Update on $\bar{n}$ ancestors in the ECL

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MANTRA meeting

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February 09, 2026

Highlights

- The main decay channel is:

$$e^+e^-(\gamma_{ISR}) \rightarrow p\pi^-\bar{n} \quad \text{(phokhara + evt_gen)}$$

- 100k events were generated
- Recoil from three body system p π^- and γ

Usual cuts and selections have been applied:

(a) 0 GeV < mRecoil < 2 GeV && α < 0.35 rad (~ 20 deg) && nbar_isFromECL == 1

(b) mcPDG selection for p (2212) and π^- (-211)

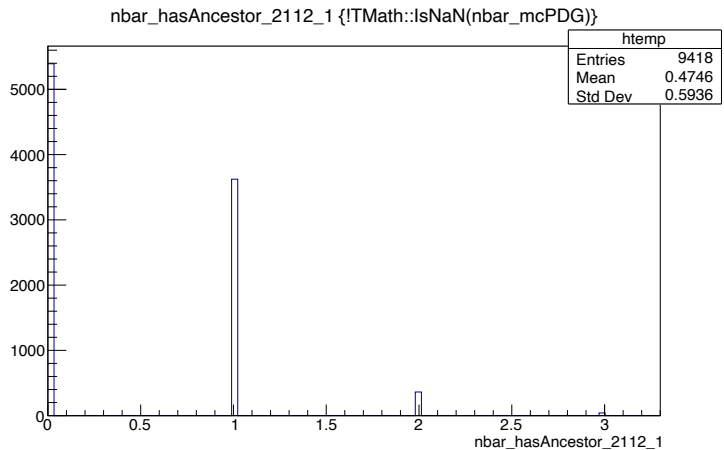
It could be useful to study the $\bar{n}$ production chain in Monte Carlo simulations

Ancestor variables

In order to look at $\bar{n}$ relatives, **ancestor** variables have been used, such as:

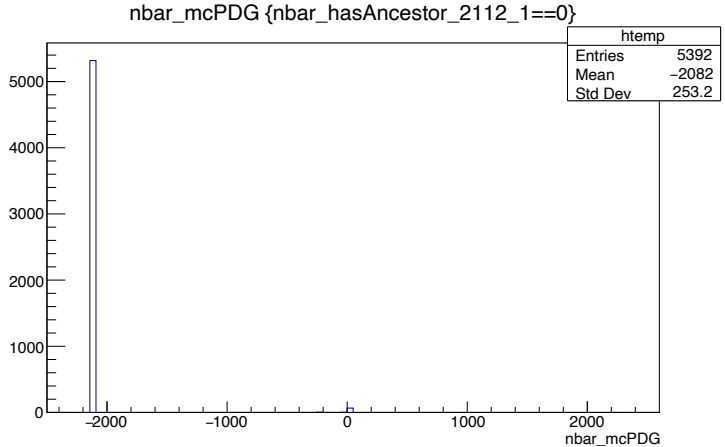
- **hasAncestor(PDG, abs)**: returns a positive integer if an ancestor with the given PDG code is found, 0 otherwise (1: first mother, 2: grandmother, etc.)
  Second argument is optional, 1 means that the sign of the PDG code is taken into account, default is 0
- **varForFirstMCAncestorOfType(type, variable)**: returns requested variable of the first ancestor of the given type
- In this case, we have:
  (a) **nbar_hasAncestor(-2112, 1)**
  (b) **nbar_varForFirstMCAncestorOfType(anti-n0, p)**

nbar_hasAncestor distribution



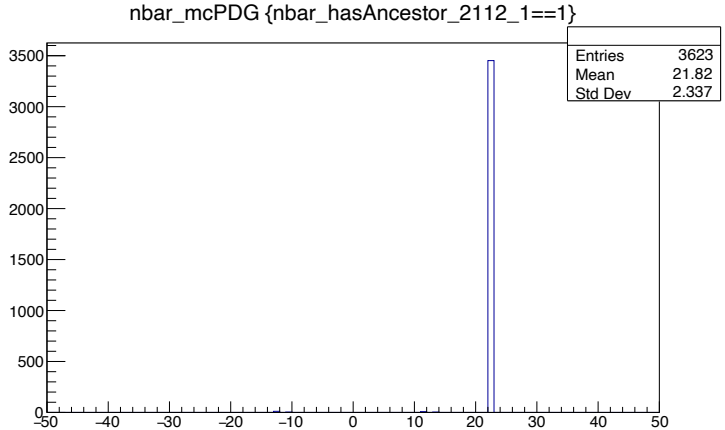
nbar_hasAncestor = 0 (no $\bar{n}$ as relative)

- As expected, they are mainly associated with $\bar{n}$ (-2112):

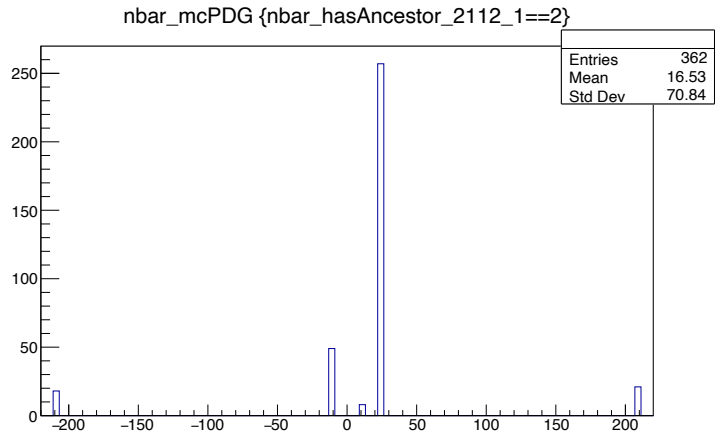


nbar_hasAncestor = 1 ($\bar{n}$ as mother)

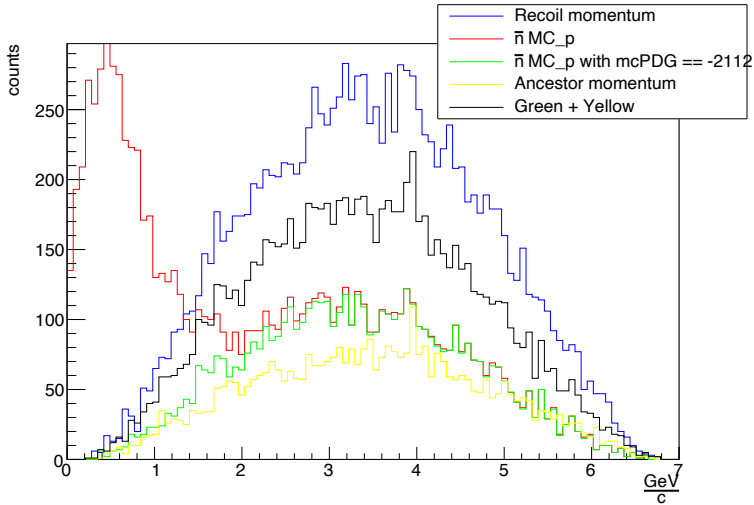
- $\bar{n}$ candidates whose mother is $\bar{n}$ are mainly photons (22).



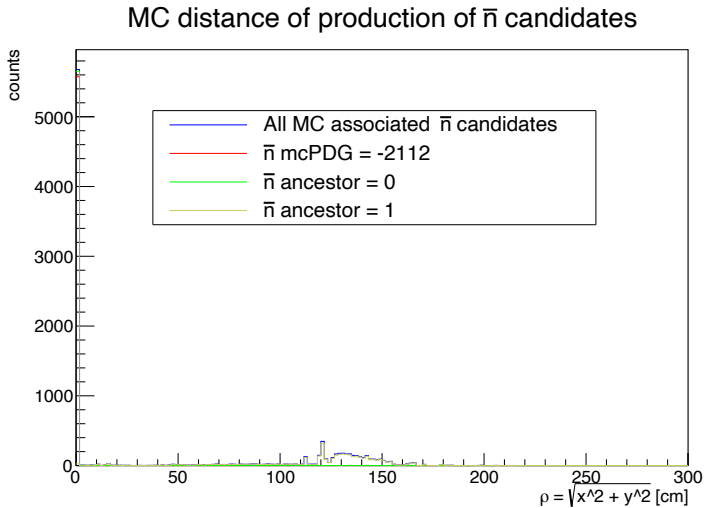
nbar_hasAncestor = 2 ($\bar{n}$ as grandmother)



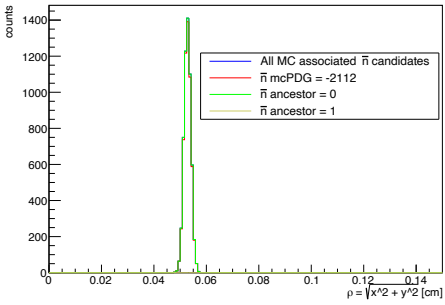
Momentum distribution comparison

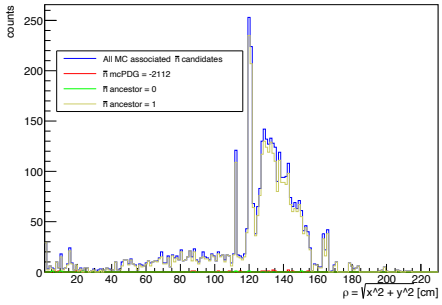


Production ρ

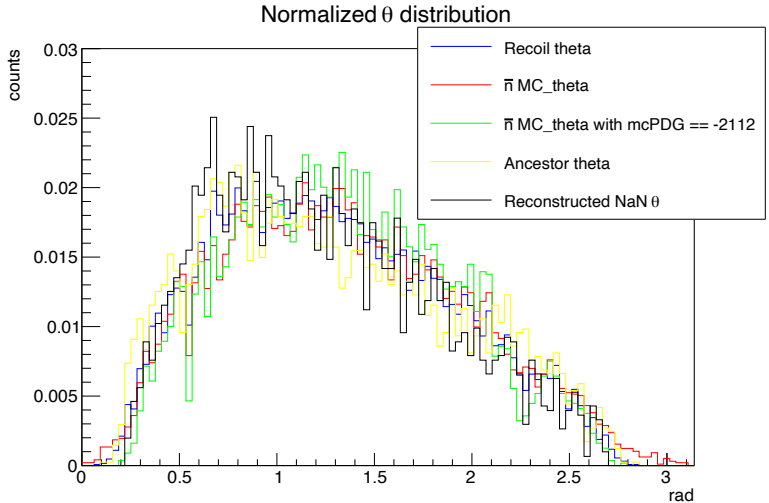


Production ρ (left & right side)

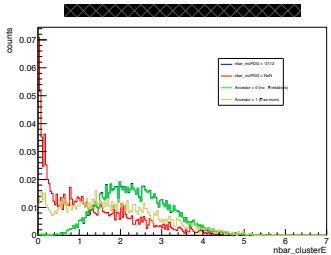


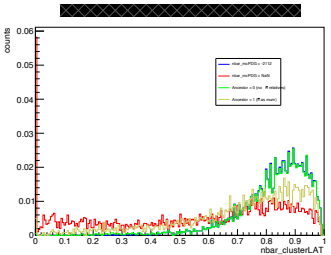


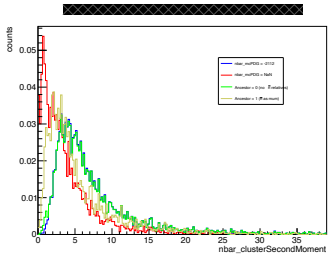
Is there a θ preference?

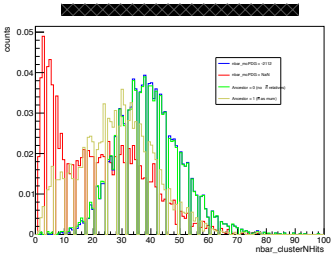


Cluster variables comparison









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Thank you for your attention

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