Updates

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for the GlueX Collaboration

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$\eta \to \gamma\gamma\pi^0$, selection criteria

Selection criteria:

- No extra tracks and no extra energy
- All 4 photons in FCAL(2), with FCAL2(JEF) island algorithm is used
- At least one photon with a polar angle below 4.5^o
- Kinematic fit $\chi^2/\text{ndf} < 3$
- Coplanarity between 4γ and p between 175 and 185^o
- Mass conservation between initial and final states between -0.2 and 0.2 $(\text{GeV}/c^2)^2$
- Elasticity, $\text{E}_\gamma^{\text{incident}}$ - $(\text{E}_\gamma^1 + \text{E}_\gamma^2 + \text{E}_\gamma^3 + \text{E}_\gamma^4)$ between -1 abd 1.5 GeV
- Proton DOCA $50 < z < 80$cm and $r < 1$cm
- $110 < m^i_{\gamma\gamma} < 160$ MeV$/c^2$
- $m^j_{\gamma\gamma} < 90$ MeV$/c^2$ or $m^j_{\gamma\gamma} > 190$ MeV$/c^2$ or $m^j_{\gamma\gamma} < 500$ MeV$/c^2$ or $m^j_{\gamma\gamma} > 600$ MeV$/c^2$
- Any events with a combination corresponding to $2\pi^0$, $\pi^0\eta$, and 2η are discarded
  - $2\pi^0$: $110 \leq m^{i/j}_{\gamma\gamma} \leq 160$ MeV$/c^2$
  - $\pi^0\eta$: $110 \leq m^i_{\gamma\gamma} \leq 160$ MeV$/c^2$ and $500 \leq m^j_{\gamma\gamma} \leq 600$ MeV$/c^2$
  - 2η: $500 \leq m^{i/j}_{\gamma\gamma} \leq 600$ MeV$/c^2$

$\eta \to \gamma\gamma\pi^0$, invariant mass distributions

Selection criteria applied

- No MVA cut and TOF veto applied
- MVA cut applied but no TOF veto applied
- MVA cut and TOF veto applied

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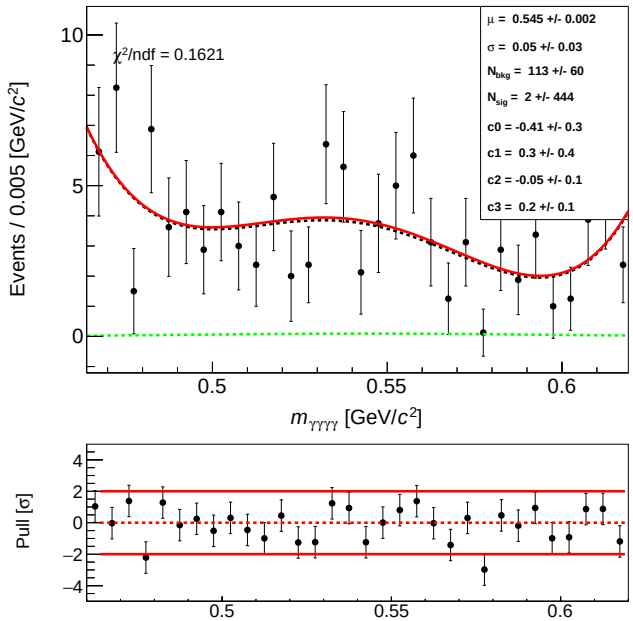

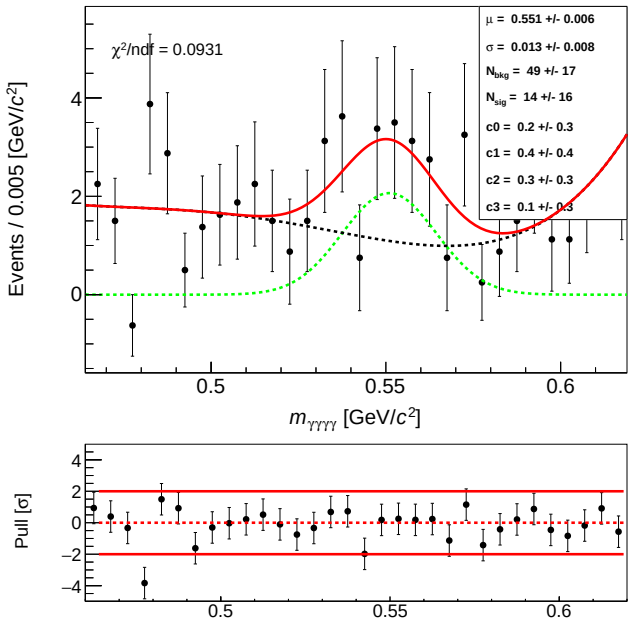

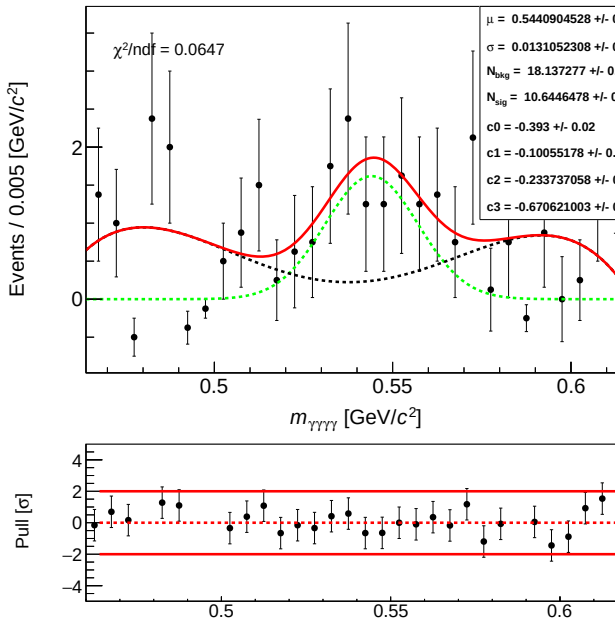

- BDT cut of 0.9
- Veto FCAL and Veto hits matched, $|\Delta x/y| < 10$ cm