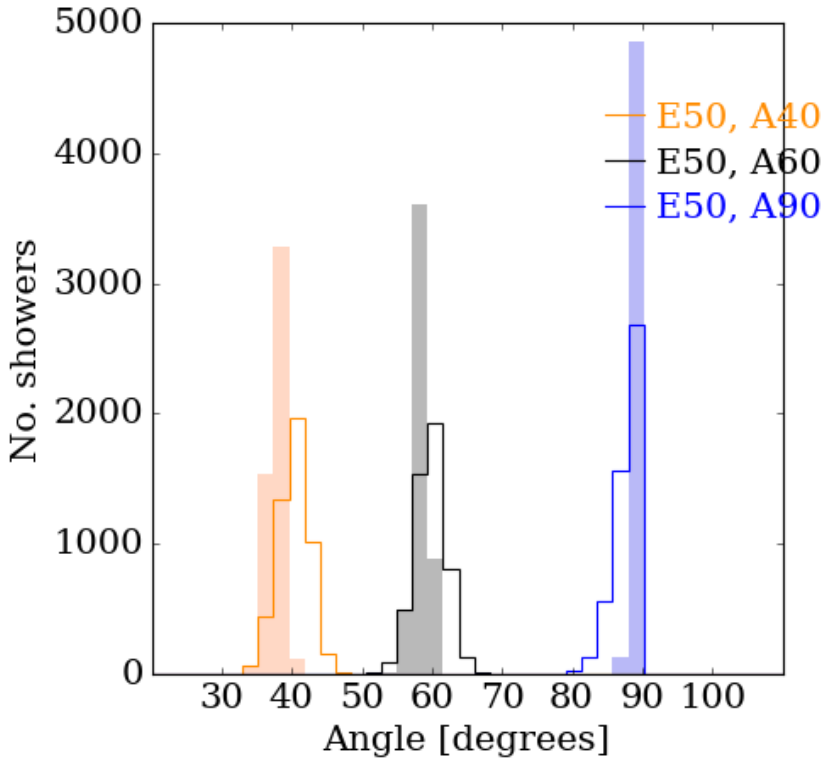


Angular distributions

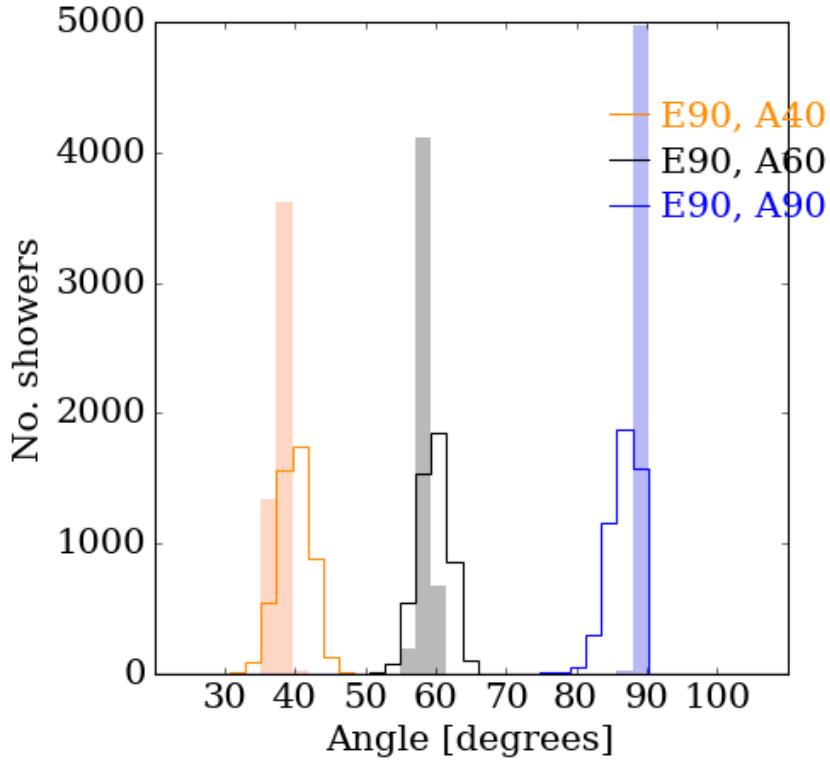
A 40 deg



A 60 deg



A 90 deg



Conclusions

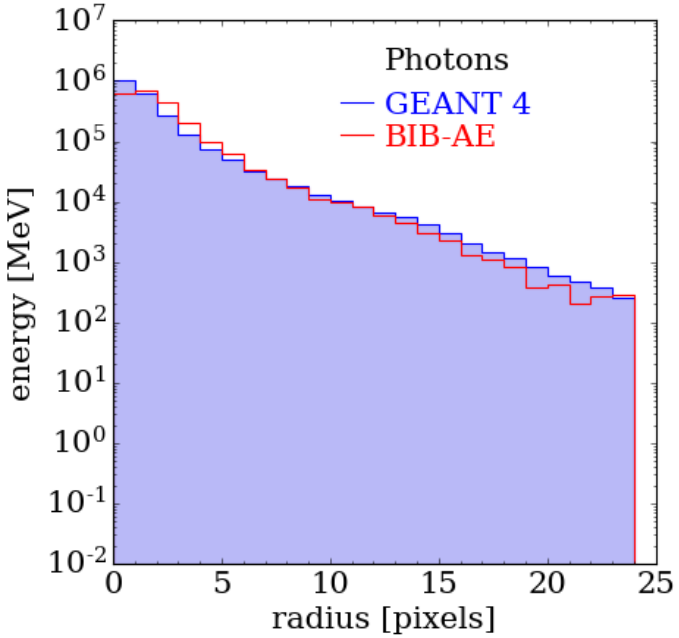
Still room to get Higher (fidelity)

- Distributions looking ok
- Particularly longitudinal and COG
- Post Processing still works- perhaps still some progress from ongoing training
- Angles are not great- room for improvement there

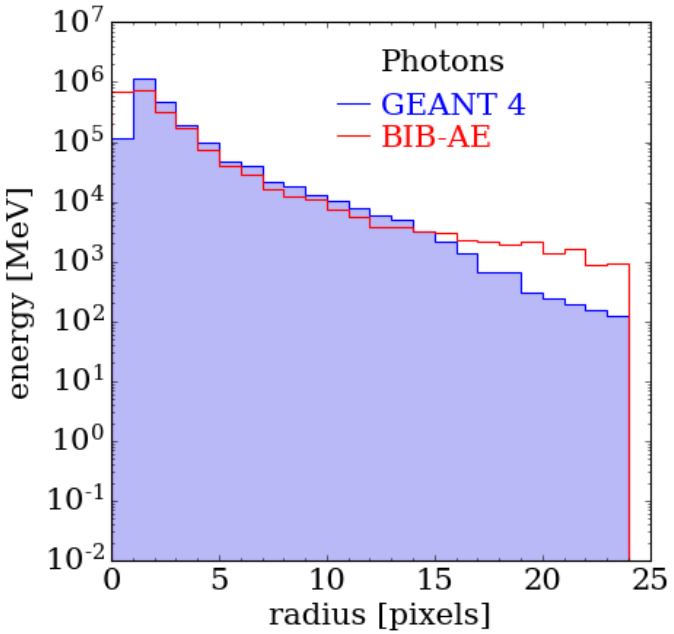
Radial profile- 20 GeV NOT YET VERIFIED!!!

A 40 deg

A 60 deg

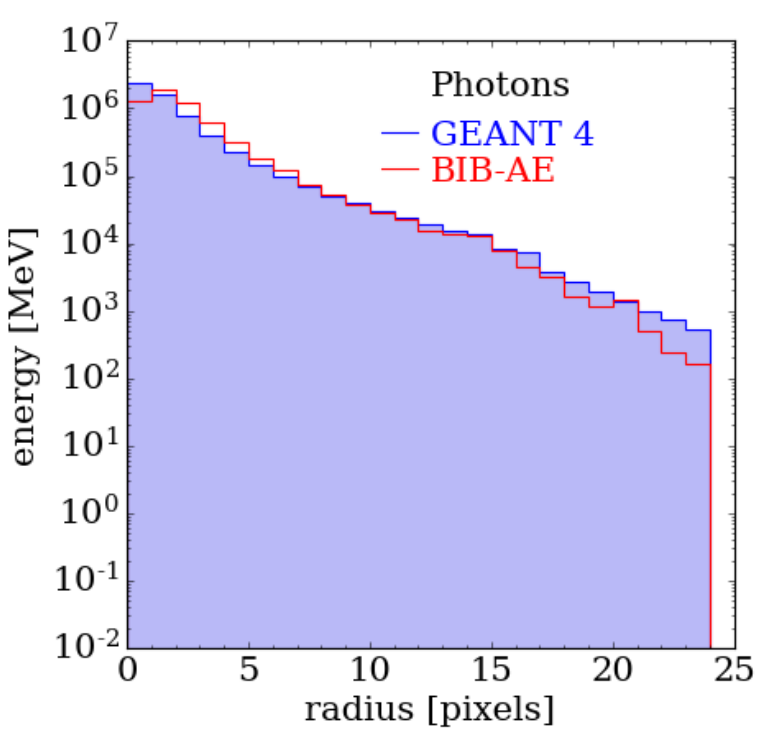


A 90 deg

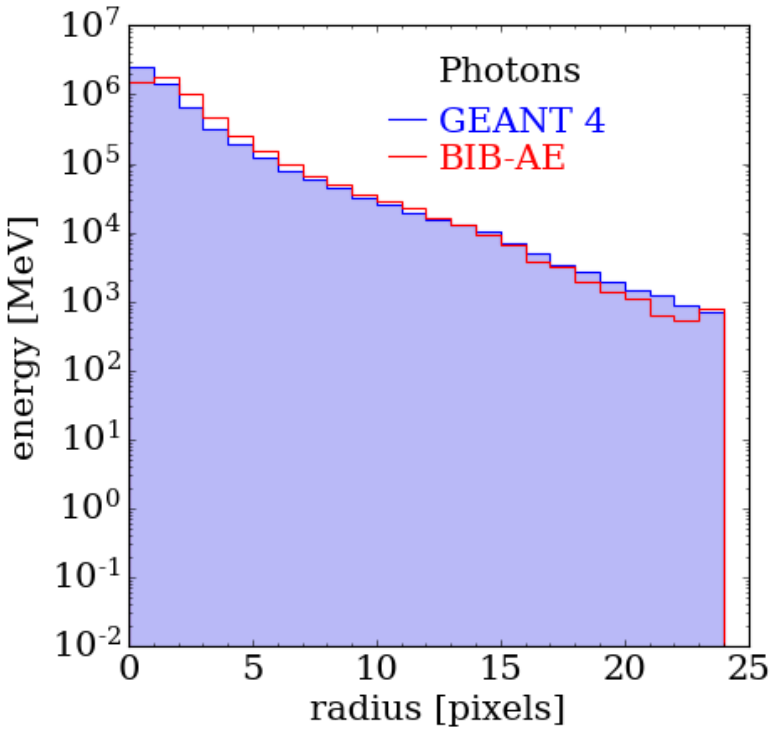


Radial profile- 50 GeV NOT YET VERIFIED!!!

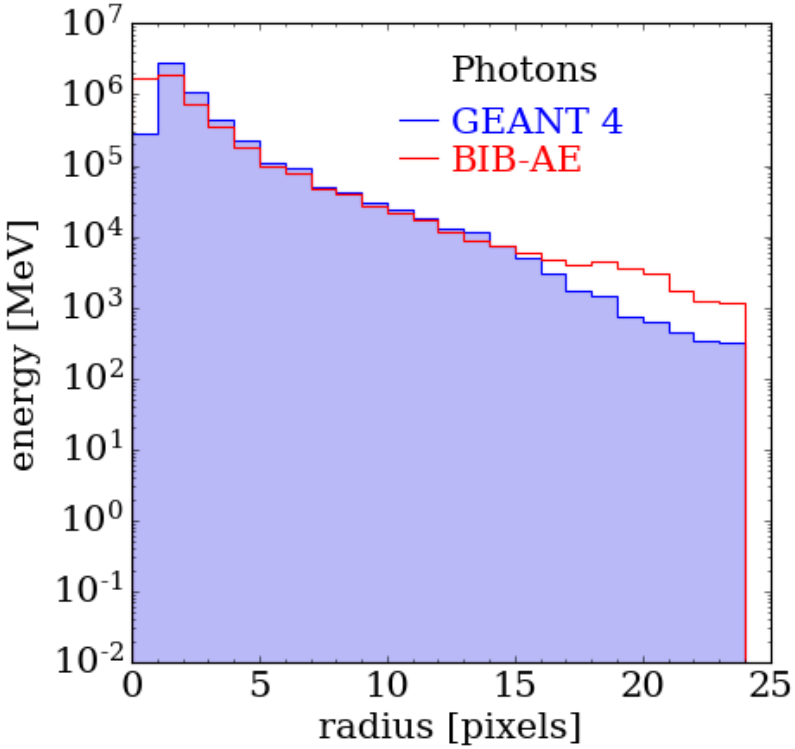
A 40 deg



A 60 deg

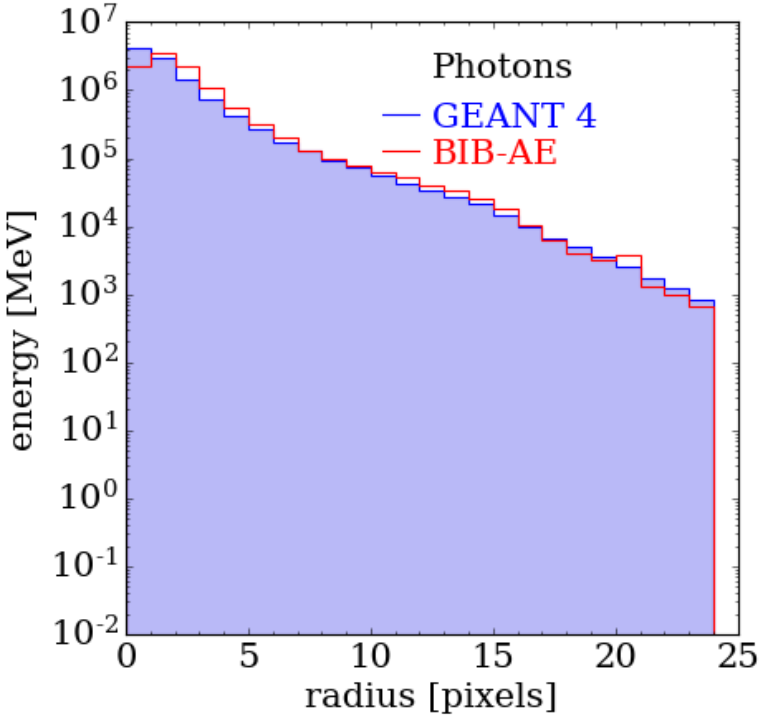


A 90 deg

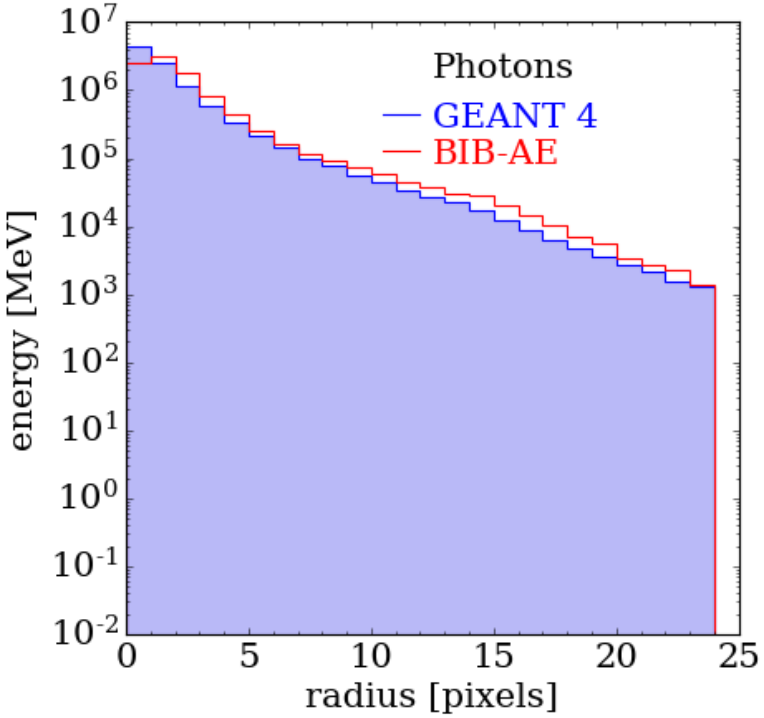


Radial profile- 90 GeV NOT YET VERIFIED!!!

A 40 deg



A 60 deg



A 90 deg