



中国科学技术大学

University of Science and Technology of China

I/O Check of LamLambar

➤ Charged Tracks

- $V_r \leq 10cm, |V_z| \leq 30cm$
- $|\cos\theta| < 0.93$

➤ PID (Use dedx+TOF)

- **Proton:** $p > 0.5 \text{ GeV}/c$ && PID:
 $\text{Prob}(p) > \text{Prob}(K/\pi)$
- **Pion:** $p < 0.5 \text{ GeV}/c$ && PID:
 $\text{Prob}(\pi) > \text{Prob}(K/p)$
- $n\text{Proton} \geq 1; n\text{Pion} \geq 1$

➤ Λ Reconstruction

- Primary and Secondary vertex fit
- Choose $p\pi^-$ with least χ_{Sec}^2
- $L/\sigma_L > 2.0$
- $\chi_{Sec}^2 < 15$
- $|M_{p\pi^-} - 1.1157| < 8 \text{ MeV}/c^2$

➤ Shower Selection

- $|\cos\theta| \leq 0.8, E > 25\text{MeV}$
- $0.86 \leq |\cos\theta| \leq 0.92, E > 50\text{MeV}$
- $0 \leq TDC \leq 14$
- $N_{shower} \geq 2$
- $\theta_{Trk,\gamma} \geq 10^\circ$

➤ 2C Kinematic fit

- on the hypothesis of $\Lambda\bar{n}\gamma\gamma$
- $75 < M_{\gamma\gamma} < 175 \text{ (MeV}/c^2)$
- Λ is from secondary vertex fit
- Anti-neutron treated as a missing particle
- **Constrain $M_{\bar{n}\pi^0} = M_{\bar{n}\pi^0}^{PDG}$**
- **Constrain $M_{\gamma\gamma} = M_{\pi^0}^{PDG}$**
- $\chi_{kmfit}^2 < 100$

➤ Charged Tracks

- $V_r \leq 10cm, |V_z| \leq 30cm$
- $|\cos\theta| < 0.93$

➤ PID (Use dedx+TOF)

- **Proton:** $p > 0.5 \text{ GeV}/c$ && PID:
 $\text{Prob}(p) > \text{Prob}(K/\pi)$
- **Pion:** $p < 0.5 \text{ GeV}/c$ && PID:
 $\text{Prob}(\pi) > \text{Prob}(K/p)$
- $n\text{Proton} \geq 1; n\text{Pion} \geq 1$

➤ $\bar{\Lambda}$ Reconstruction

- Primary and Secondary vertex fit
- Choose $\bar{p}\pi^+$ with **least** χ_{Sec}^2
- $L/\sigma_L > 2.0$
- $\chi_{sec}^2 < 15$
- $|M_{\bar{p}\pi^+} - 1.1157| < 0.008 \text{ (GeV}/c^2\text{)}$
- $M_{\bar{p}\pi^+}^{recoil} < 1.15 \text{ GeV}/c^2$

➤ Shower Selection

- $|\cos\theta| \leq 0.8, E > 25\text{MeV}$
- $0.86 \leq |\cos\theta| \leq 0.92, E > 50\text{MeV}$
- $0 \leq TDC \leq 14$
- $N_{shower} \geq 2$
- $Ang_{shower, ChgTrk} \geq 10^\circ$ (for $\bar{p} \geq 20^\circ$)

➤ 2C Kinematic fit

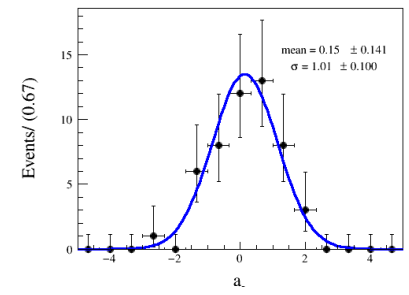
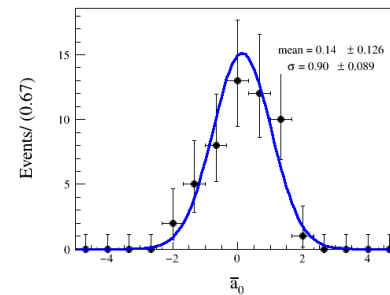
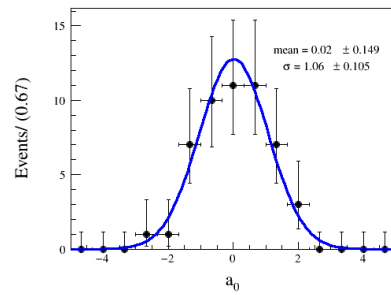
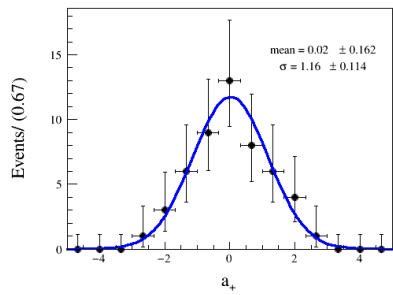
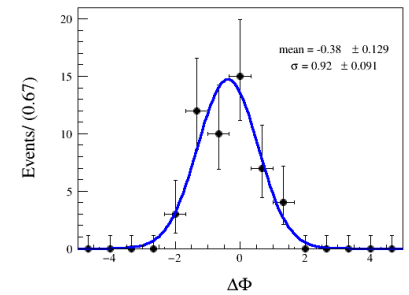
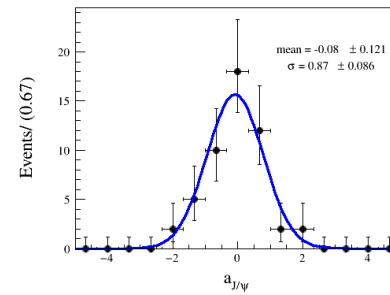
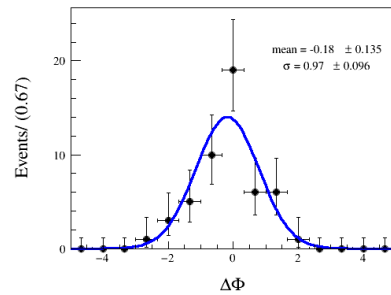
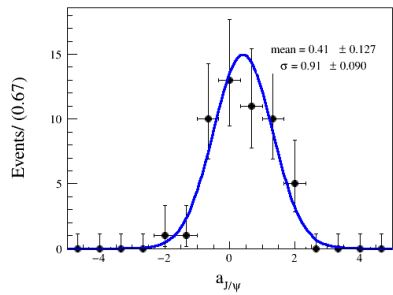
- on **hypothesis** $\bar{\Lambda}n\gamma\gamma$
- $75 < M_{\gamma\gamma} < 175 \text{ (MeV}/c^2\text{)}$
- $\bar{\Lambda}$ is from secondary vertex fit
- Neutron is treated as a missing particle
- **Constrain** $M_{n\pi^0} = M_{\Lambda}^{PDG}$
- **Constrain** $M_{\gamma\gamma} = M_{\pi^0}^{PDG}$
- $\chi_{kmfit}^2 < 60$



- mDIY MC to estimate normalization constant
- 1 sample = 1 data (Generate 425w events), 50 samples
- Toy MC 没有单独产生，从50个样本中抽样出10x data事例数

$$\bar{p}\pi^+n\pi^0$$

$$p\pi^-\bar{n}\pi^0$$



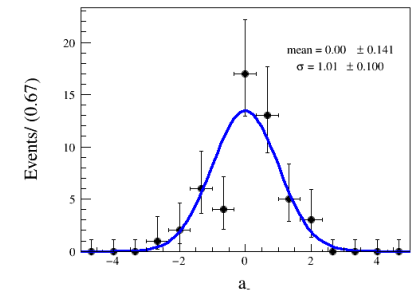
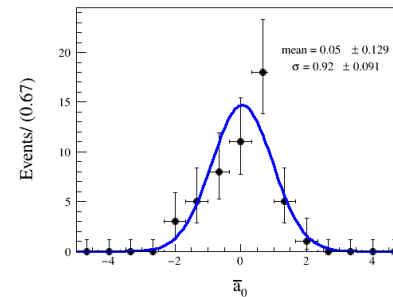
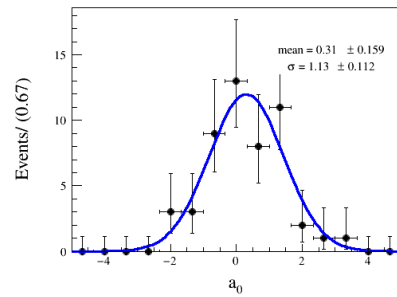
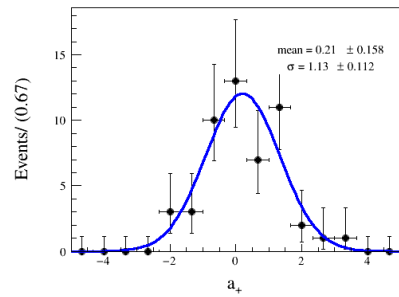
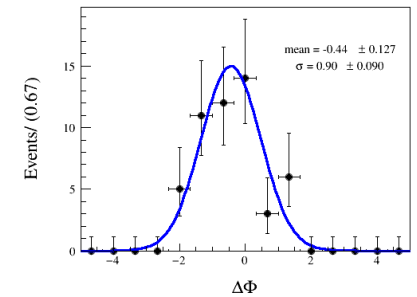
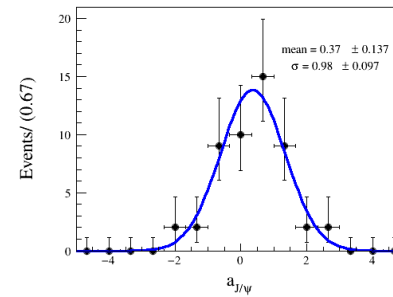
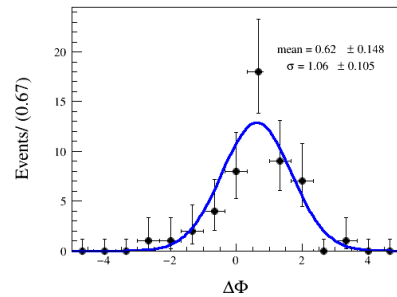
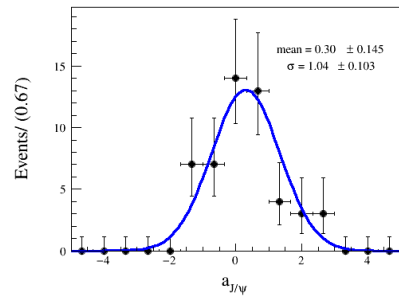
Truth + Efficiency



中国科学技术大学
University of Science and Technology of China

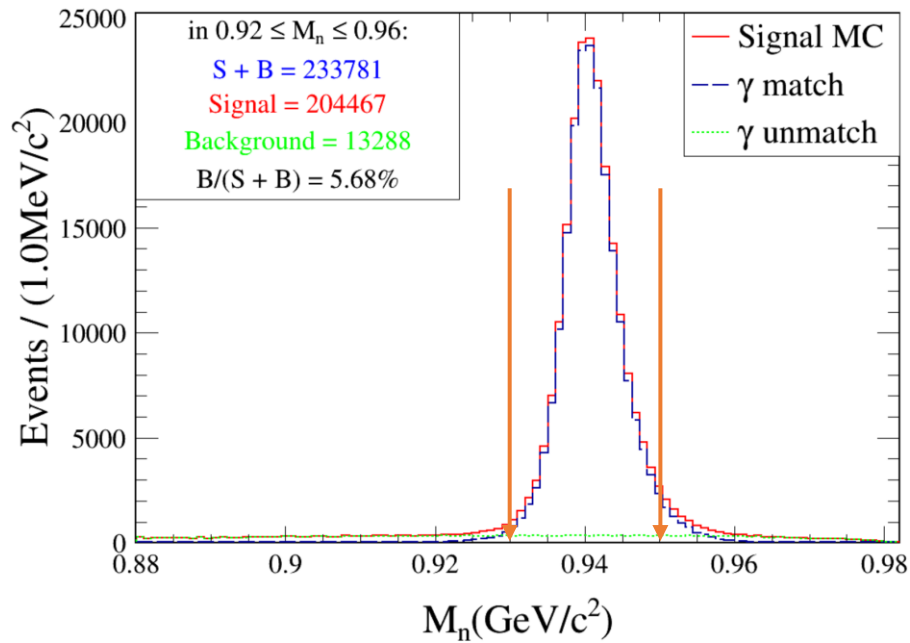
$\bar{p}\pi^+n\pi^0$

$p\pi^-\bar{n}\pi^0$

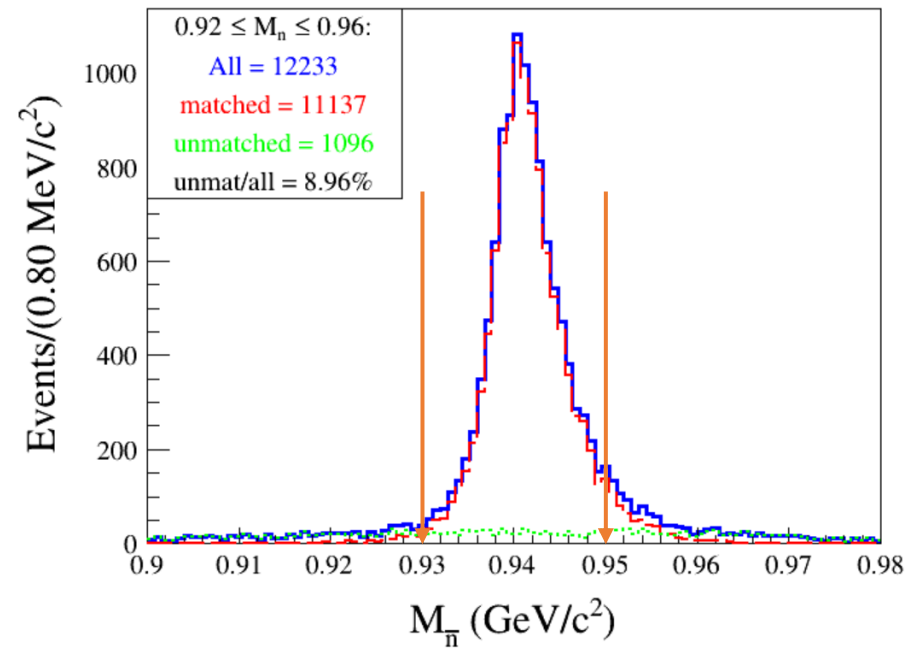




$\bar{p}\pi^+n\pi^0$



$p\pi^-\bar{n}\pi^0$

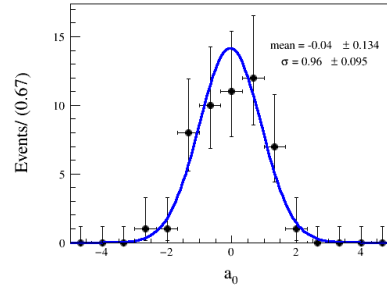
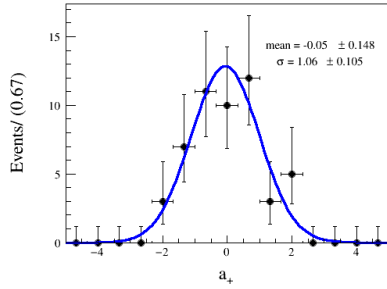
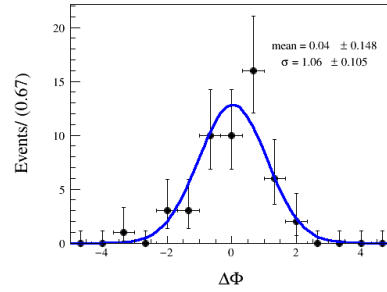
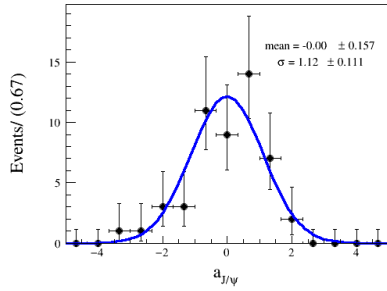


Rec + γ Matched (15°)

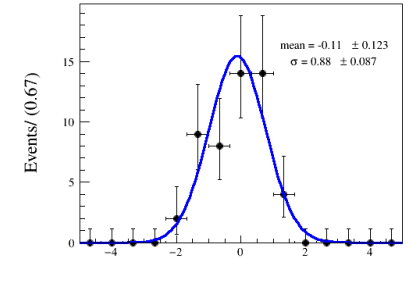
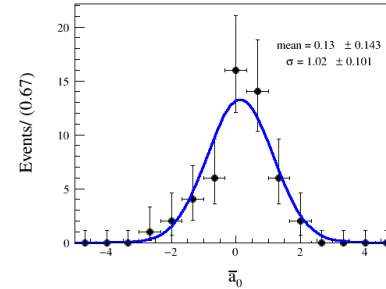
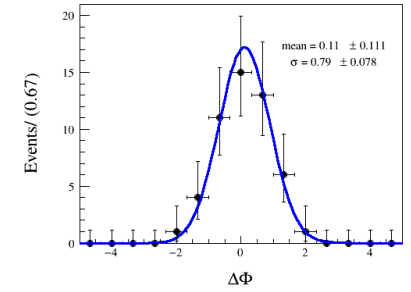
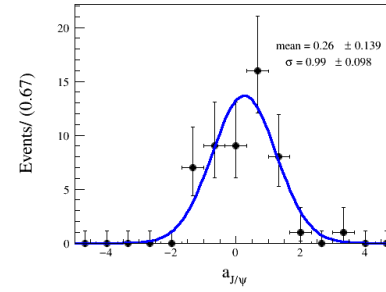


中国科学技术大学
University of Science and Technology of China

$\bar{p}\pi^+n\pi^0$



$p\pi^-\bar{n}\pi^0$



Using mDIY ToyMC to Calculate MC Integration



My pdf in likelihood fit:

$$\mathcal{P}(\xi_i; \alpha) = C \mathcal{W}(\xi_i; \alpha) \epsilon(\xi_i)$$

$$C^{-1} = \int d\xi \mathcal{W}(\xi; \alpha) \epsilon(\xi)$$

- 通常采用Mento Carlo方法估计MC积分
- 任意积分可表示为某个随机变量的数学期望
- 均匀分布对应PHSP MC

若选取与待积函数相近的随机分布，对积分的估计更准确：

$$C^{-1} = \int d\xi \frac{\mathcal{W}(\xi; \alpha)}{\mathcal{W}(\xi; \alpha')} \epsilon(\xi) \mathcal{W}(\xi; \alpha') = E \left[\frac{\mathcal{W}(\xi; \alpha)}{\mathcal{W}(\xi; \alpha')} \right] = \frac{1}{N_{ToyMC}} \sum_{i=1}^{N_{ToyMC}} \frac{\mathcal{W}(\xi_i; \alpha)}{\mathcal{W}(\xi_i; \alpha')}$$

- N_{ToyMC} : 已知参数的Toy MC经过事例筛选后的事例数
- $\mathcal{W}$: 角分布振幅, ξ_i : 运动学量, α' : Toy MC的已知角分布参数
- α : 角分布振幅中的待测参数