Updates

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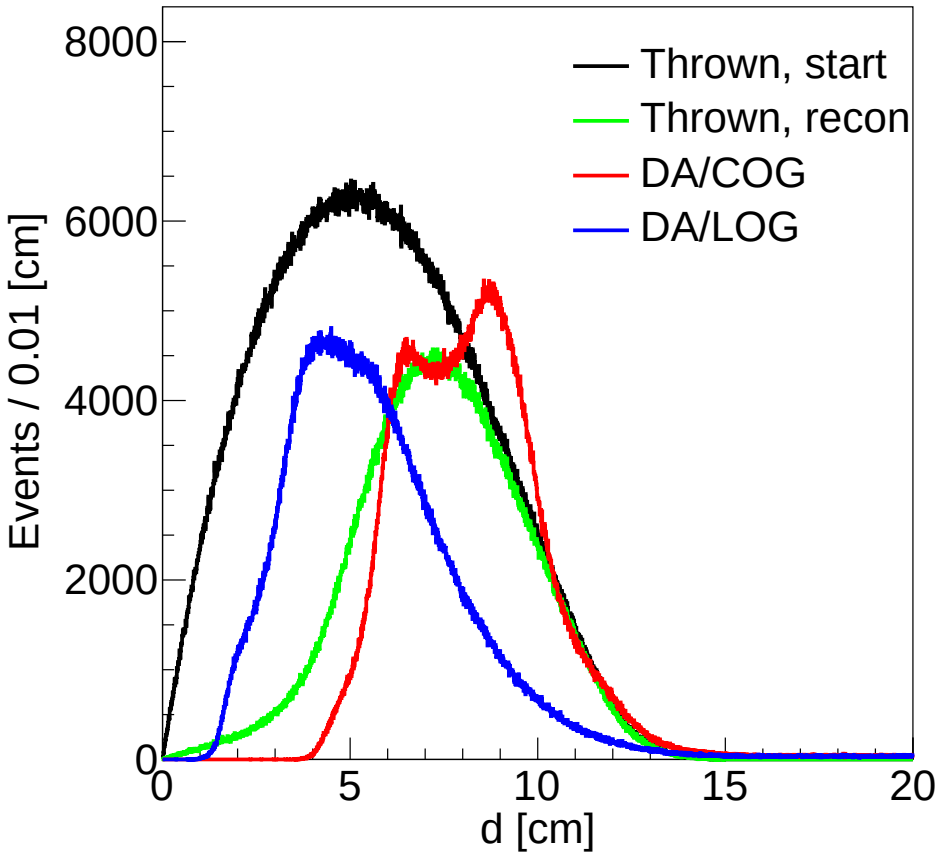
for the GlueX Collaboration

July 22, 2022

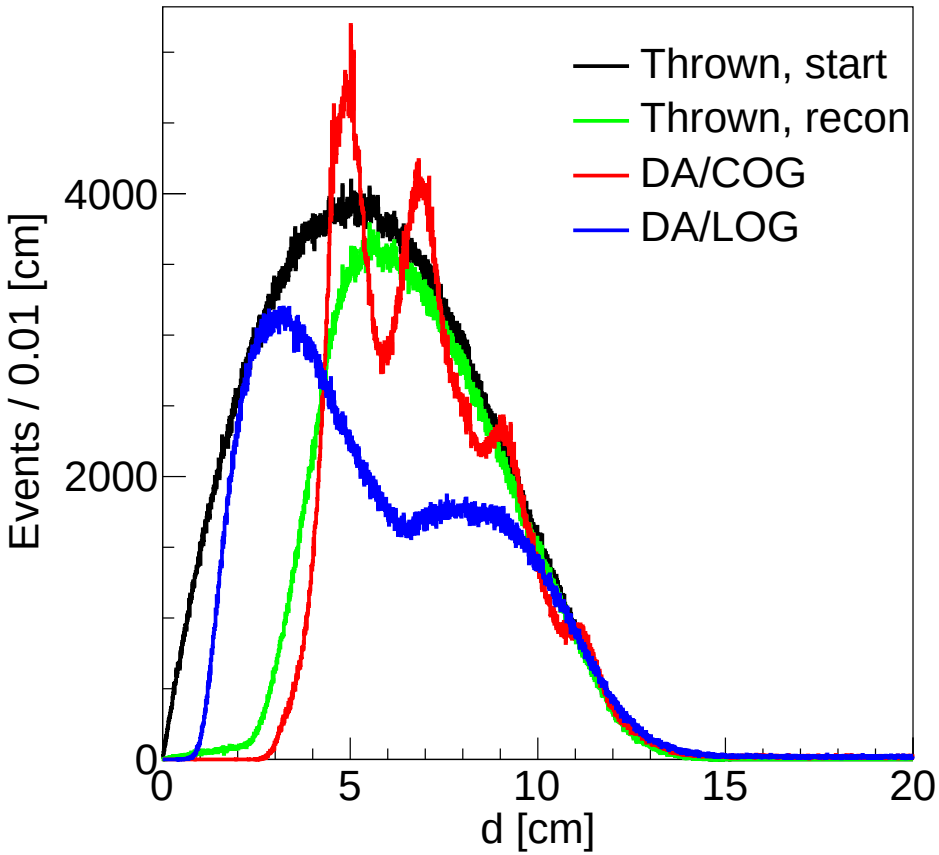
Default Algorithm and distance, previously

- Two photons of 1 and 3 GeV thrown simultaneously into FCAL1/2
- Two clusters (only) events

- FCAL1



- FCAL2

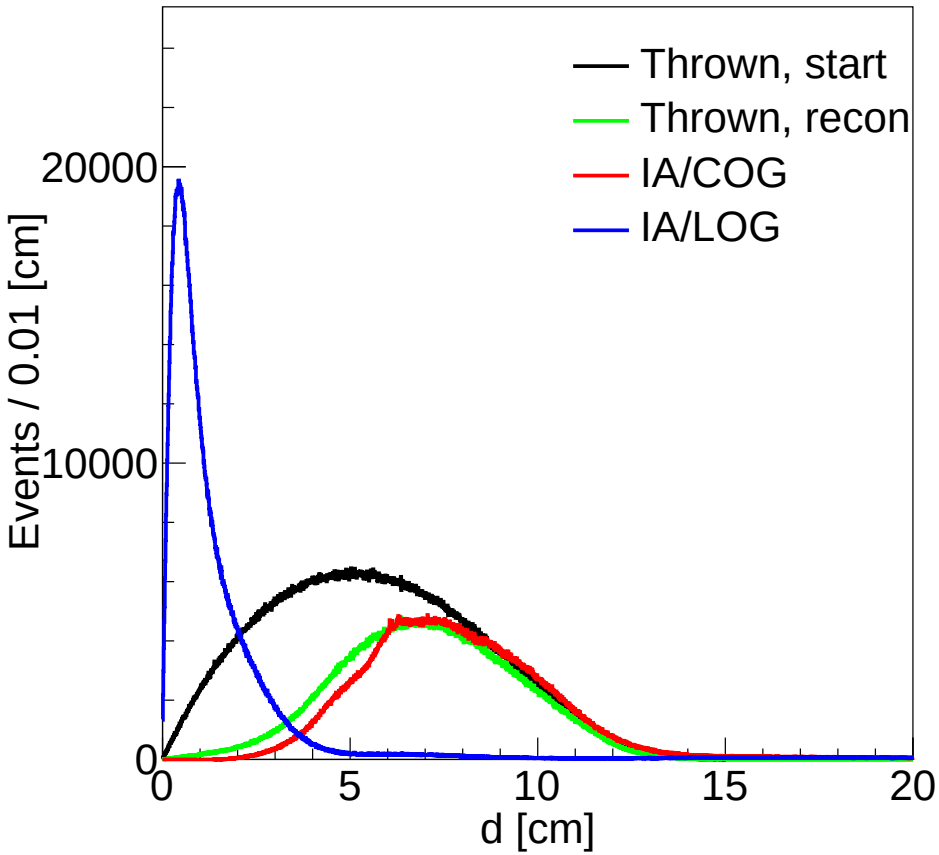


Default Algorithm is doing a bad job at this extreme conditions

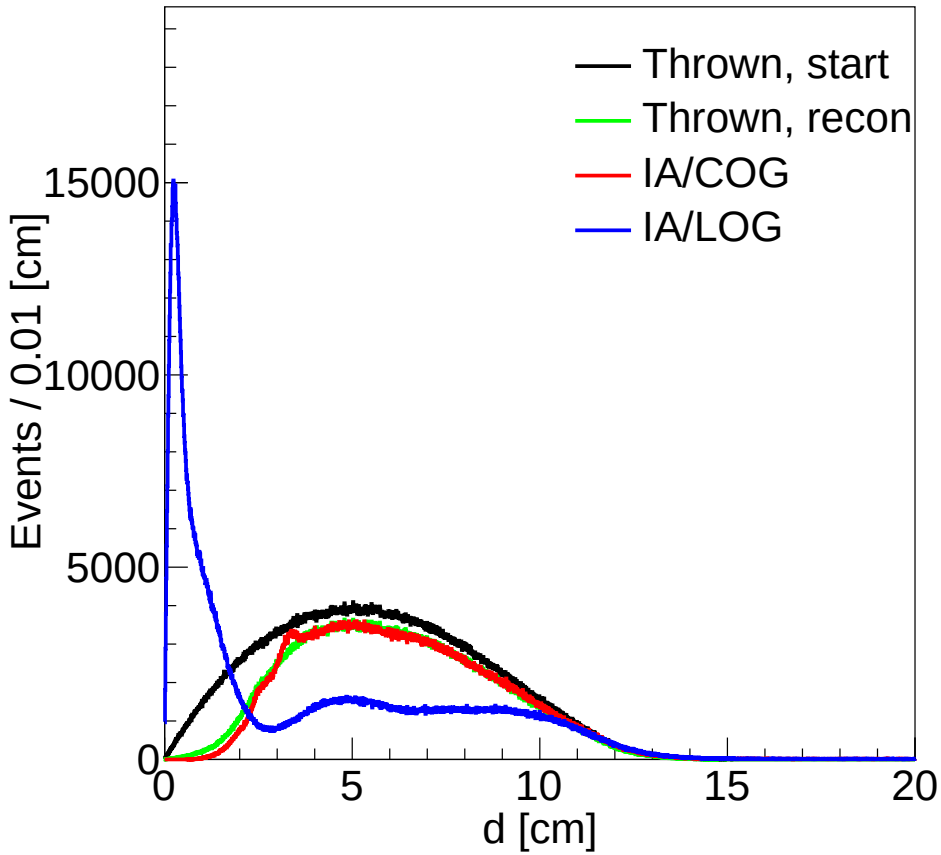
Island Algorithm and distance, previously

- Two photons of 1 and 3 GeV thrown simultaneously into FCAL1/2
- Two clusters (only) events

- FCAL1



- FCAL2

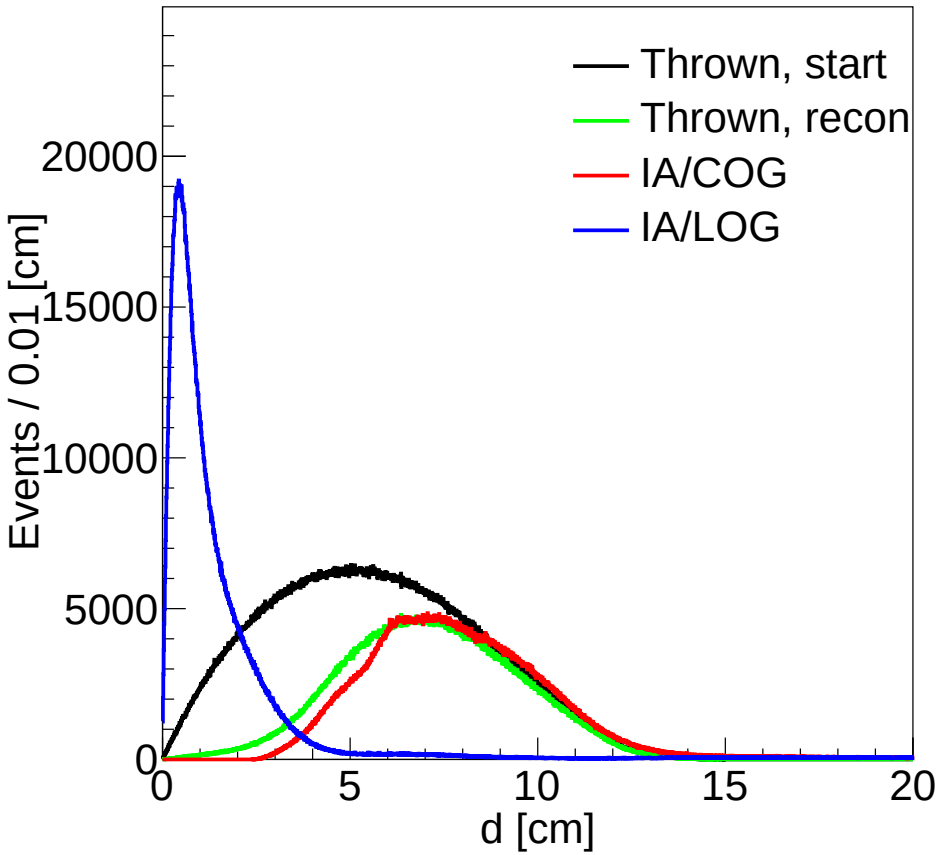


Island Algorithm appears doing a good job at this extreme conditions

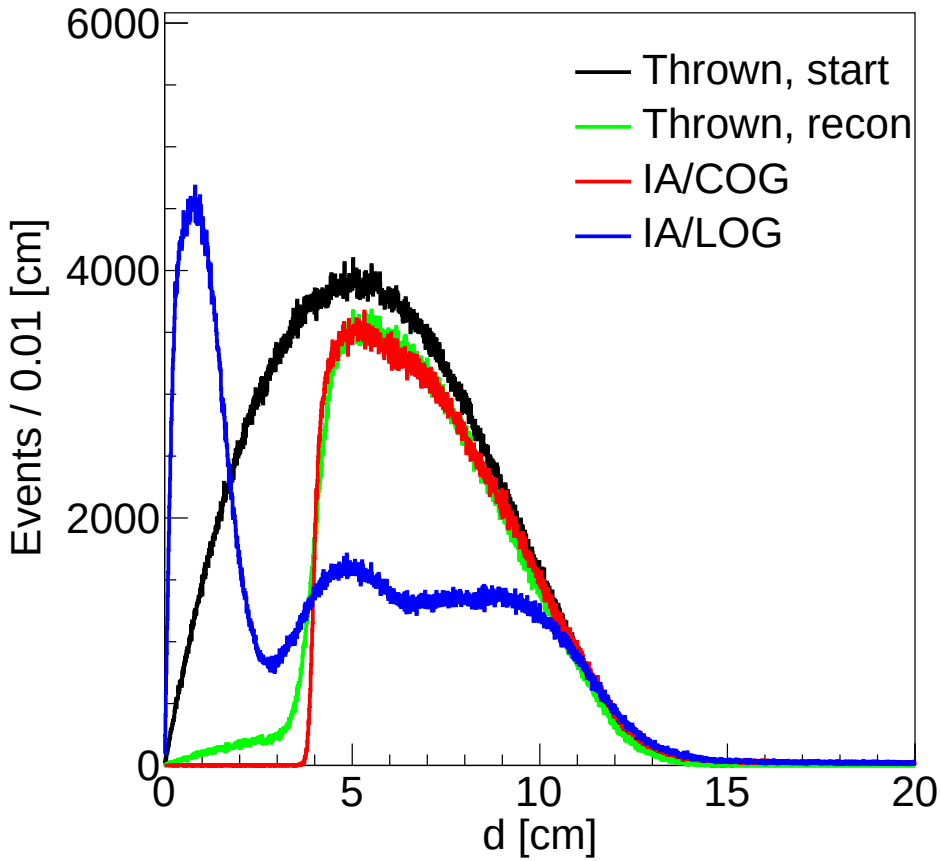
Island Algorithm and distance, now

- Two photons of 1 and 3 GeV thrown simultaneously into FCAL1/2
- Two clusters (only) events

- FCAL1



- FCAL2



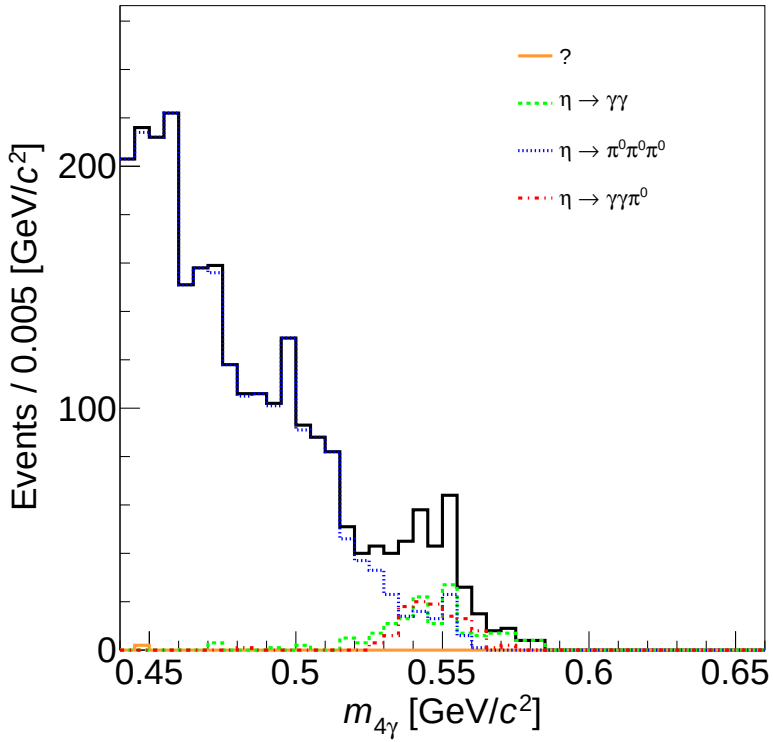
Island Algorithm appears doing a good job at this extreme conditions

DA, reconstruct $\eta \to \gamma\gamma\pi^0$ and recoil proton

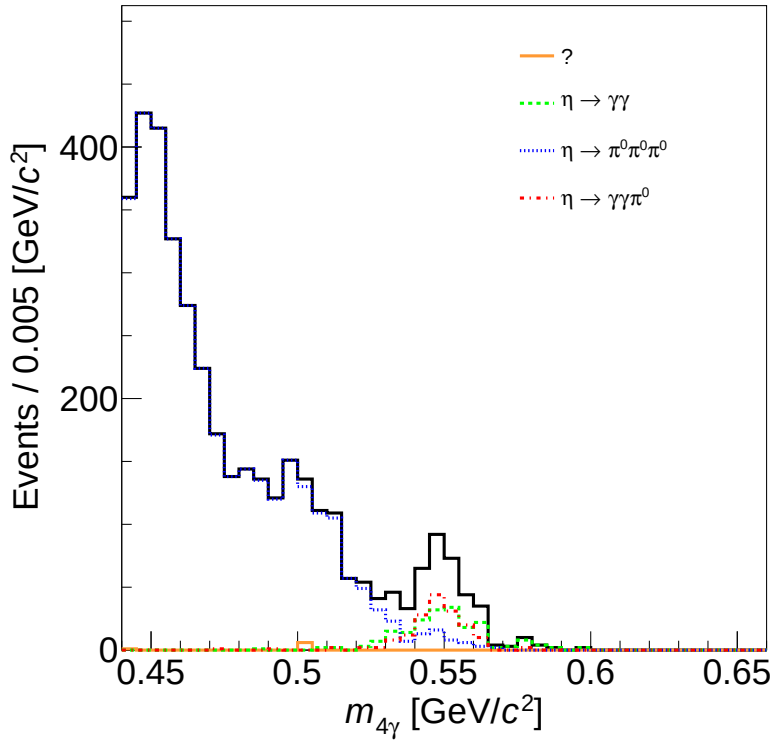
Selection criteria:

- Default ReactionFilter time selection criteria
- π^0 selected by a χ^2-test on the diphoton invariant mass
- Elasticity
- Mass conservation
- $\pi^0\pi^0$, $\eta\eta$, and $\pi^0\eta$ veto applied
- Coplanarity
- All photons in FCAL with at least one in insert (FCAL2) or below 4.5^0 (FCAL1)

- FCAL1 (DA-COG)



- FCAL2 (DA-COG)



$\eta \to \gamma\gamma$ "peaking" and $\eta \to \pi^0\pi^0\pi^0$ "smooth" backgrounds

DA vs. IA, reconstruct $\eta \to \gamma\gamma\pi^0$ and recoil proton

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- Elasticity
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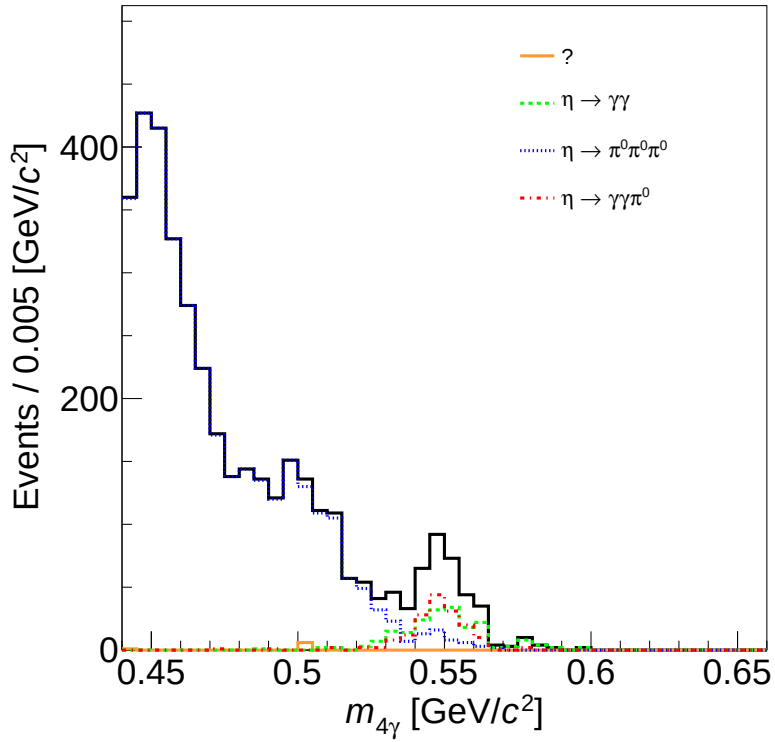
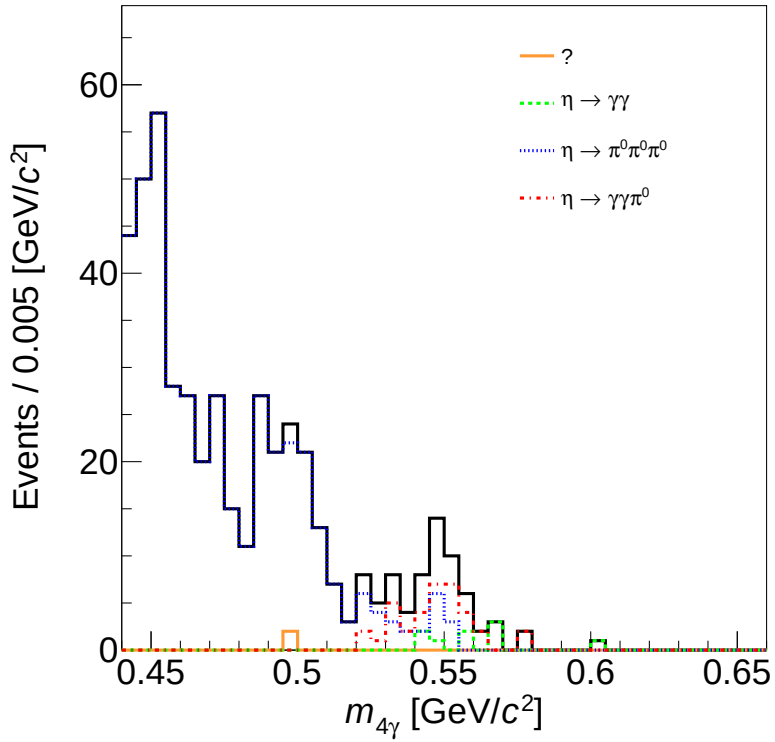
- $\pi^0\pi^0$, $\eta\eta$, and $\pi^0\eta$ veto applied
- Coplanarity
- All photons in FCAL with at least one in insert (FCAL2) or below 4.5^0 (FCAL1)

- FCAL2 (DA-COG)



- FCAL2 (IA-COG)



$\eta \to \gamma\gamma$ "peaking" and $\eta \to \pi^0\pi^0\pi^0$ "smooth" backgrounds

Current status, reconstruct $\eta \to \gamma\gamma\pi^0$ and recoil proton

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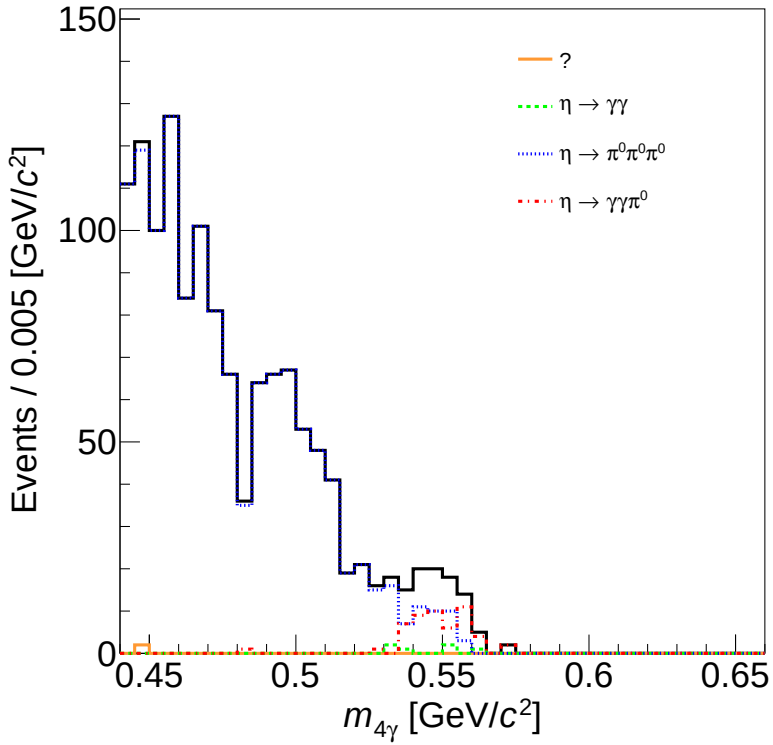
- TOF veto

- FCAL2 (DA-COG)



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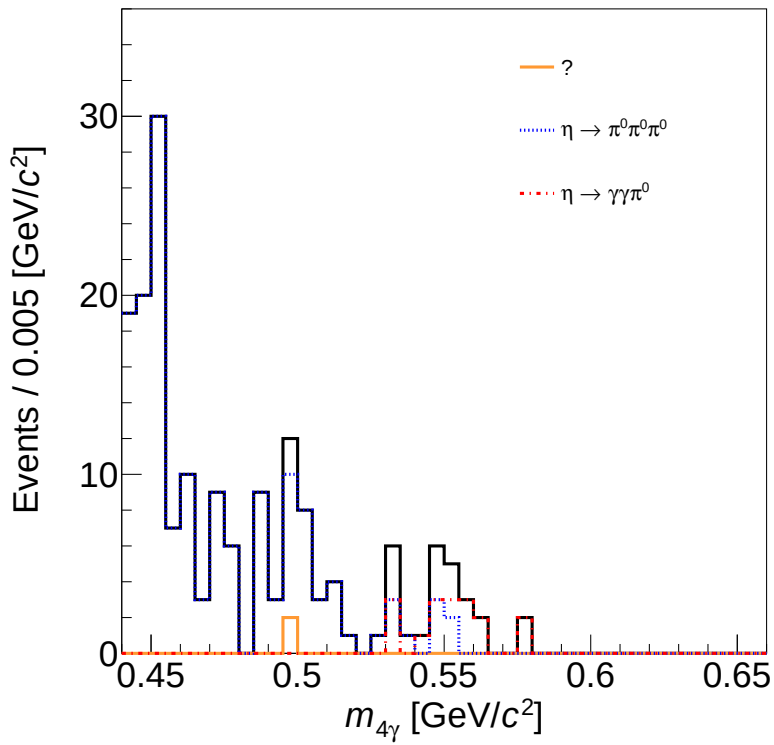

Still $\eta \to \pi^0\pi^0\pi^0$ "smooth" backgrounds but gamma converstion from $\eta \to \gamma\gamma$ strongly reduced

Current status, reconstruct $\eta \to \gamma\gamma\pi^0$ and recoil proton

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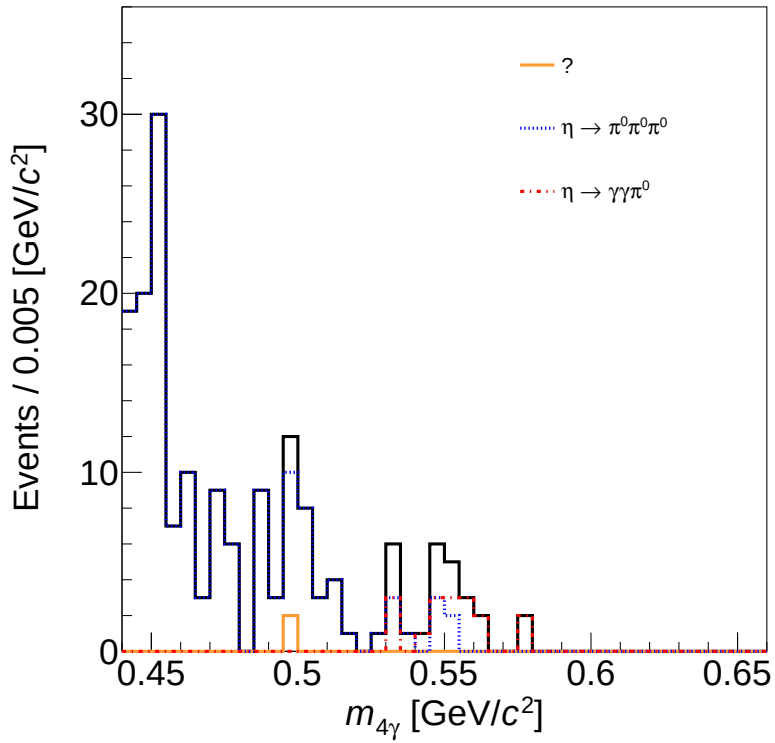
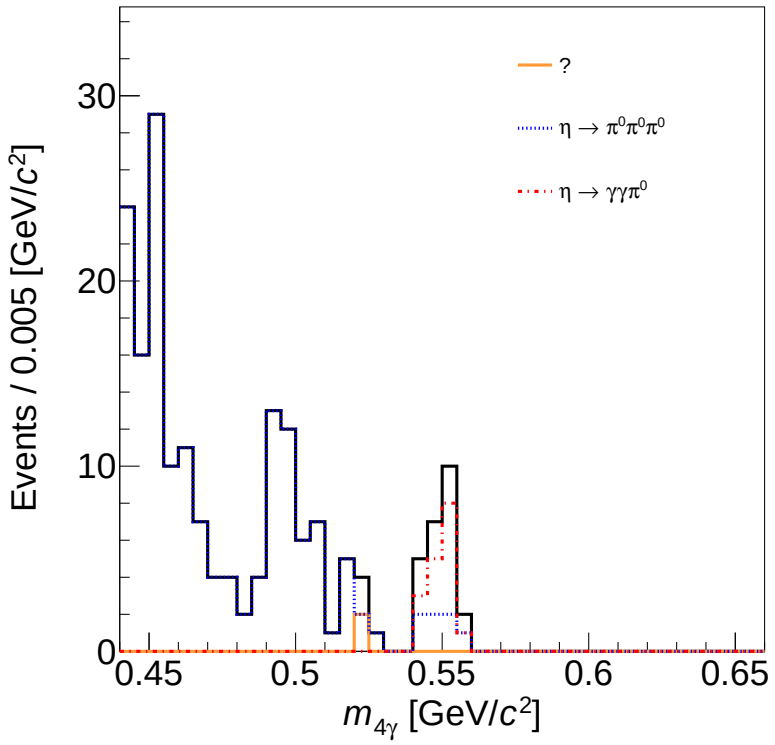
- FCAL2 (IA-COG-measured)



- FCAL2 (IA-COG-fitted)



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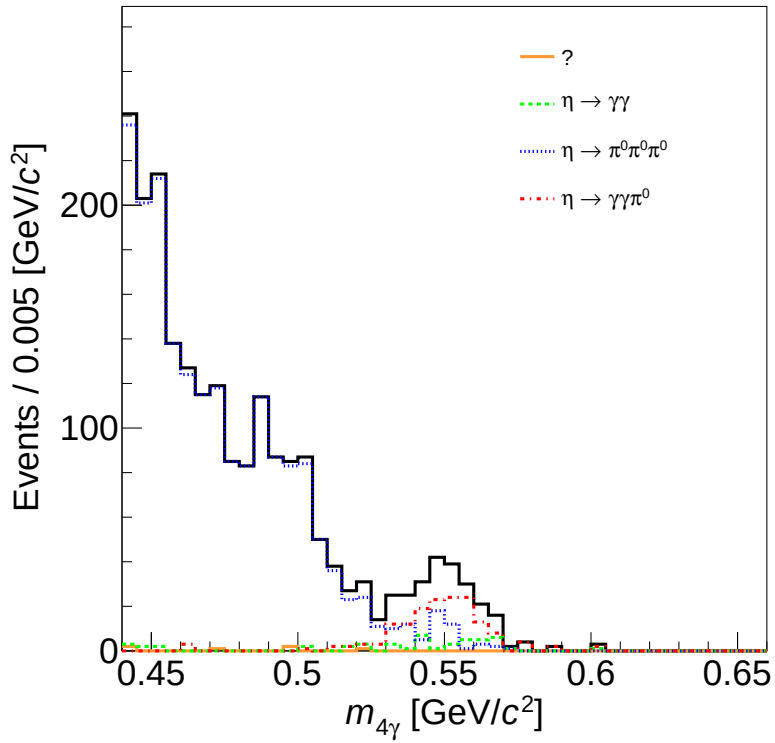

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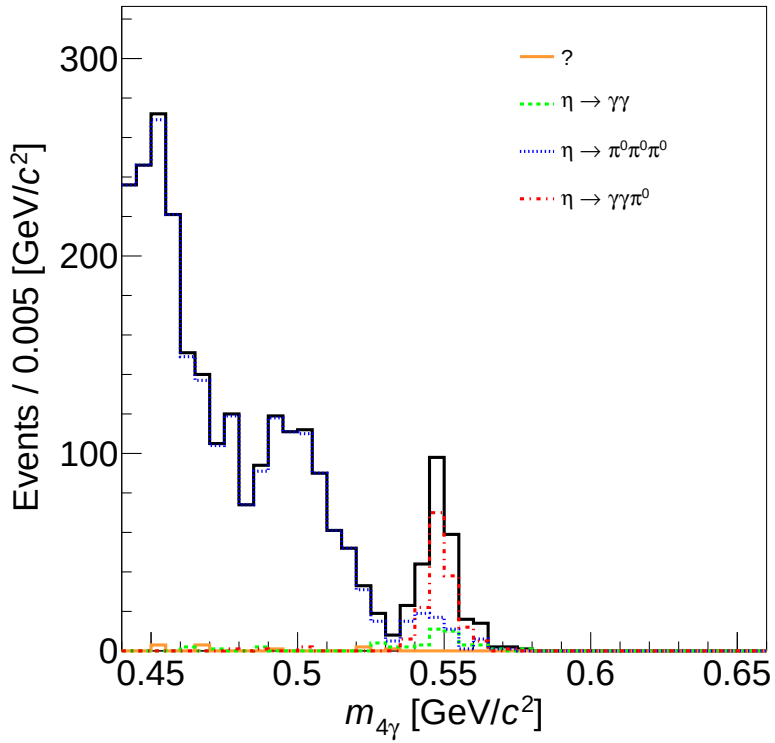

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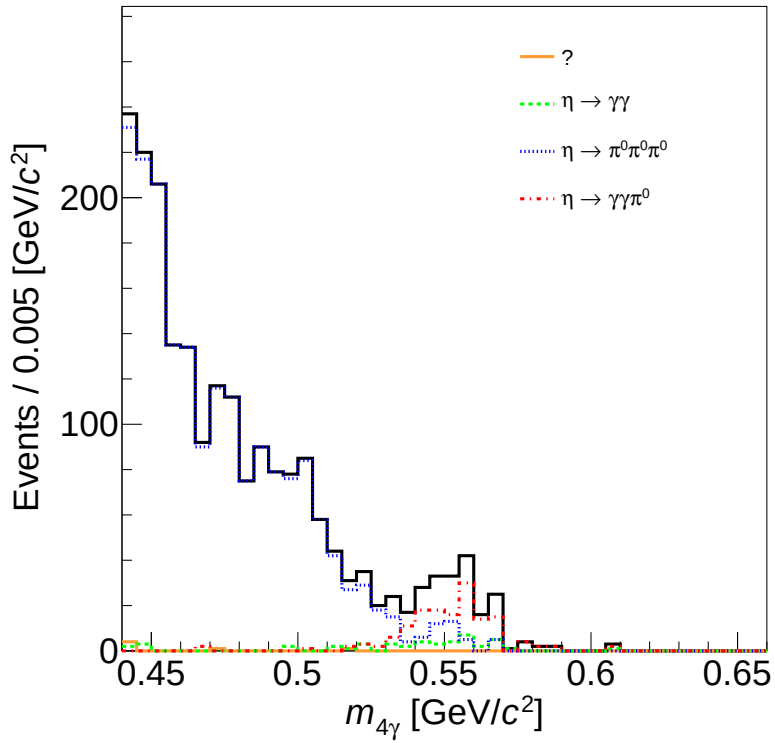
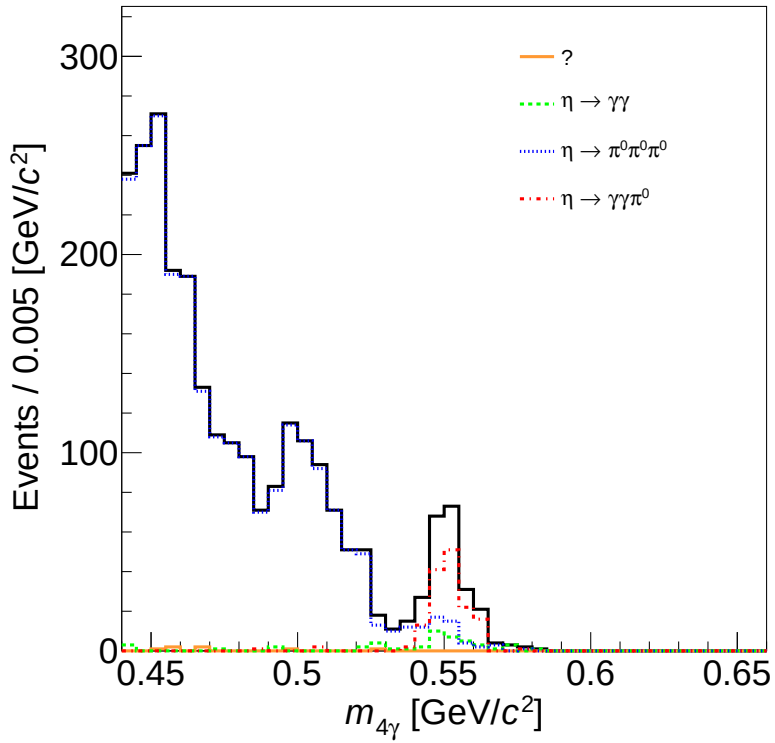
- FCAL2 (IA-LOG-measured)



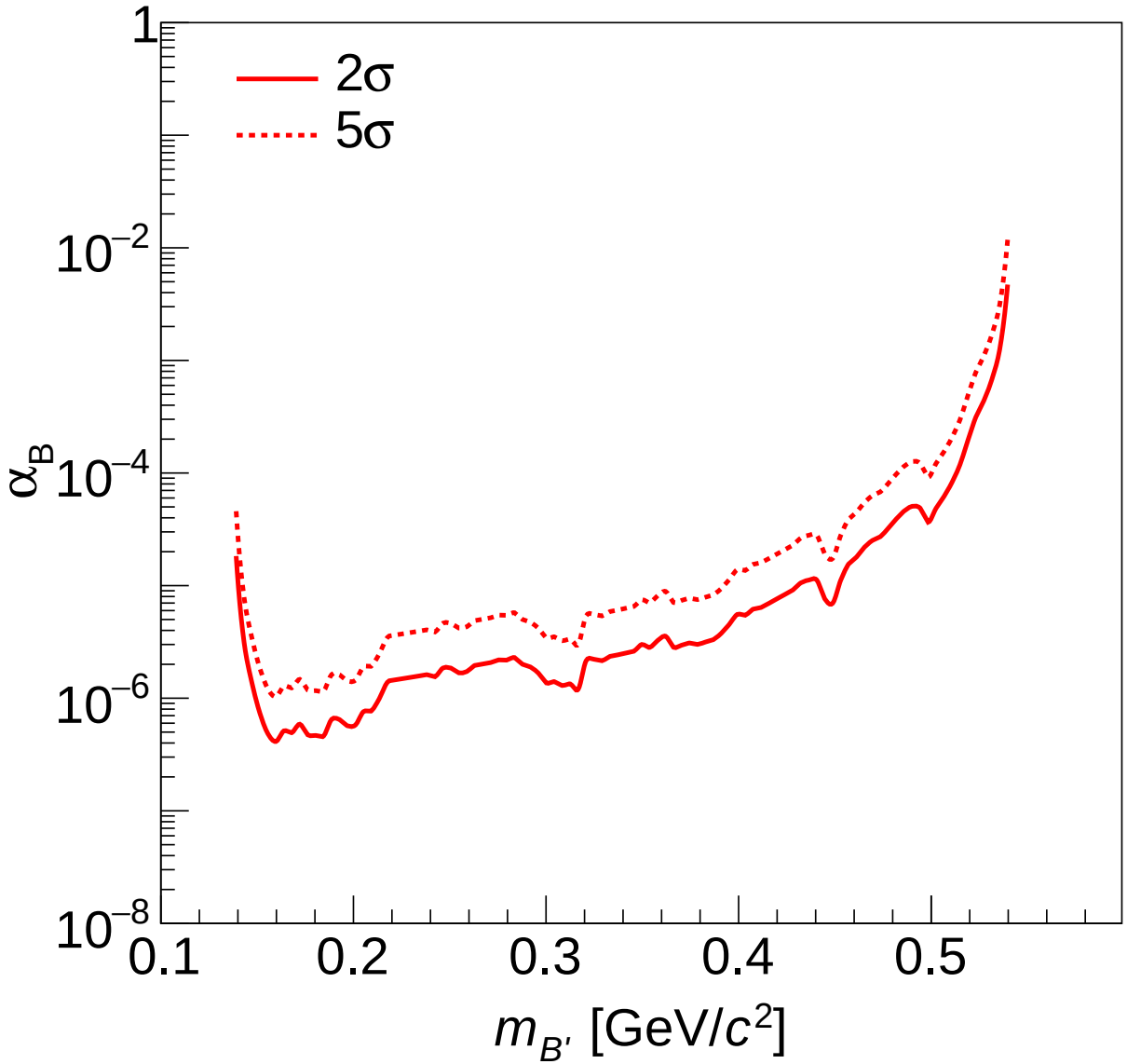
- FCAL2 (IA-LOG-fitted)



Still $\eta \to \pi^0\pi^0\pi^0$ "smooth" backgrounds but gamma converstion from $\eta \to \gamma\gamma$ strongly reduced

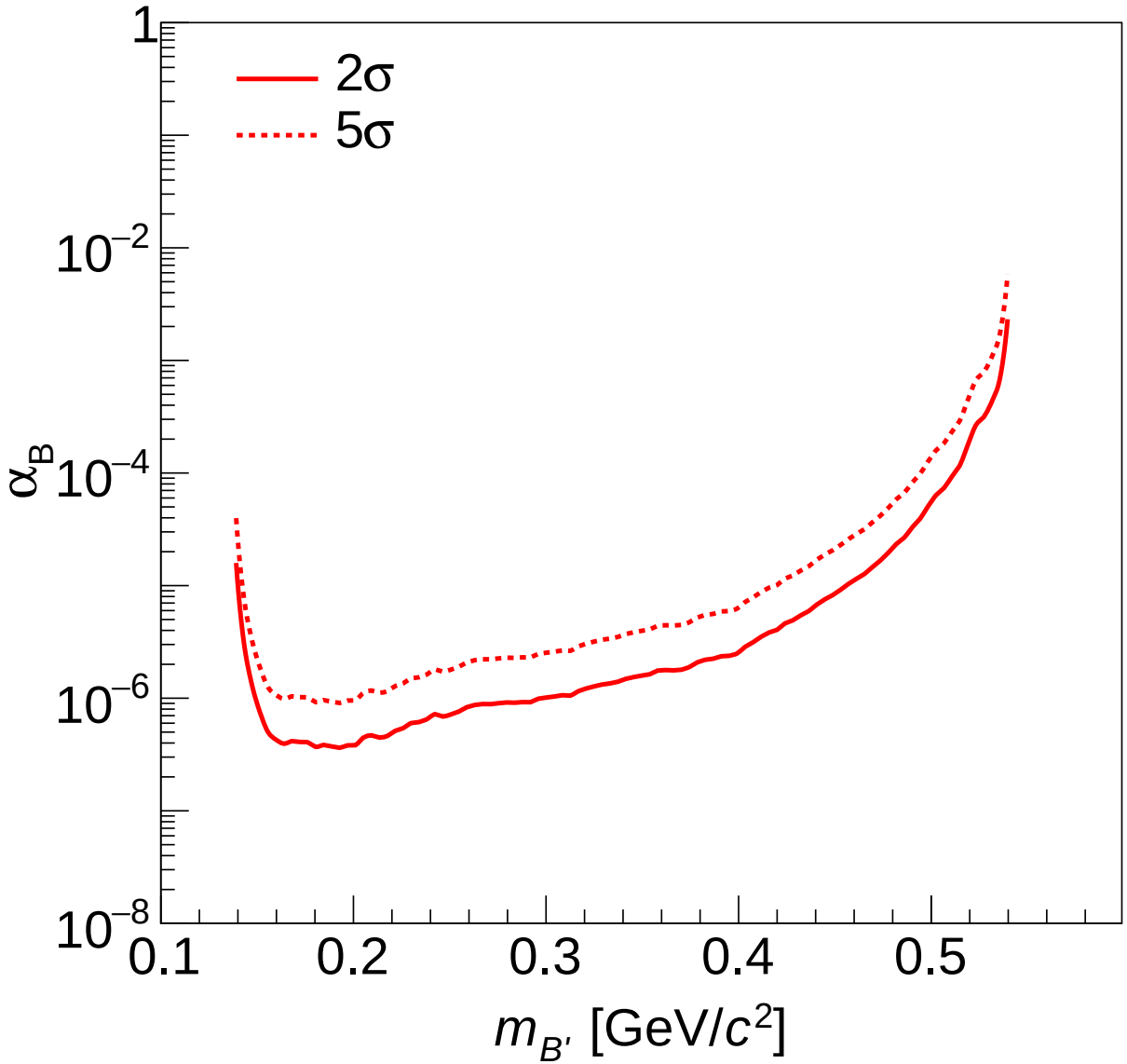
$\eta \to \gamma B$, previous results with measured P4

Extract reach using the method described in the PAC note



$\eta \to \gamma B$, with new IA and minimal cuts, and measured P4

Extract reach using the method described in the PAC note



$\eta \to \gamma B$, with new IA and minimal cuts, and fitted P4

Extract reach using the method described in the PAC note