LAV Efficiency studies

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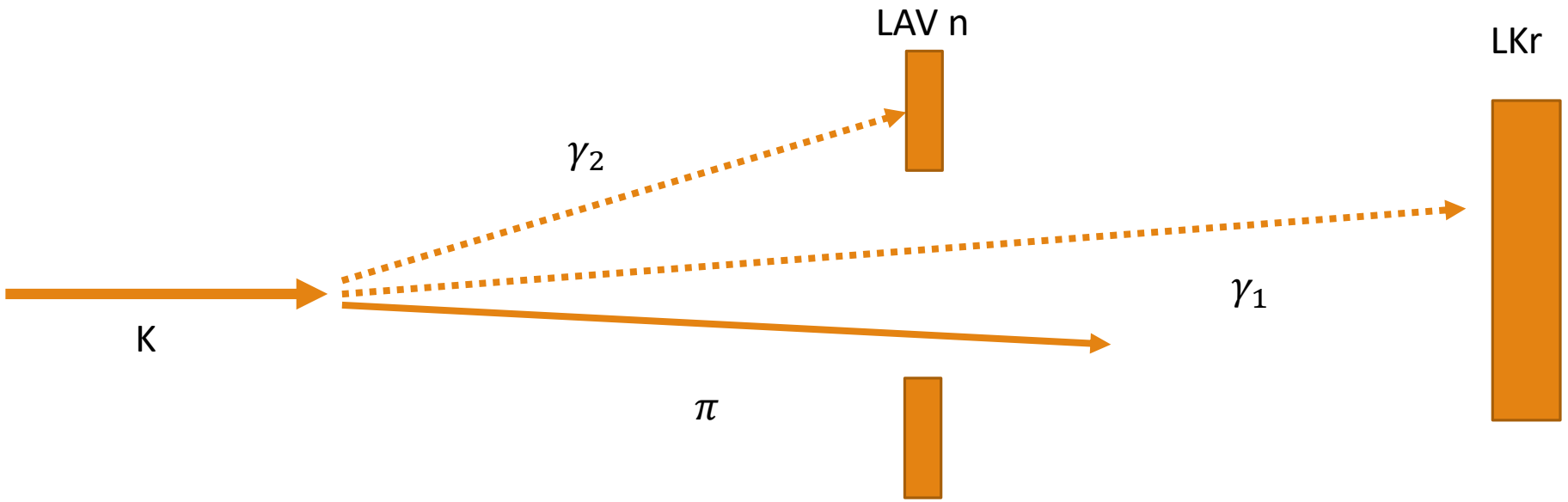
NA62 ITALIA ANALYSIS MEETING, 19/01/2018

Samples analyzed

- Data: run 6291, 6291 ,6320 ,6321, 6330, 6341, 6342, 6343, 6346, 6348, 6349, 6350, 6351, 6352, 6354, 6355, 6356, 6362, 6364
- MC : $K^+ \rightarrow \pi^+\pi^0(\gamma)$ v0.11.0
- K2Pi selection
  - One track selection;
  - No CHANTI, IRC, SAC activity
  - 1 LKr clusters (+1 associated to the track)
  - GTK-Downstream track matching using CDA (BlueTubeTracker corrections applied)
  - GTK Alignment tool + Residual corrections (see Pinunu note)
- KinFit with 1 unmeasured particle (6 parameters)
  - Constraints: Momentum, Energy, Pi0 mass, Vtx (8 contraints)
  - D.o.f: 2

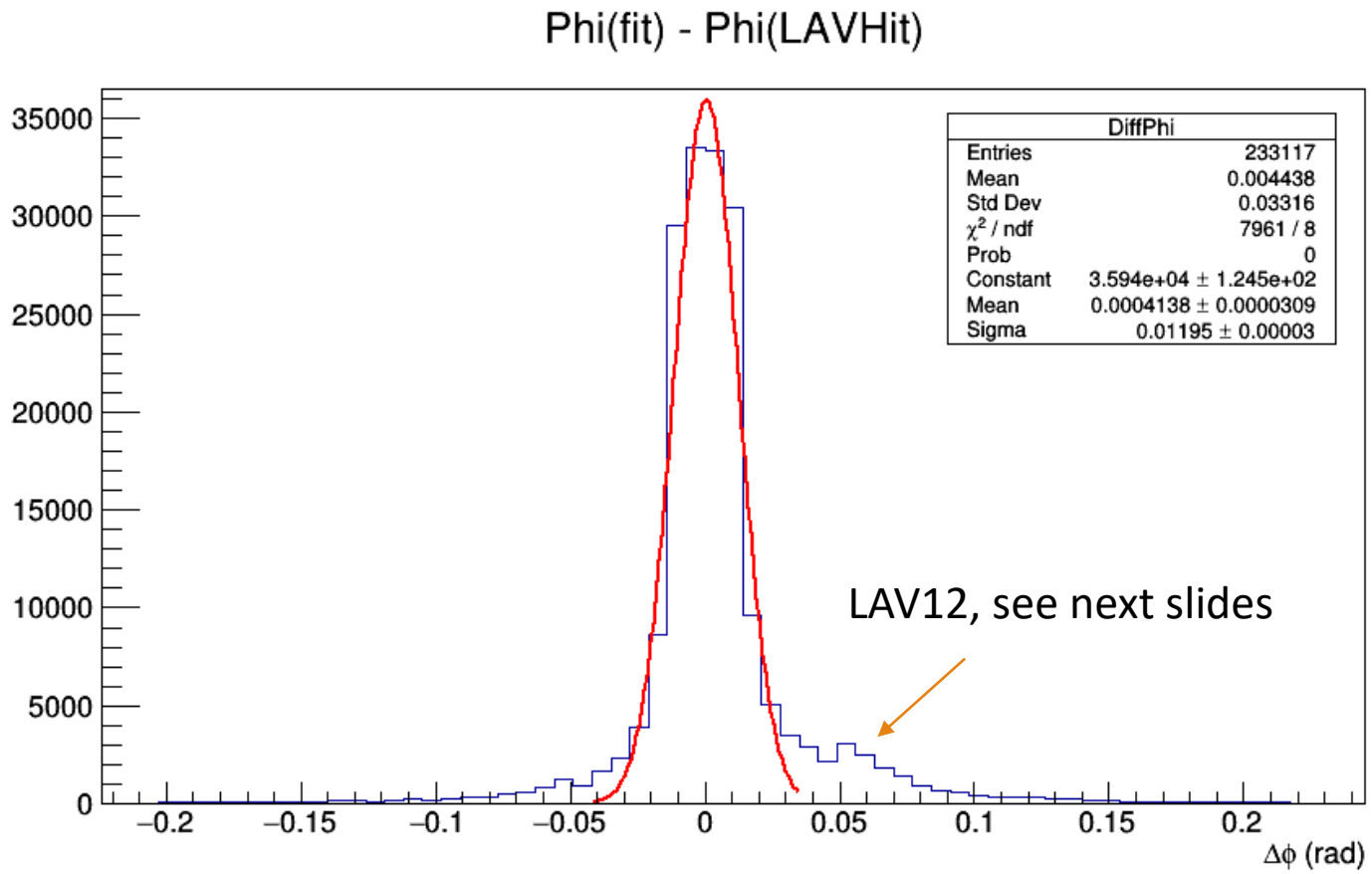
LAV Efficiency



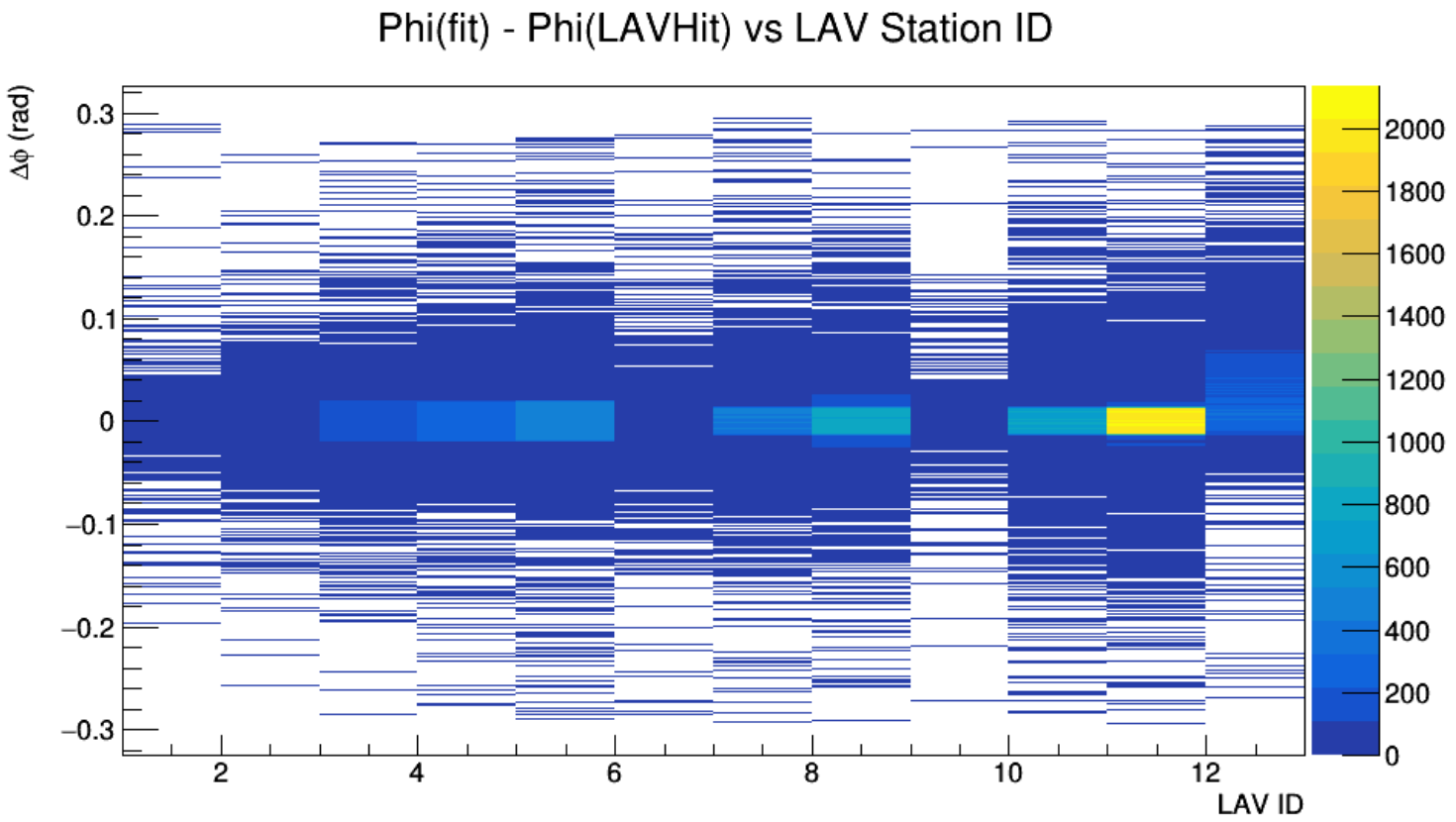
$E_{\gamma 2} > 200$ MeV

Search for LAV hits in all stations with $\left|\phi_{hit} - \phi_{expected}\right| < 1.5\phi_{LAVblock}$

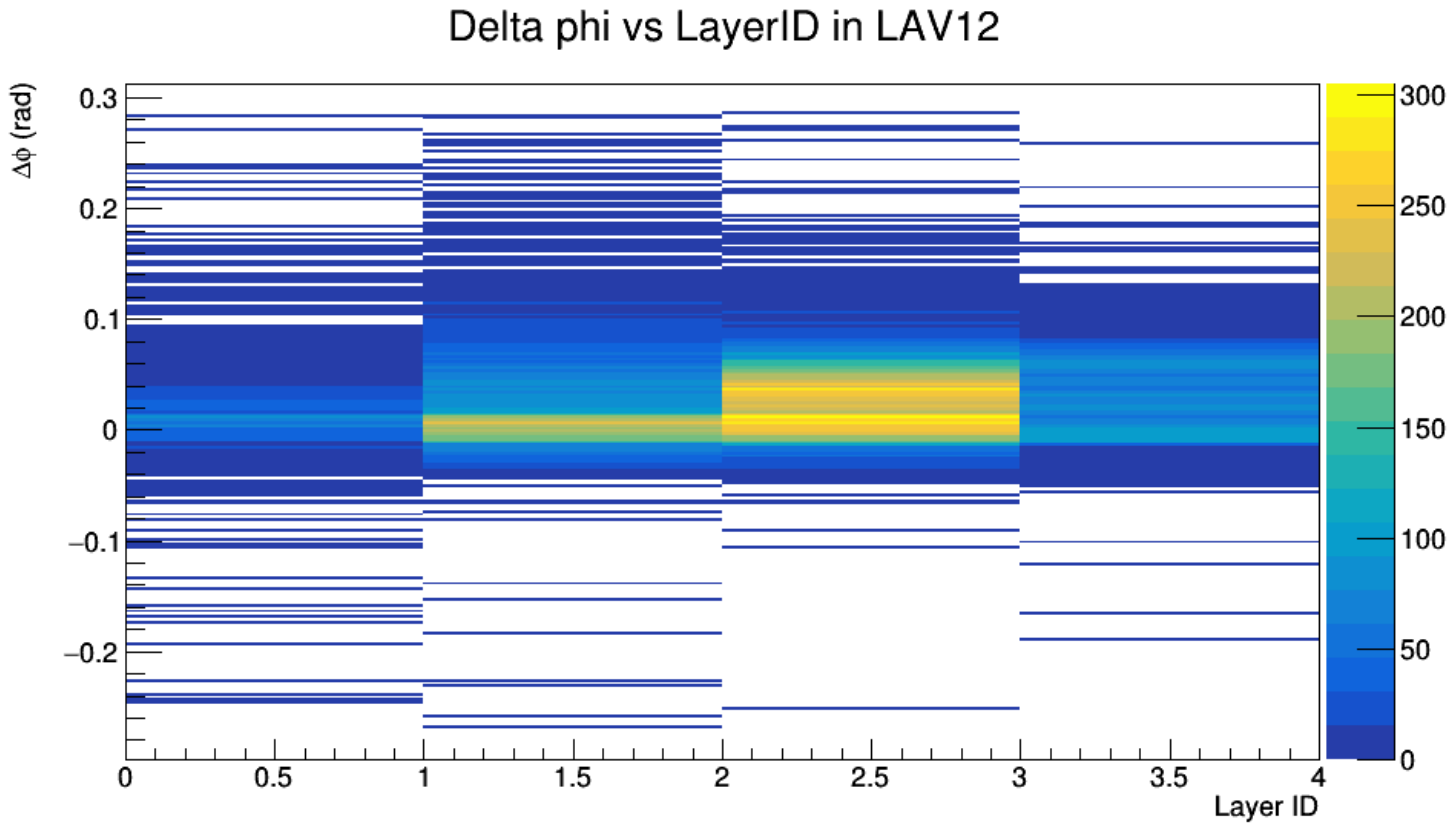
Pointer ϕ resolution



Pointer ϕ resolution vs LAVID



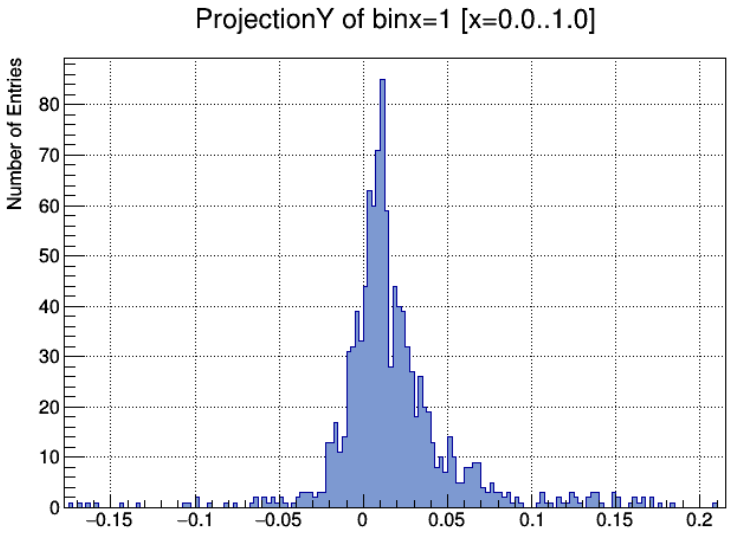
$\Delta\phi$ in LAV12

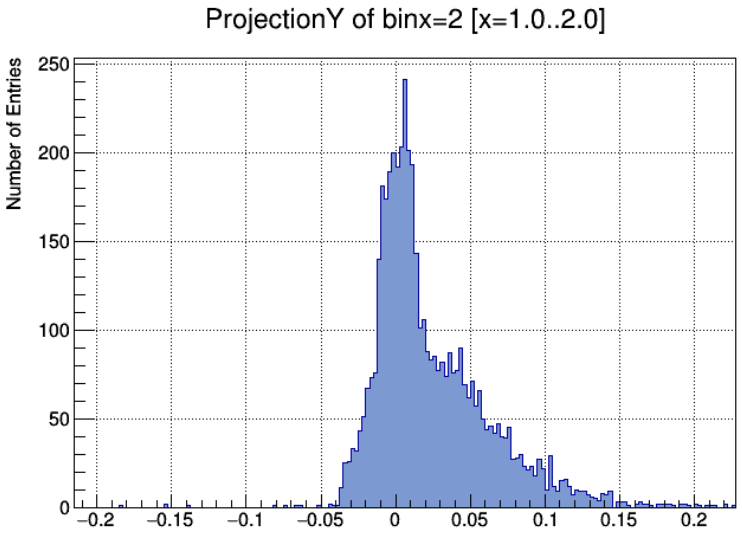


$\Delta\phi$ in LAV12

Different distributions for each layer, not easy to spot the cause

No evidences of this problem in MonteCarlo





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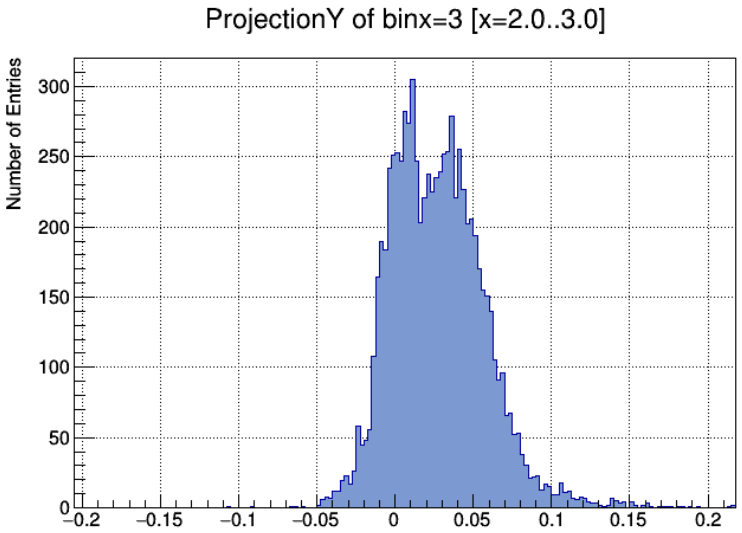
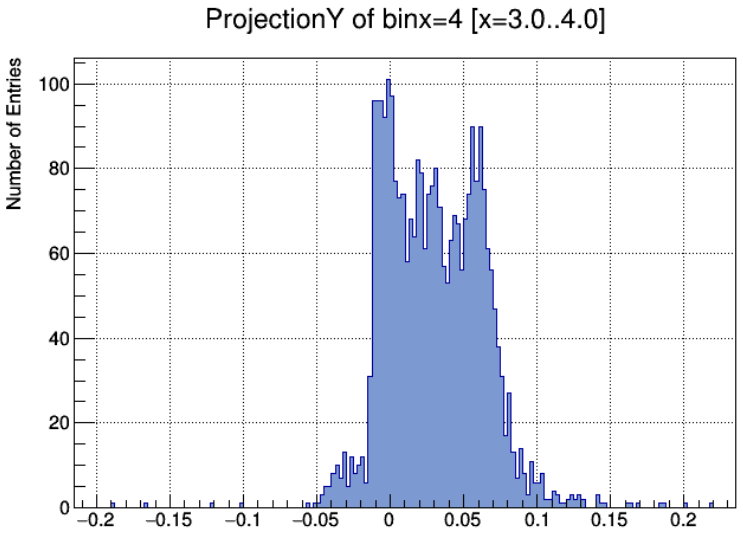
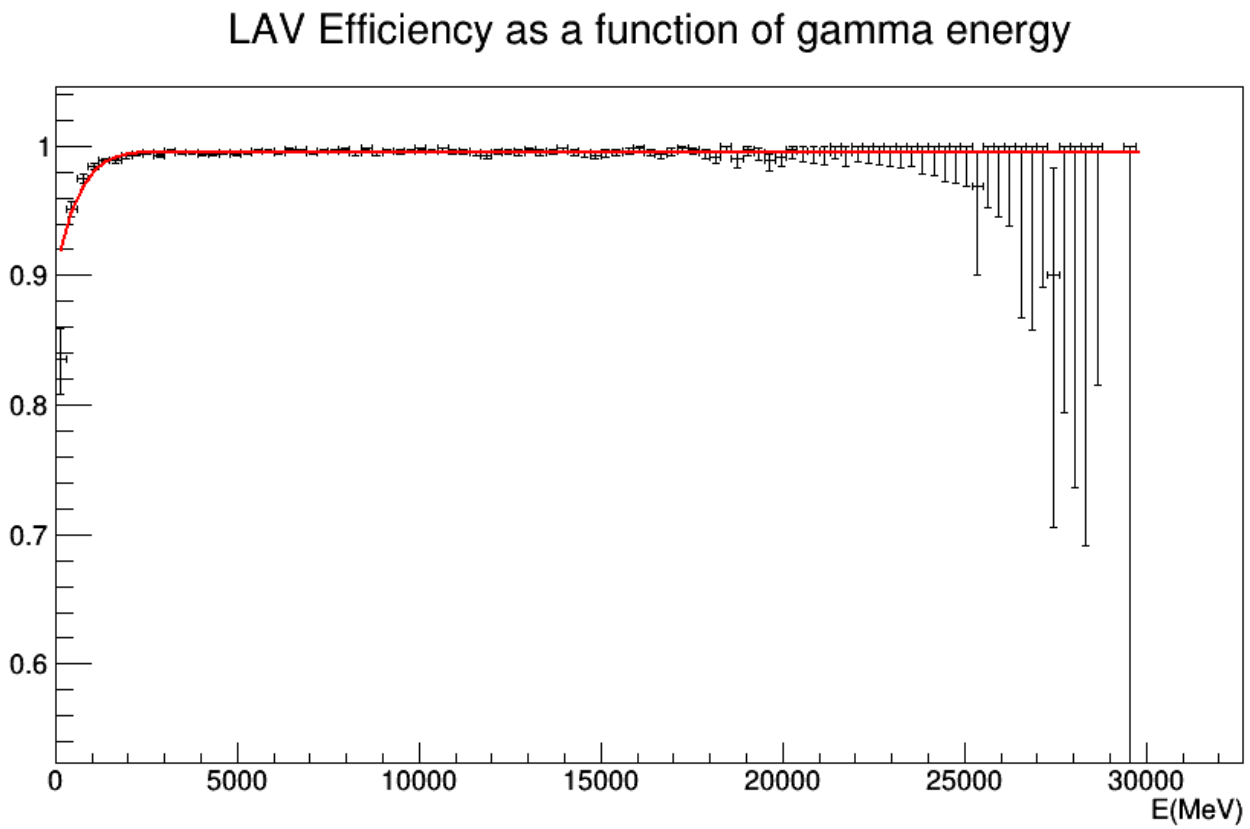
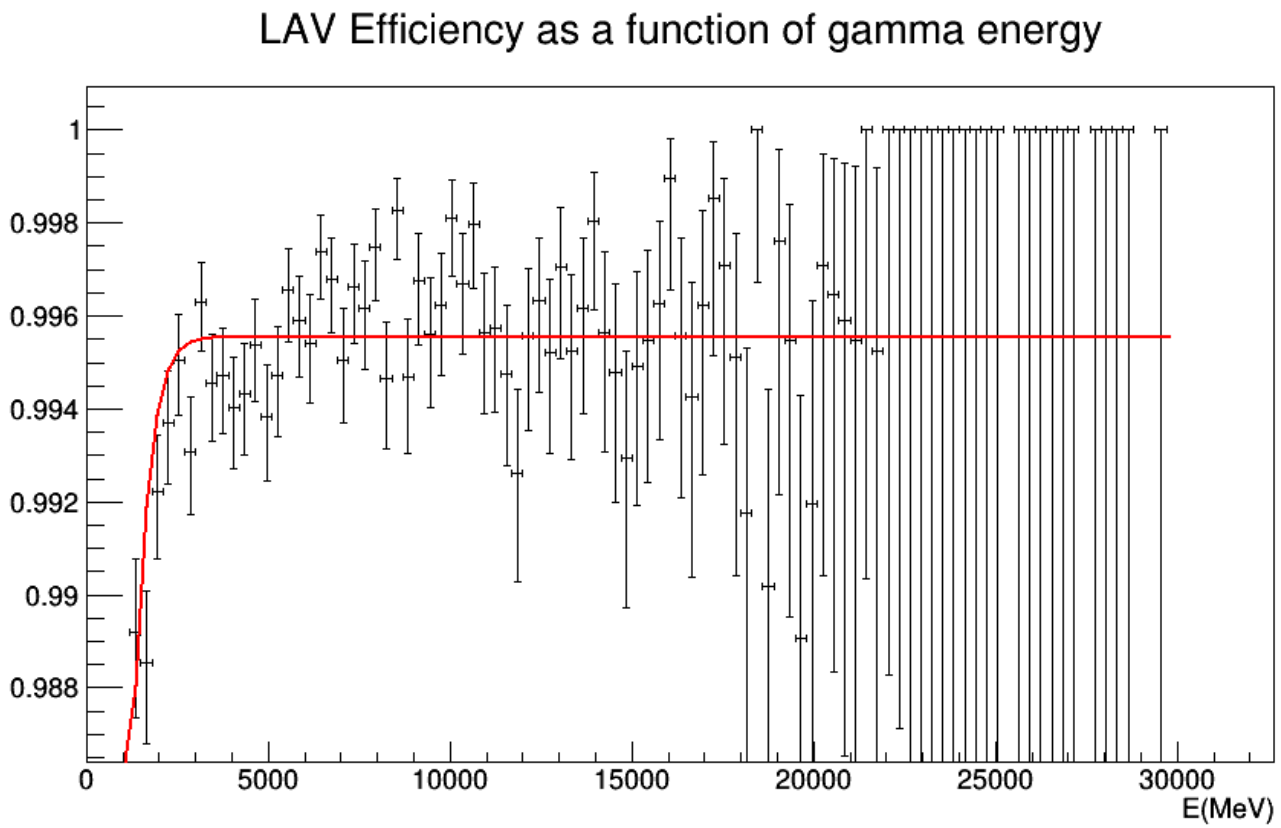




First results – efficiency

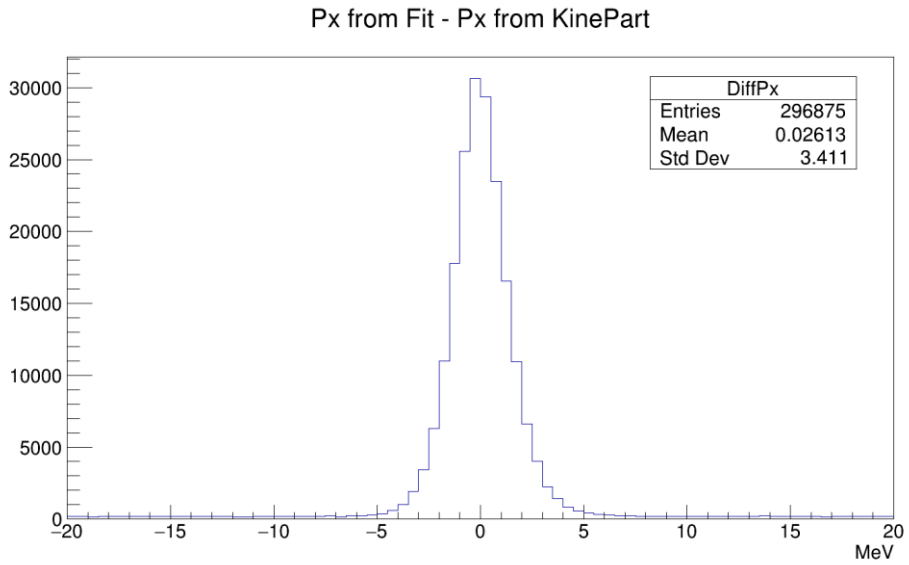


First results – efficiency



Pointer performances from MonteCarlo

KinePart corresponding to the photon on the LAV is found cutting on $\Delta P_i = P_{i_{fit}} - P_{i_{KinePart}}$



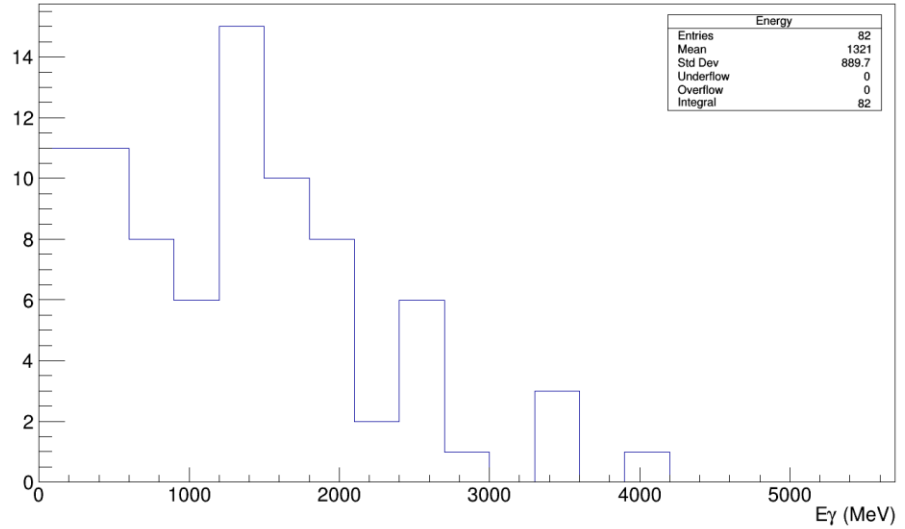
Pointer performances from MonteCarlo

KinePart corresponding to the photon on the LAV is found cutting on ΔP

Given the KinePart, it is possible to compute the ratio:

$$r = \frac{\#_{photon\ not\ in\ LAV\ acceptance}}{\#_{photon\ expected\ on\ LAV}} = 1 - \varepsilon_{max}$$

With MC v0.11.0 sample $r = 4.29 \times 10^{-4}$



To do list

Selection and algorithm to measure LAV efficiency was shown.

Possibility to measure efficiency up to $99.95\ \%$

Things to be understood:

- Cause of LAV12 $\Delta\phi$ distribution
- Tails rejection in $\Delta\phi$ distribution to use a tighter cut in ϕ (fit p-value, ..)