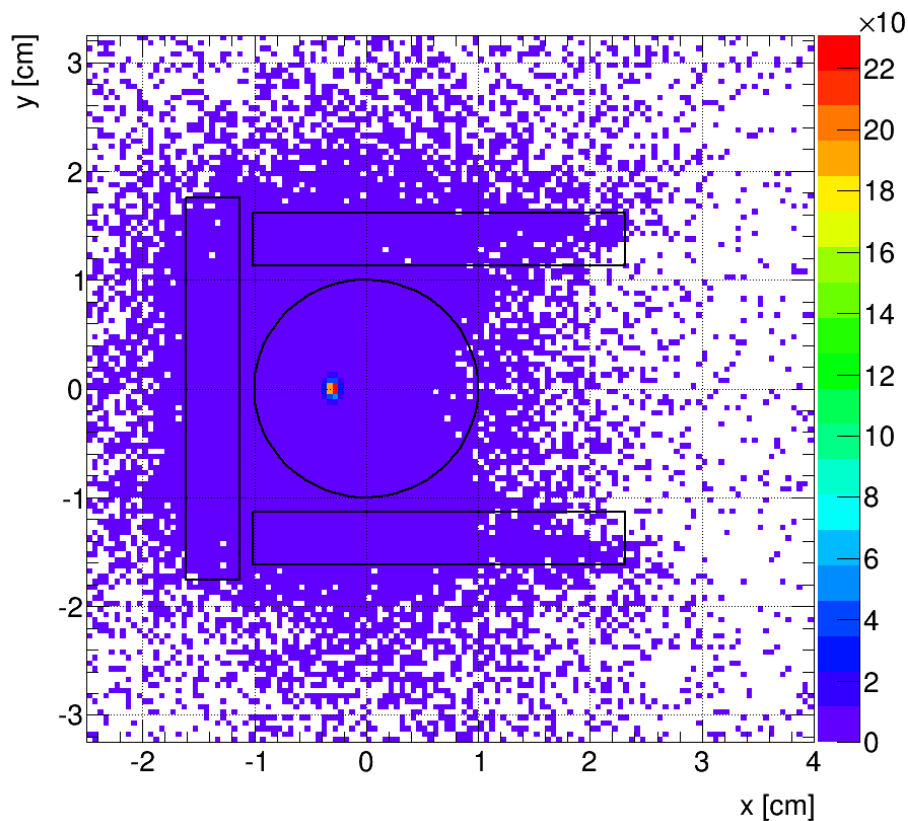# POCA analysis with cuts

1. Hits in sensors by all charged particles

2. Tracking only for every π^- per event

3. POCA method with subsequent cuts (on POCAs not events)
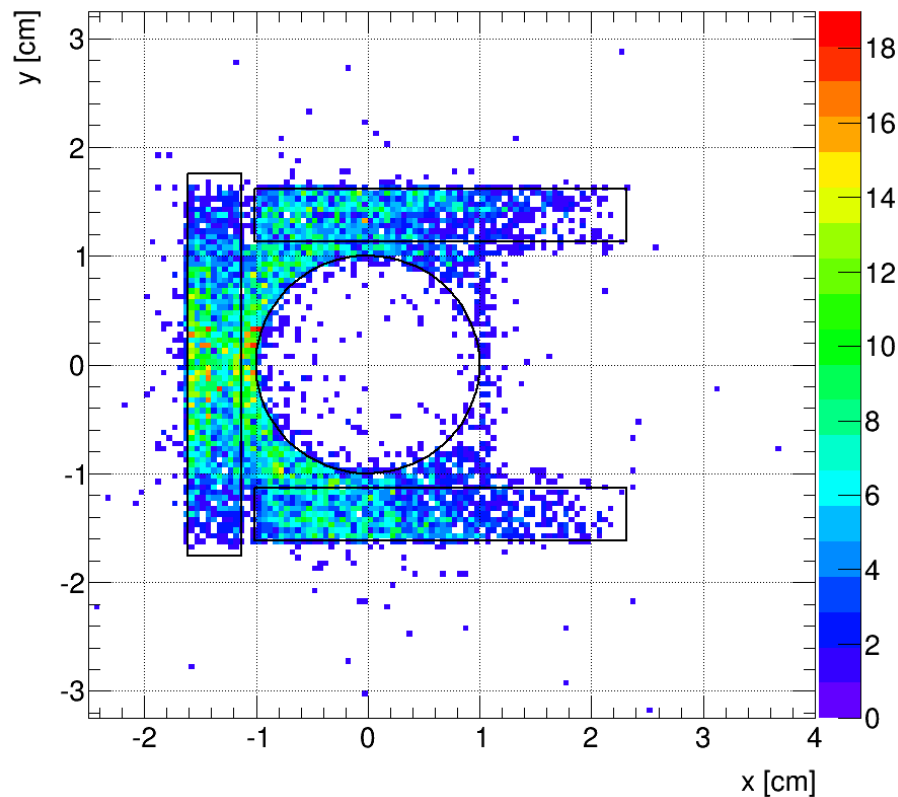
Cut 1: momentum of each π⁻

Every π^- with 60 MeV/c < p_{reco} < 150 MeV/c is filtered for combinatorics

POCAs for inclusive events (without Ξ^-)

POCAs for events with stopped Ξ^-

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Cut 1: momentum of each π⁻

Every π⁻ with 60 MeV/c < p_{reco} < 150 MeV/c is filtered for combinatorics
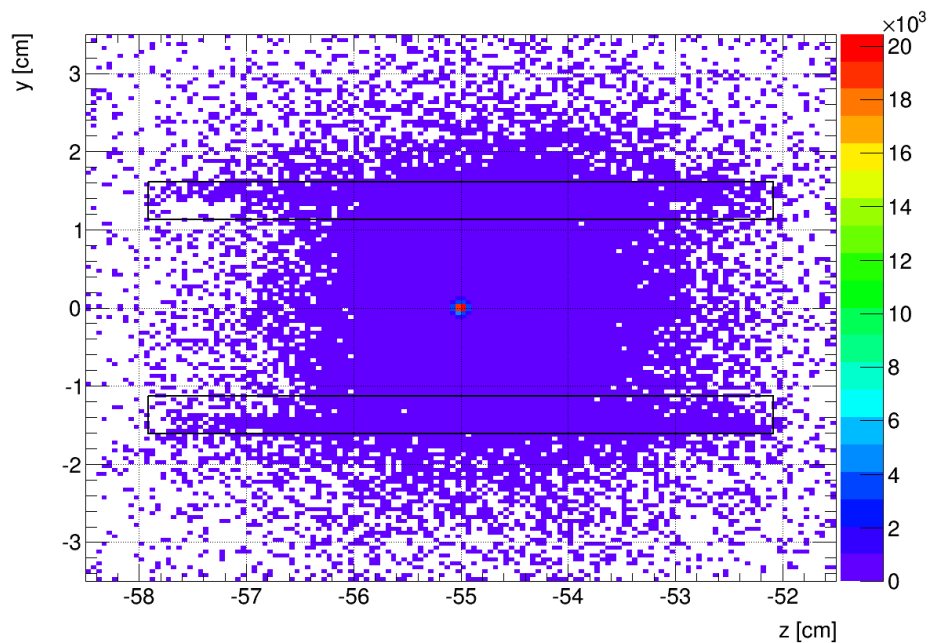
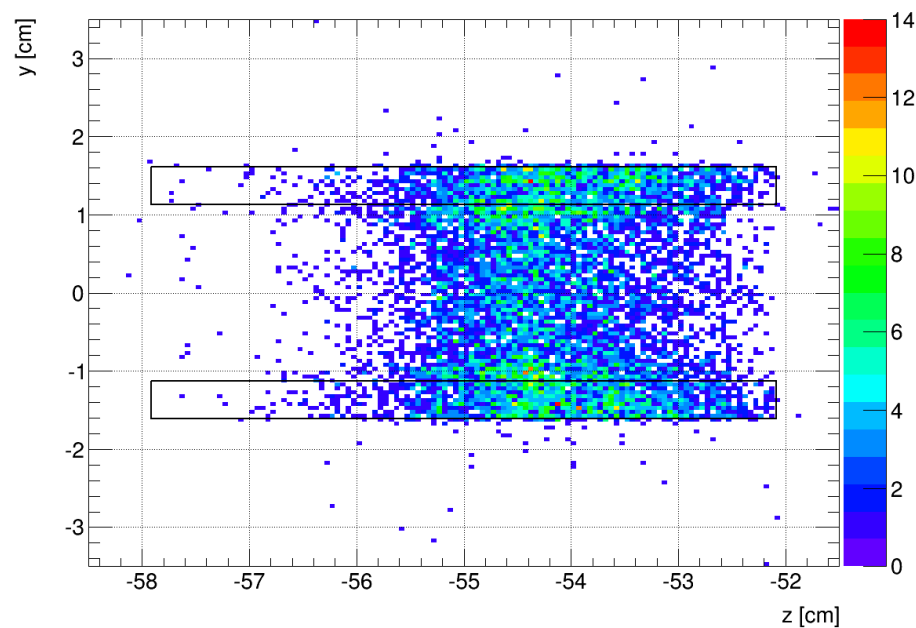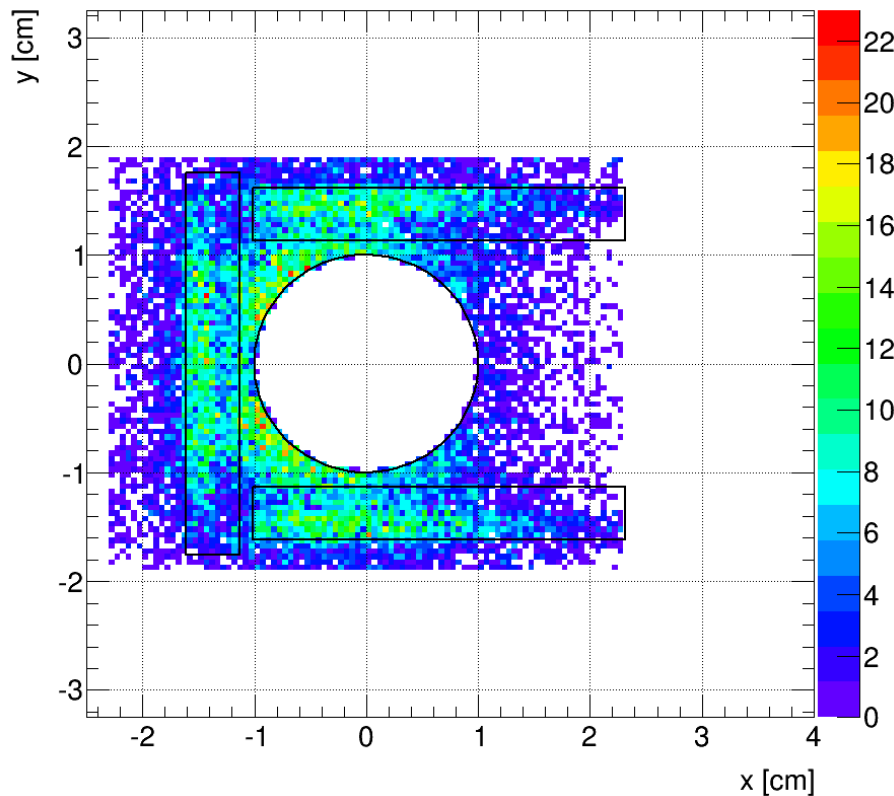POCAs for inclusive events (without Ξ⁻)
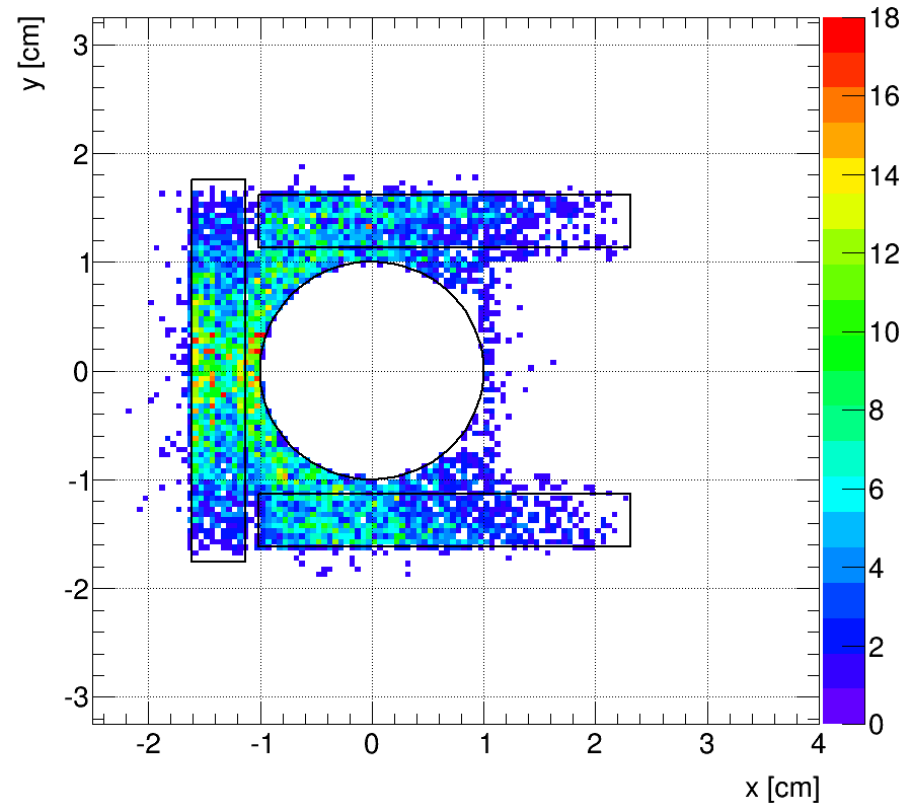
POCAs for events with stopped Ξ⁻

Cut 2: Position of the POCA

POCAs have to be located in absorber material

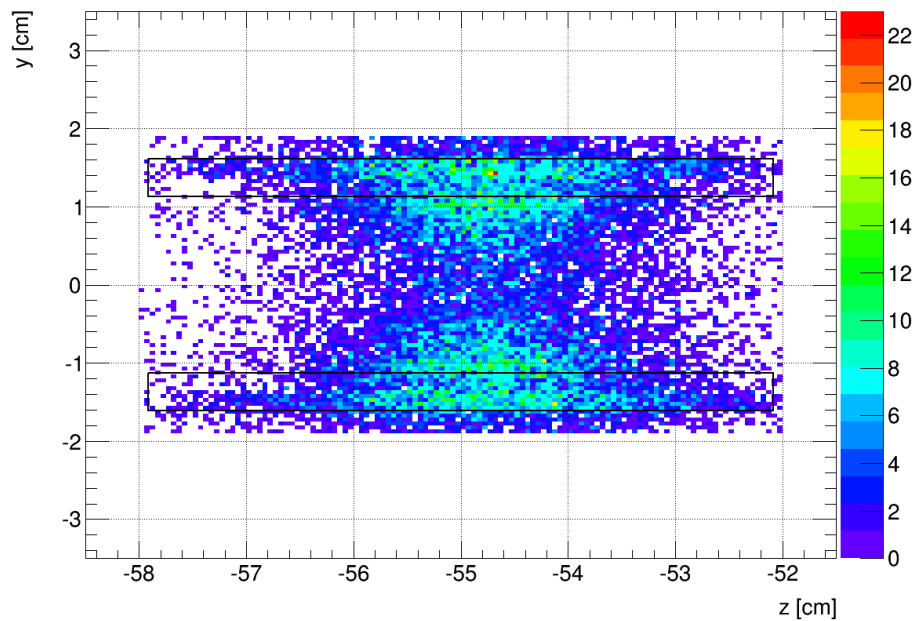POCAs for inclusive events (without Ξ^-)   POCAs for events with stopped Ξ^-
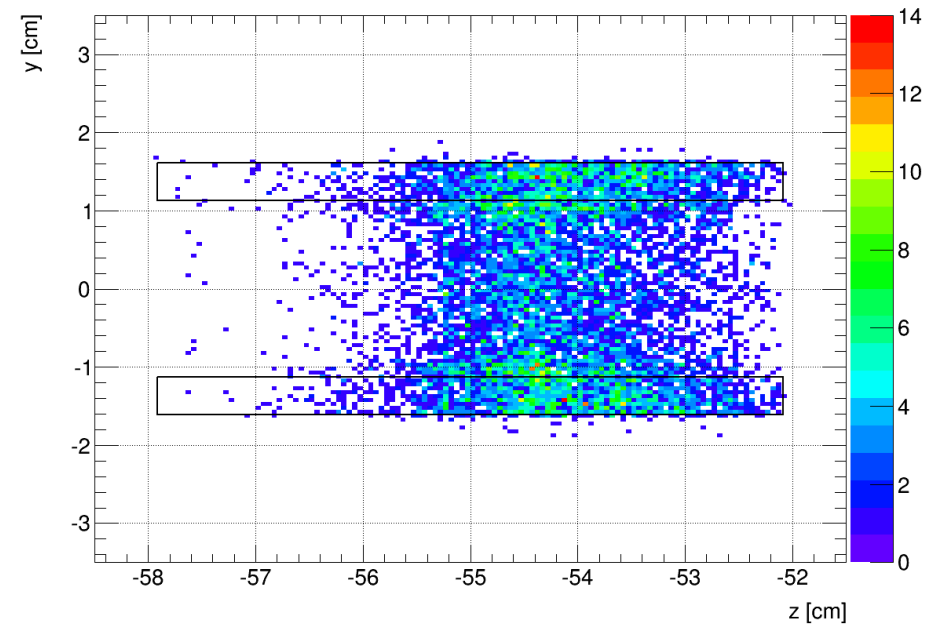
Cut 2: Position of the POCA

POCAs have to be located in absorber material

POCAs for inclusive events (without Ξ^-)
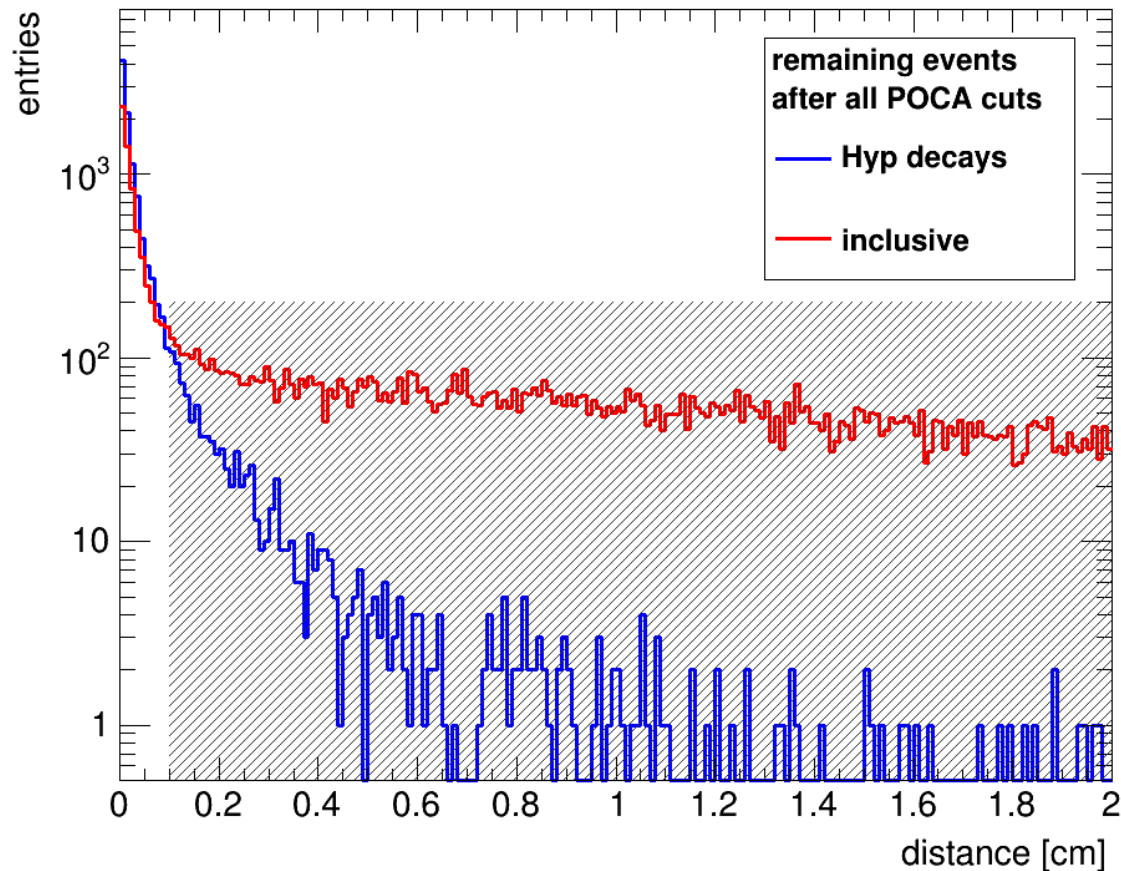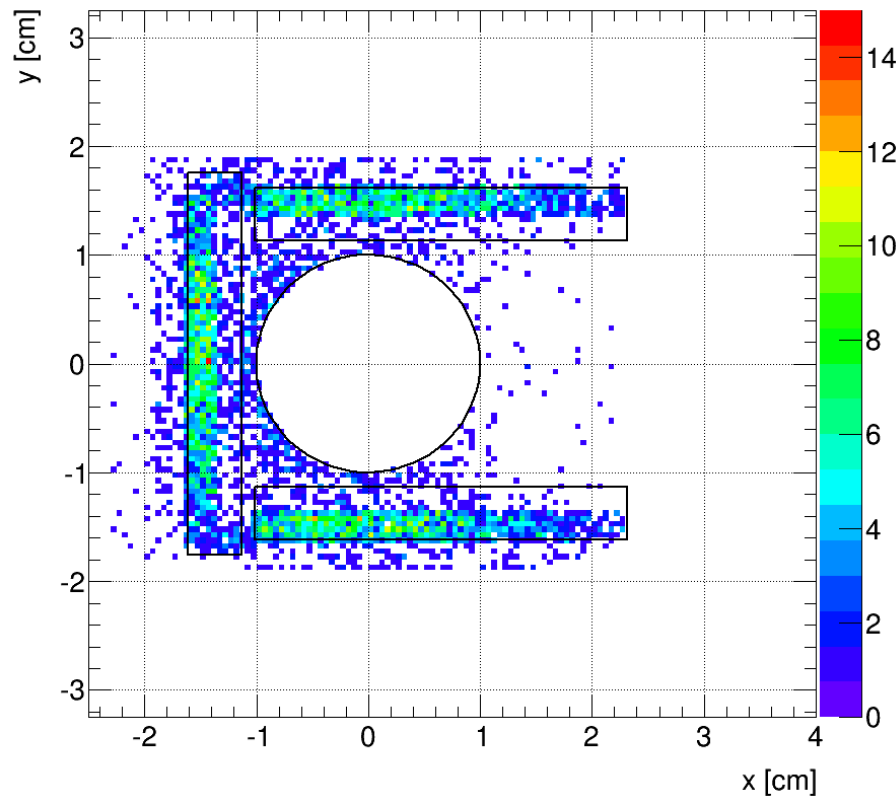
POCAs for events with stopped Ξ^-

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Distances in reconstructed POCAs have to be small for two-π^--vertices

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Distances in reconstructed POCAs have to be small for two-π^--vertices

POCAs for inclusive events (without Ξ^-)

POCAs for events with stopped Ξ^-
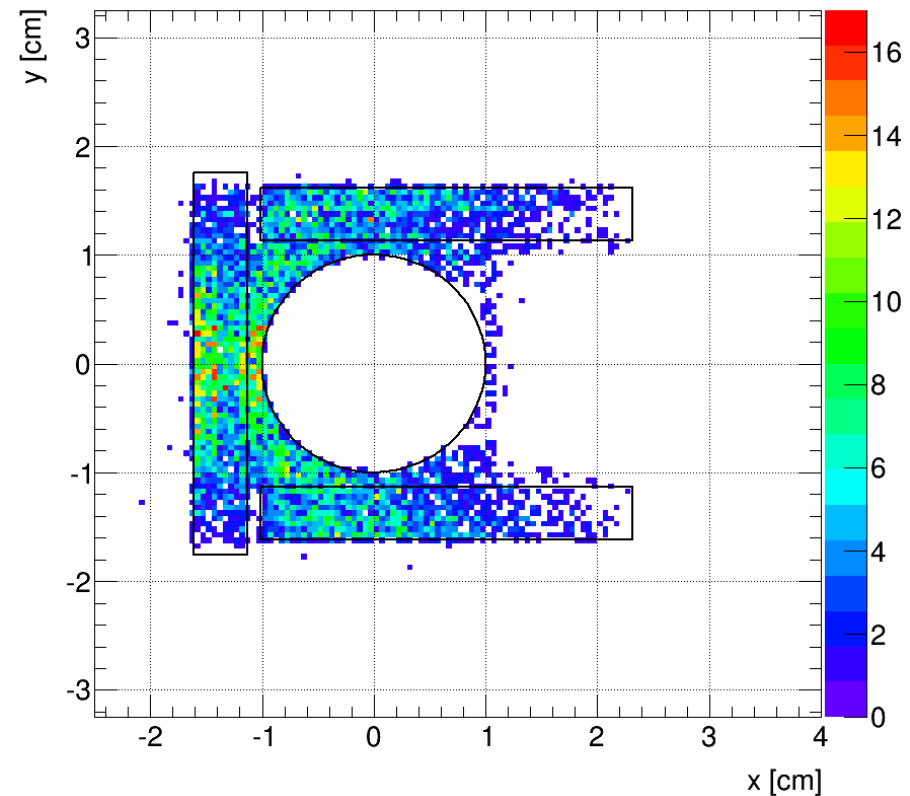
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Cut 3: Distance of tracks in POCA

Distances in reconstructed POCAs have to be small for two-π^--vertices
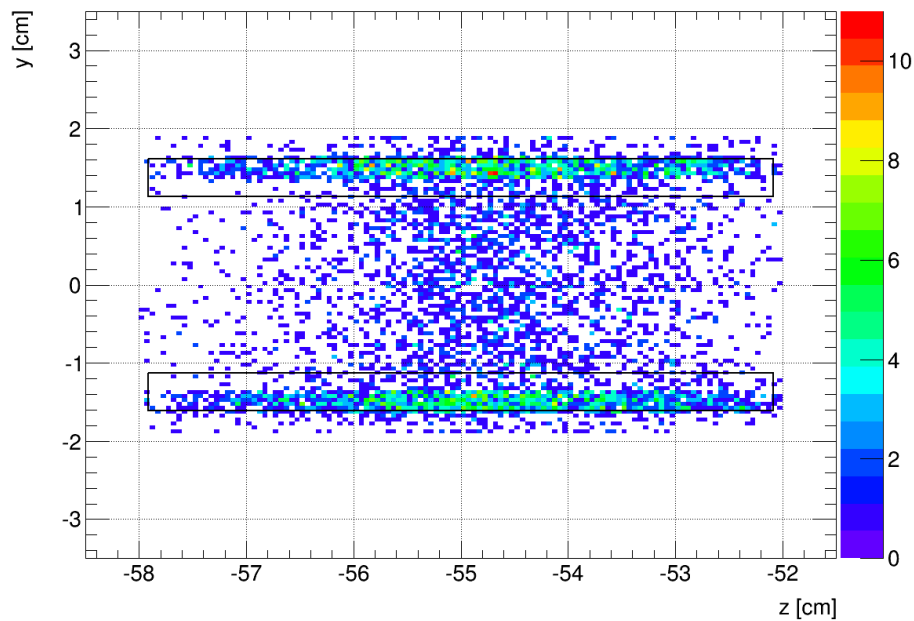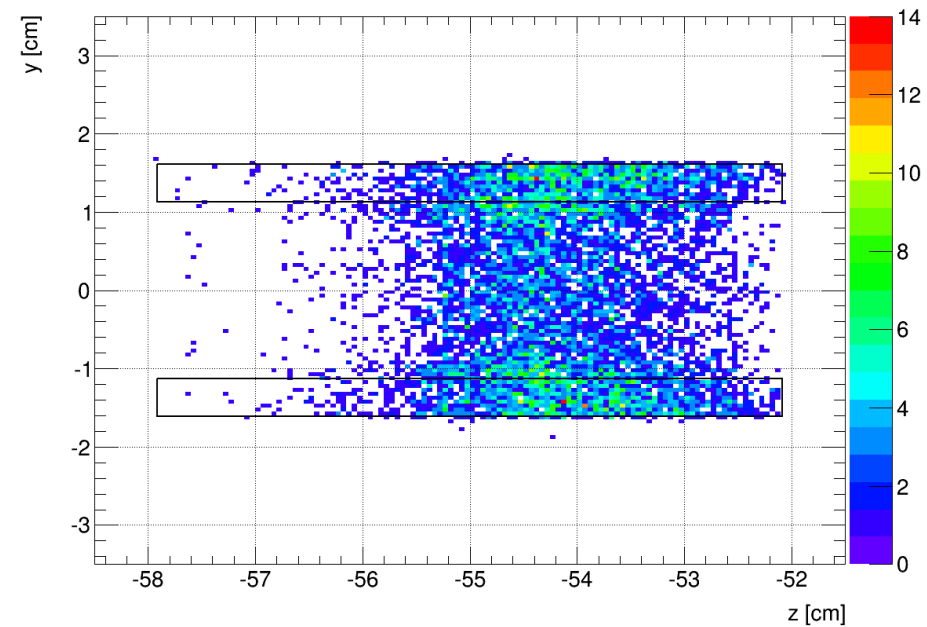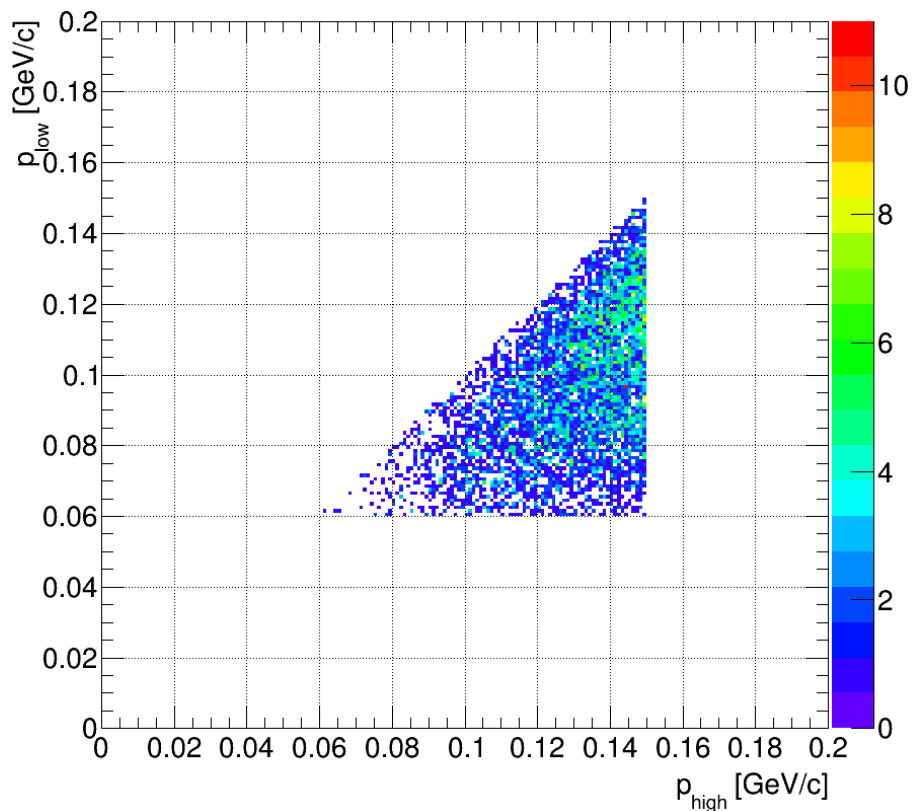
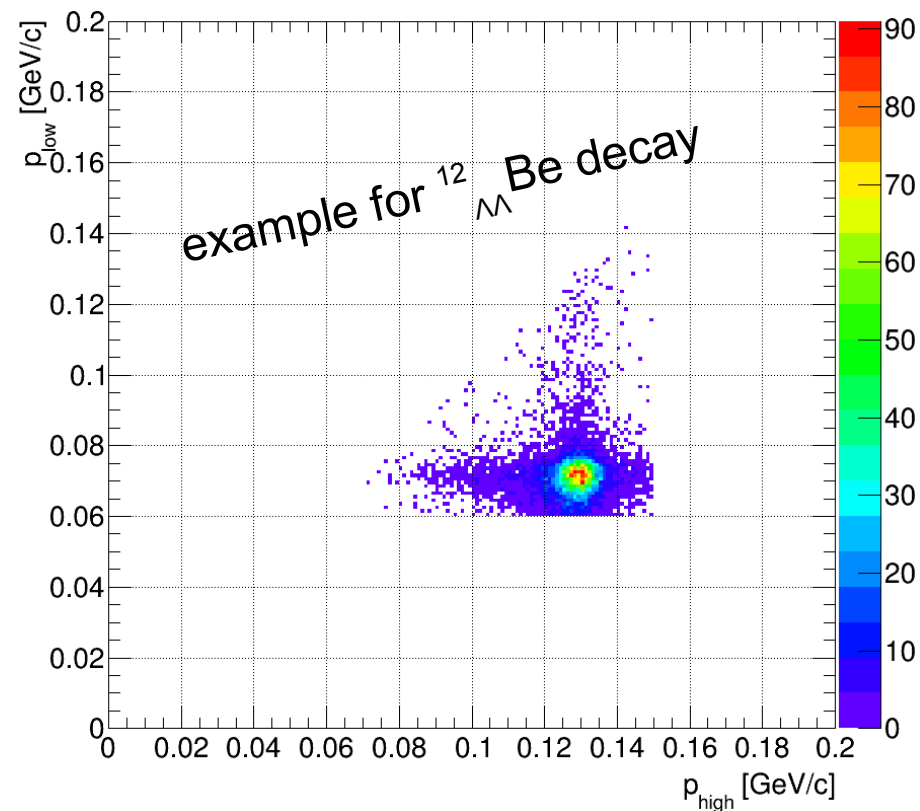POCAs for inclusive events (without Ξ^-)   POCAs for events with stopped Ξ^-

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π⁻ from weak hypernucleus decays have discrete momenta

POCAs for inclusive events (without Ξ⁻)   POCAs for events with stopped Ξ⁻

example for $^{12}_{\Lambda\Lambda}$Be decay

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π⁻ from weak hypernucleus decays have discrete momenta

POCAs for inclusive events (without Ξ⁻)   POCAs for events with stopped Ξ⁻

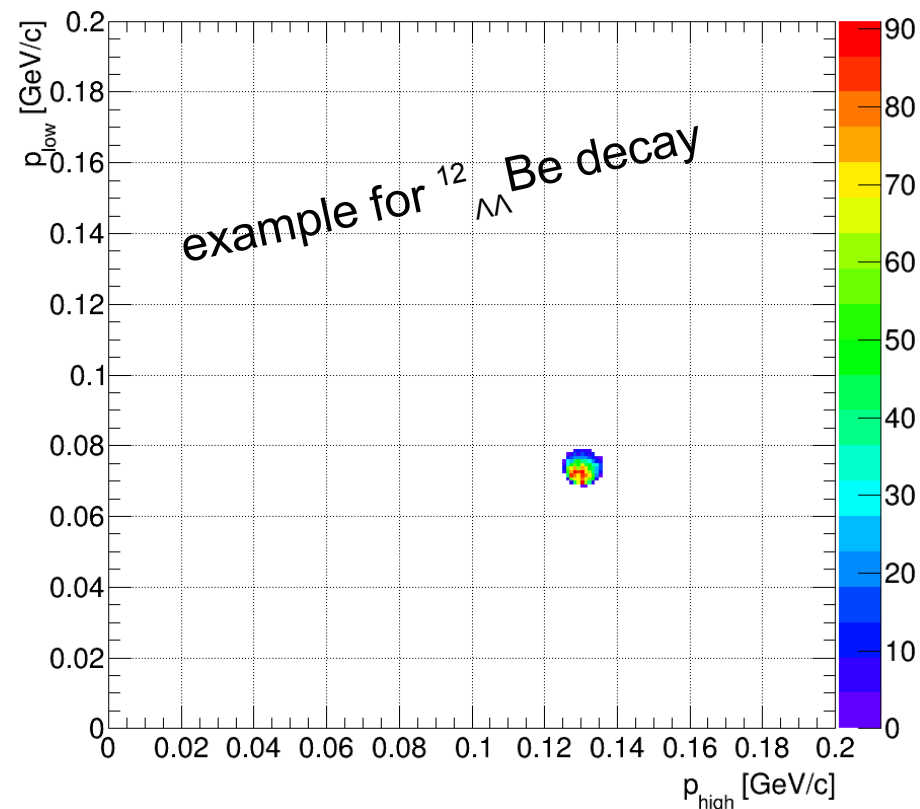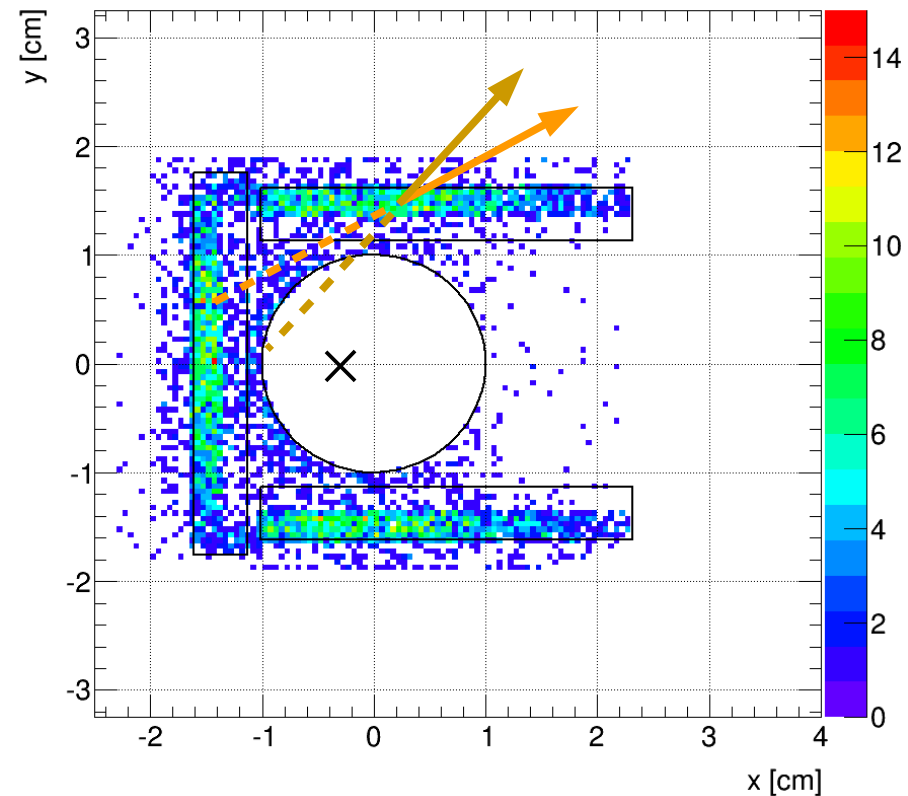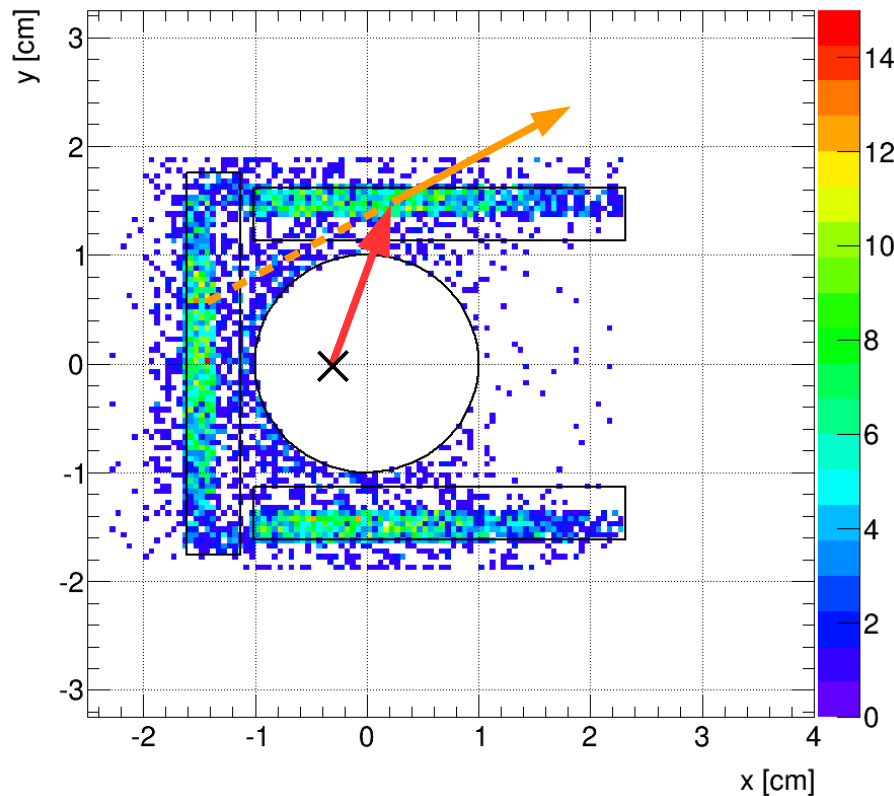example for $^{12}_{\Lambda\Lambda}$Be decay
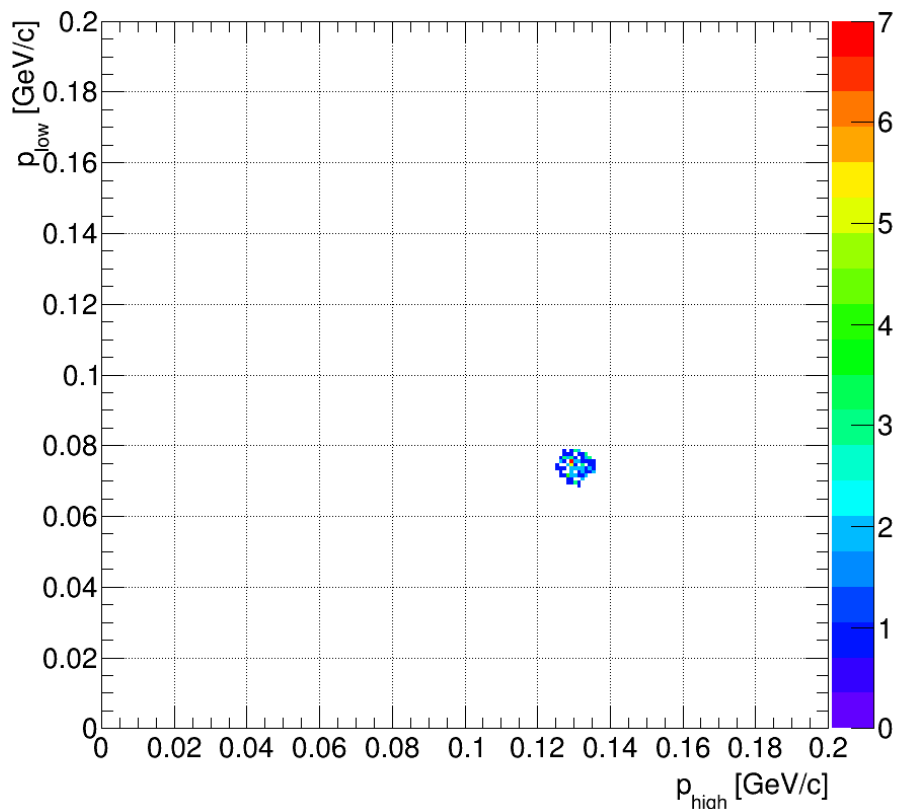
Primary π⁻ must not contribute $\Rightarrow$ larger distances of π⁻ tracks from primary vertex requested
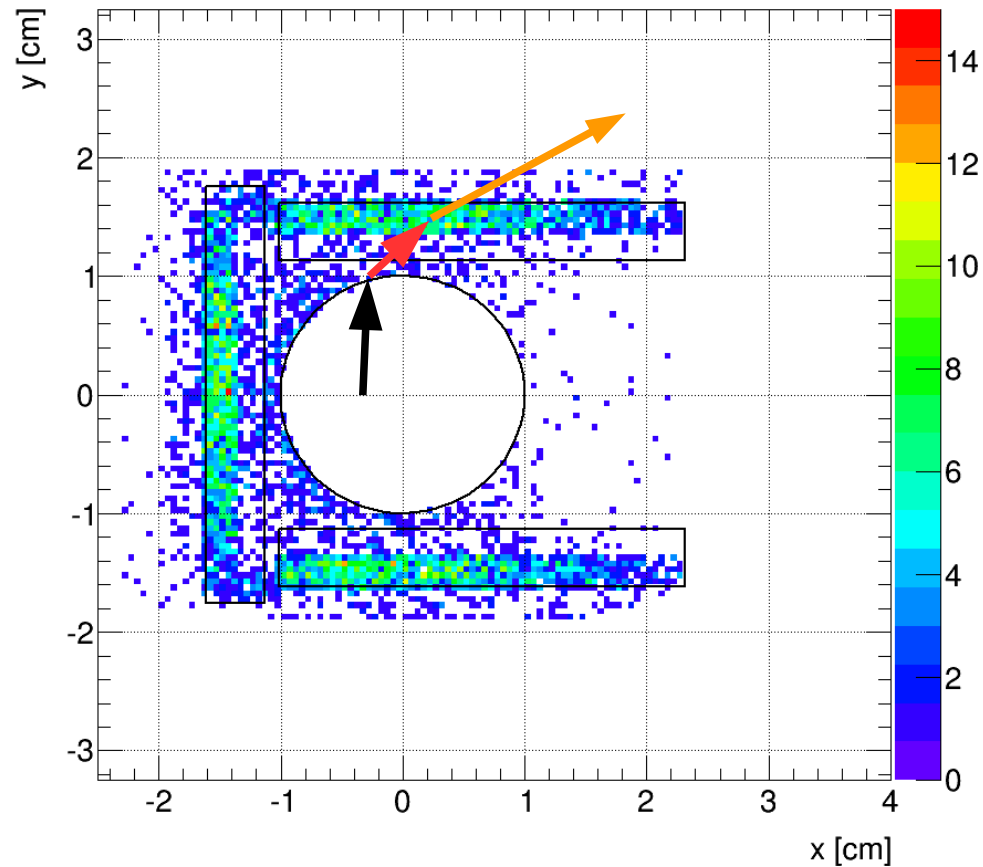
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Cut 5: Distance of π⁻ from vertex

Larger distances of π⁻ tracks from primary vertex requested
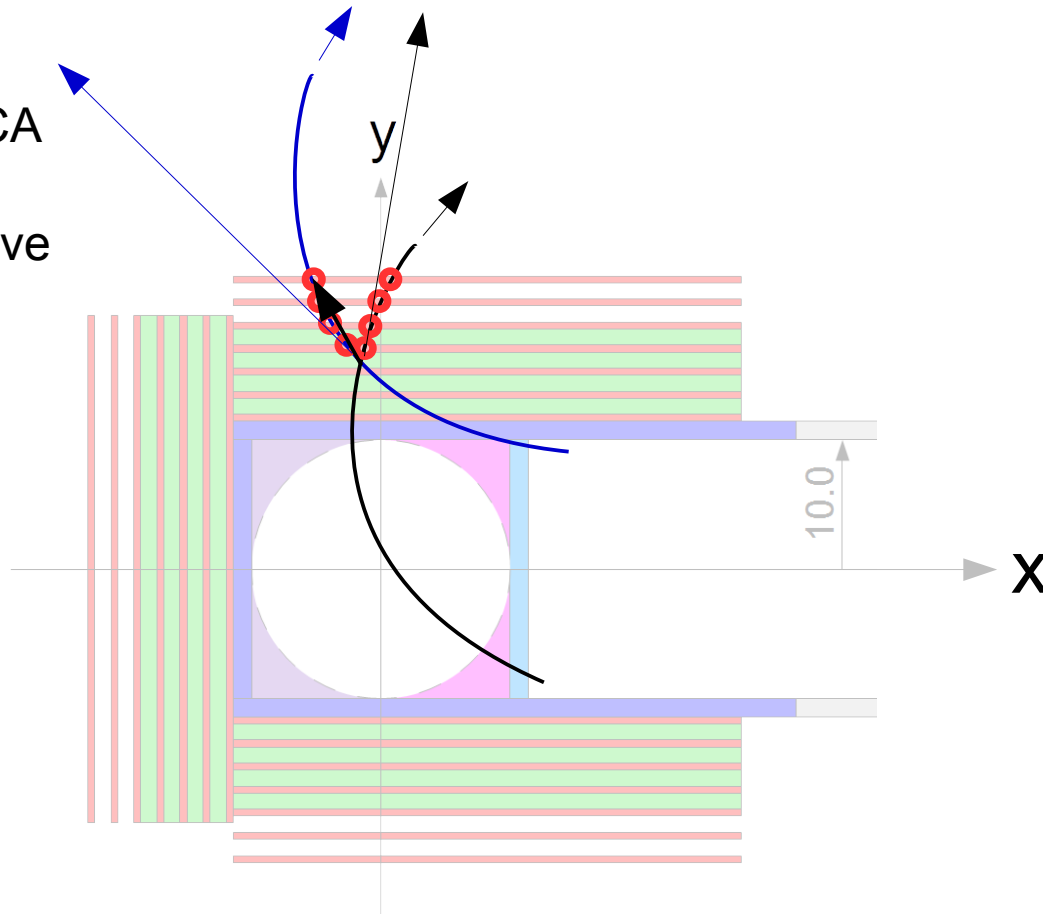
Histograms with the π⁻
closer to the primary vertex

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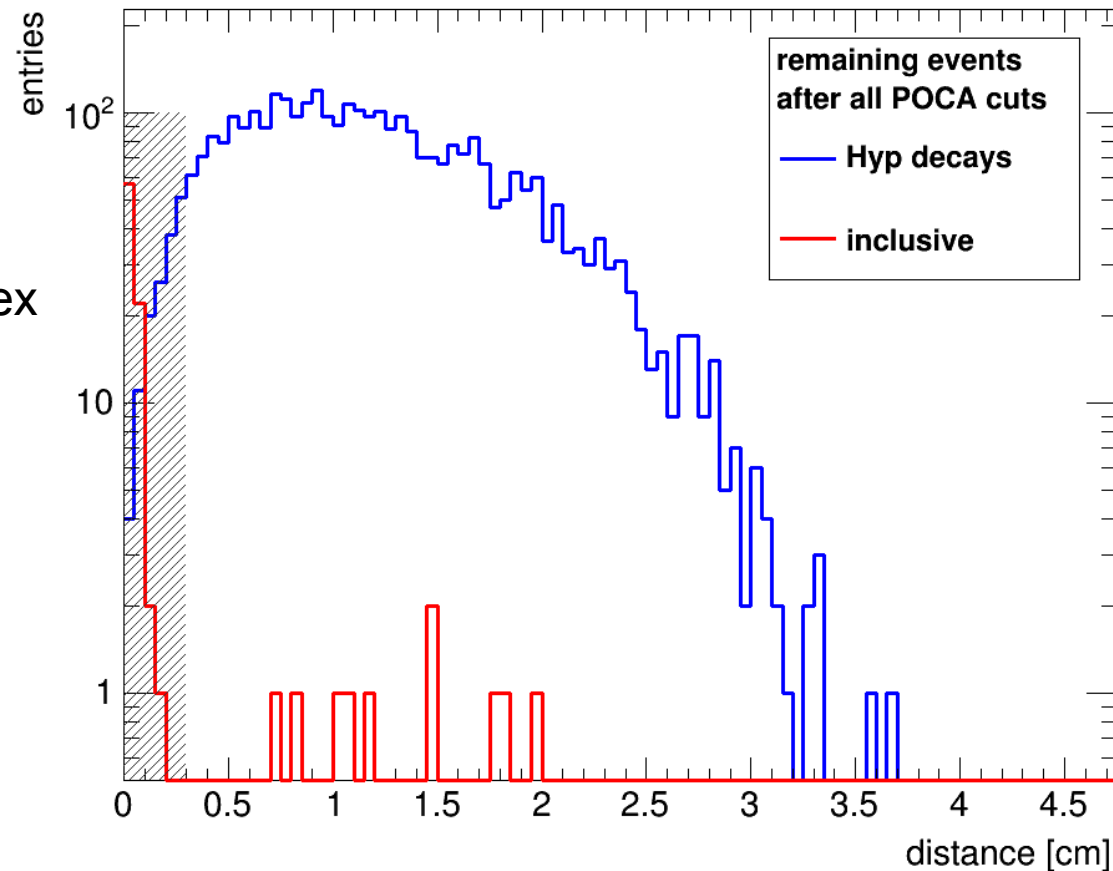
Cut 6: Direction cut

Multiple nuclear reactions request another cut: direction in the POCA

π⁻ out of the POCA
⇒ small angle
⇒ cosine is positive

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π⁻ into the POCA
⇒ large angle
⇒ cosine is negative

10.0

y

X

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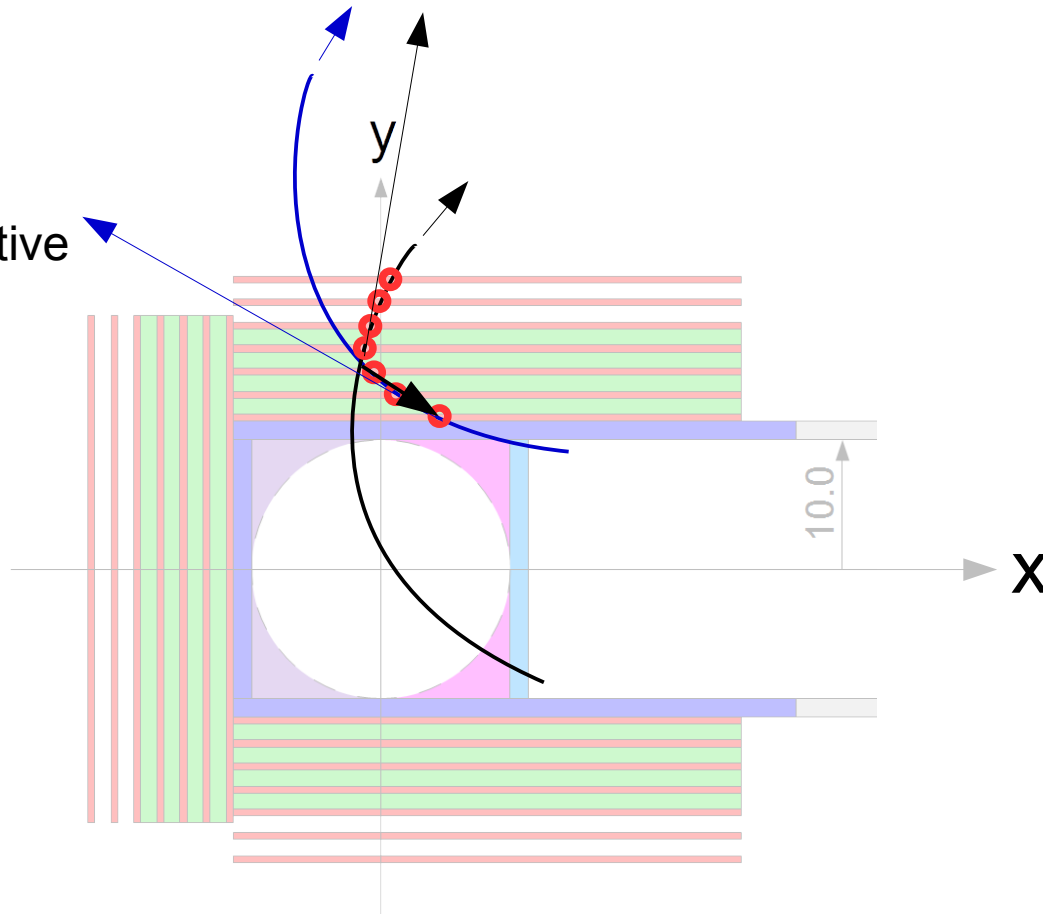
Determination of cosine for both π⁻ and every hit

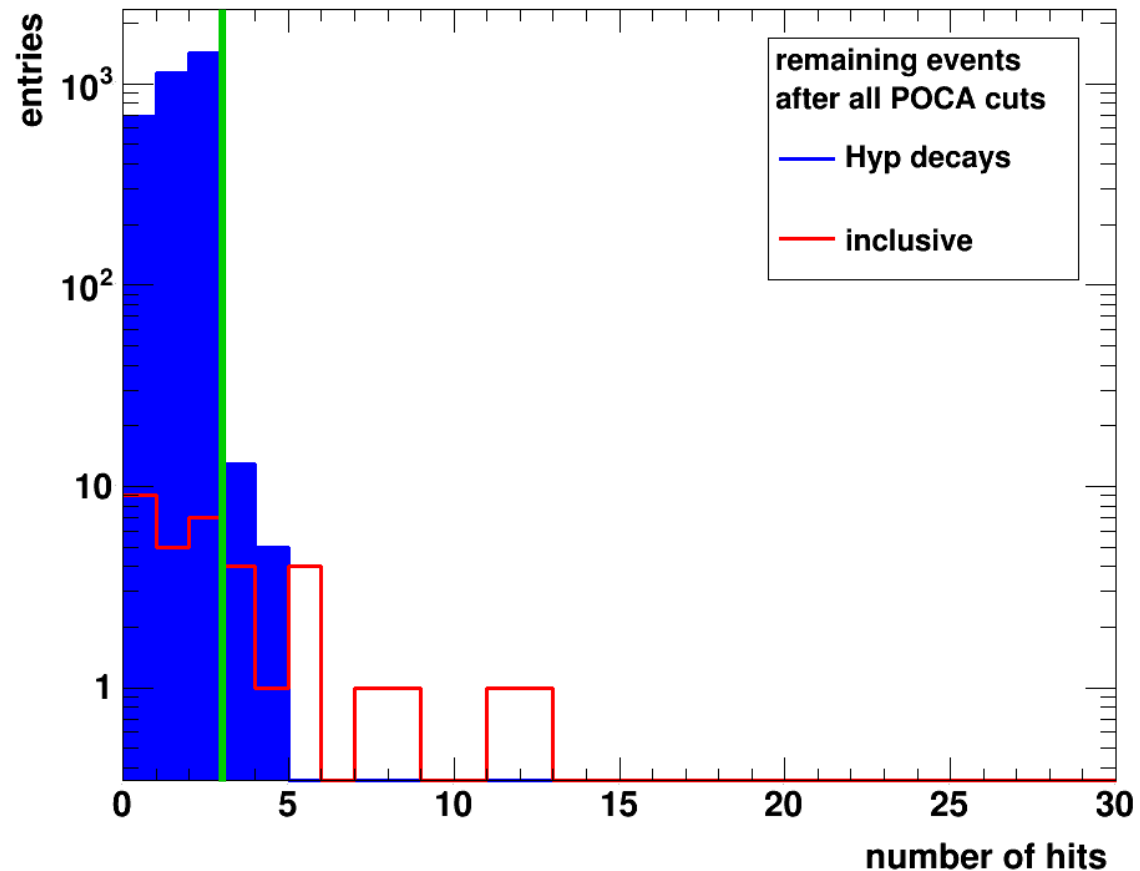Evaluation of hit number and energy loss in spheres around POCAs
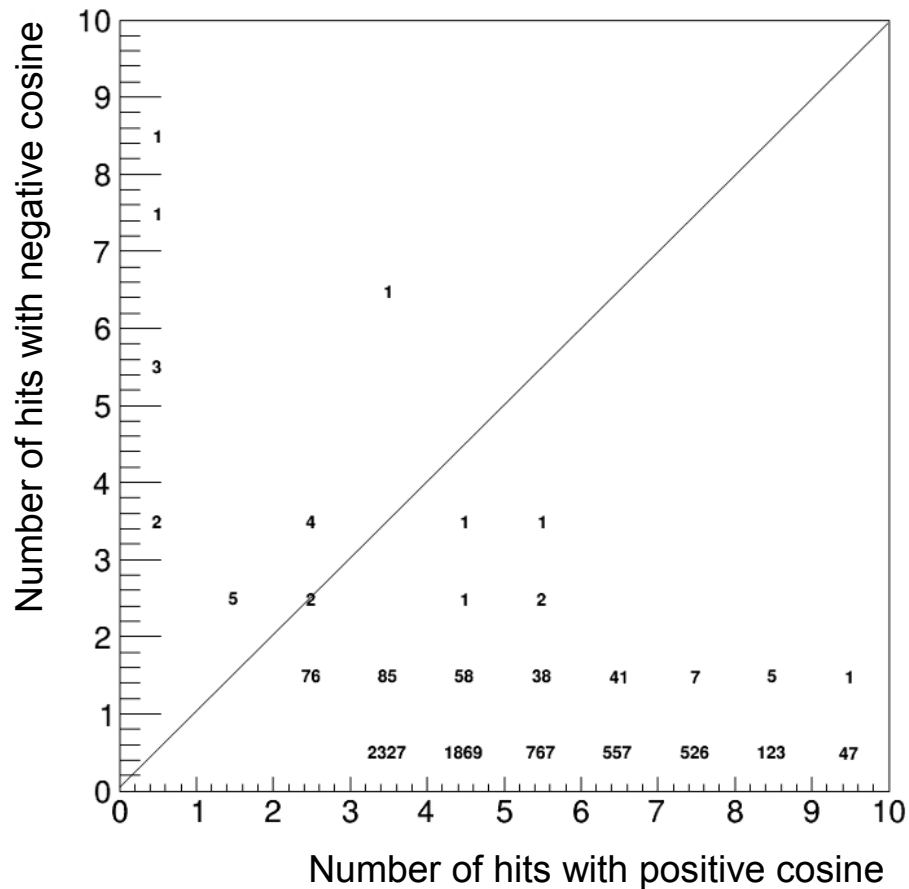
Cut 7: Hit number and energy loss

Evaluation of hit number and energy loss in spheres around POCAs

Example for sphere
with 1mm radius

→   cut in every
    histogram

Summary & Outlook

Summary:

Suppression of background events: $7.6 * 10^{-8}$

Suppression of signal events: 8.5 %

Outlook:

- From subsequent cuts to cuts on the whole statistics
- Optimization of the cuts

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