

VERTEX

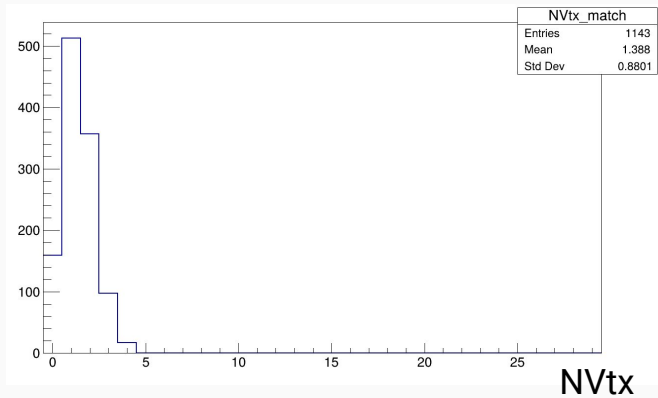
Efficiency study

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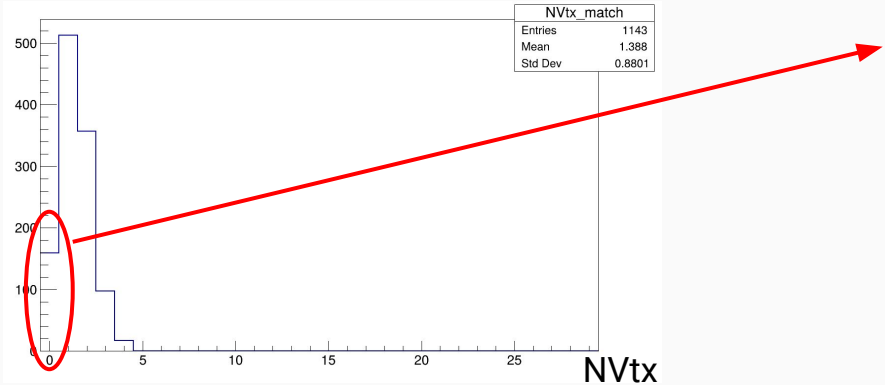
Efficiency studies

- ❖ Event with 1 BM_track in the vertex acceptance
- Multiplicity of vertex with check that there is a matched vertex

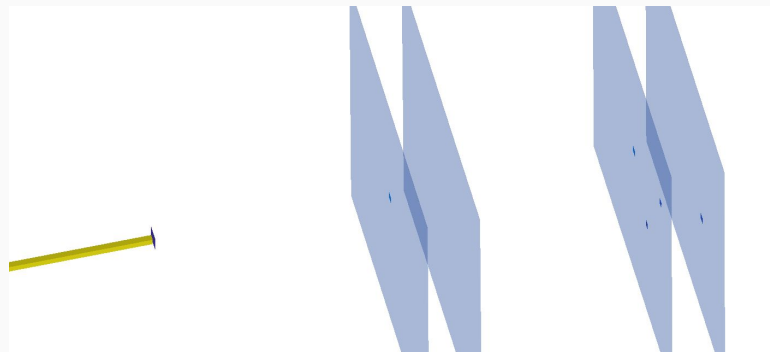
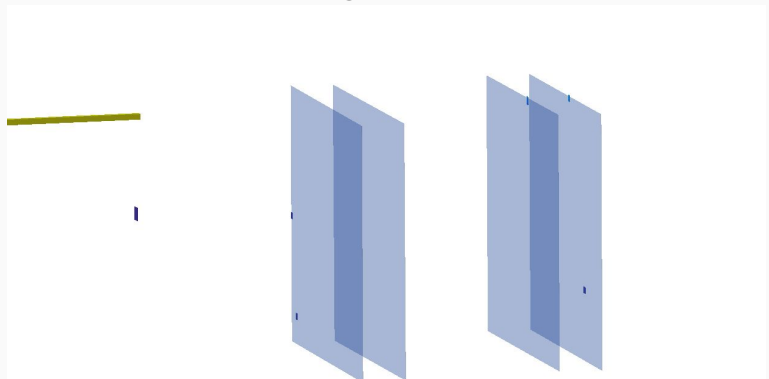


Efficiency studies

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- Multiplicity of vertex with check that there is a matched vertex



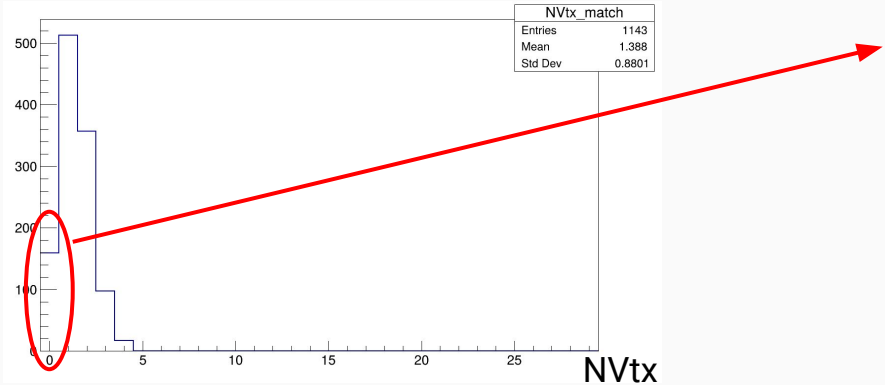
Bin 0 -> inefficiency_match



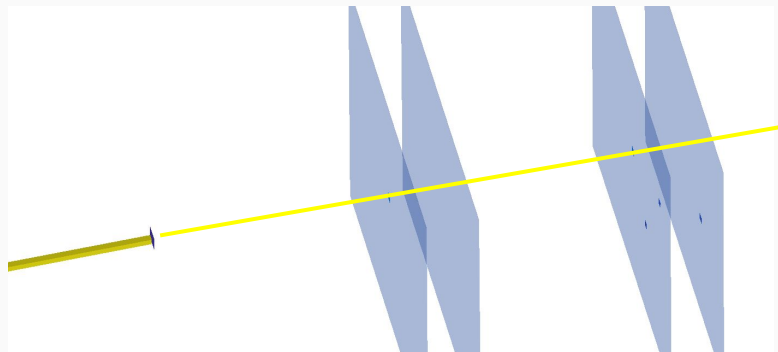
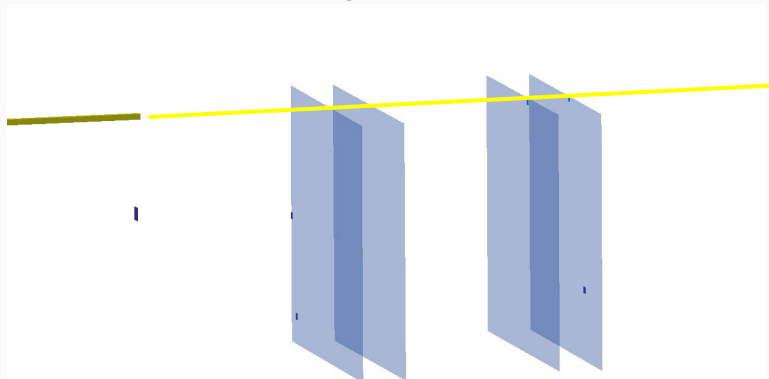
Event_display for C

Efficiency studies

- ❖ Event with 1 BM_track in the vertex acceptance
- Multiplicity of vertex with check that there is a matched vertex



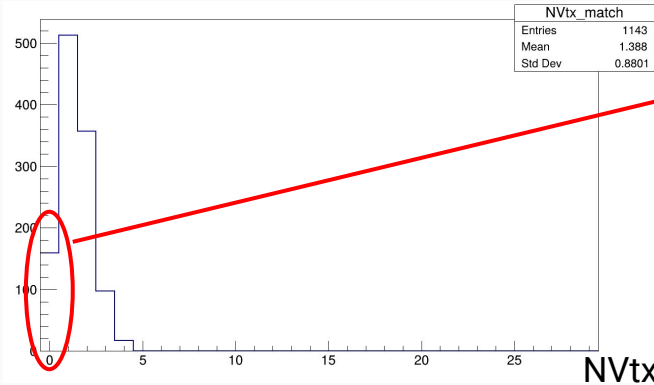
Bin 0 -> inefficiency_match



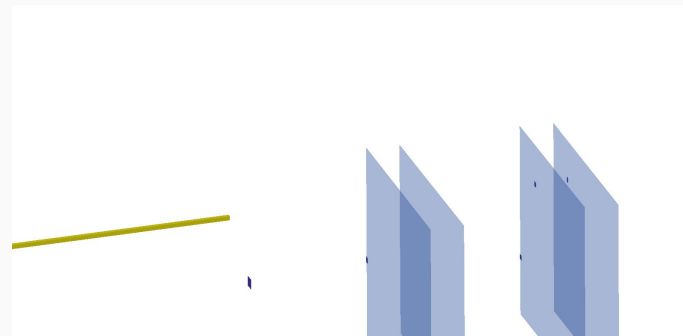
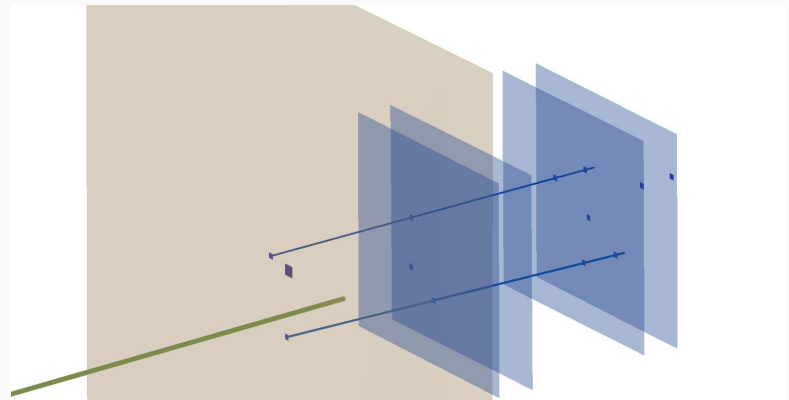
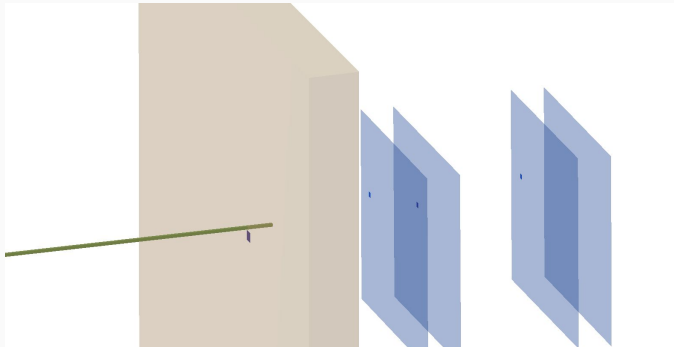
Event_display for C

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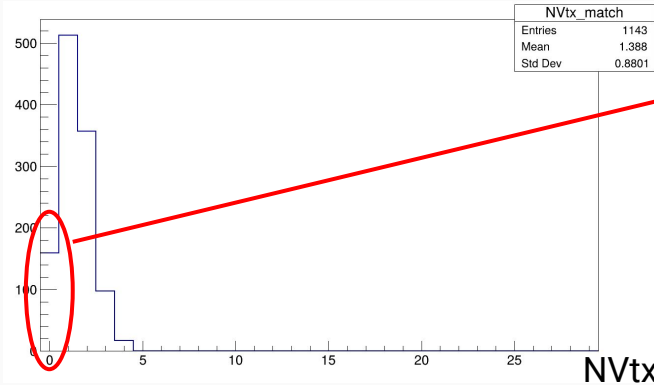
Bin 0 -> inefficiency_match



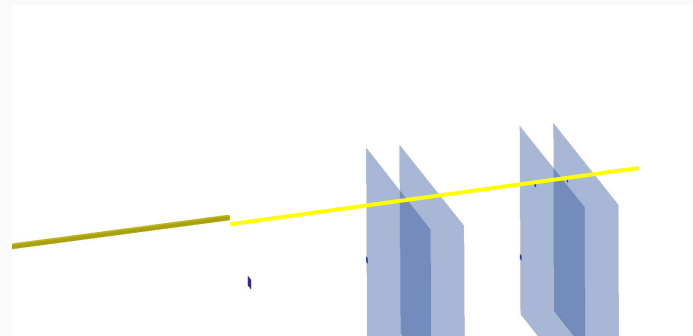
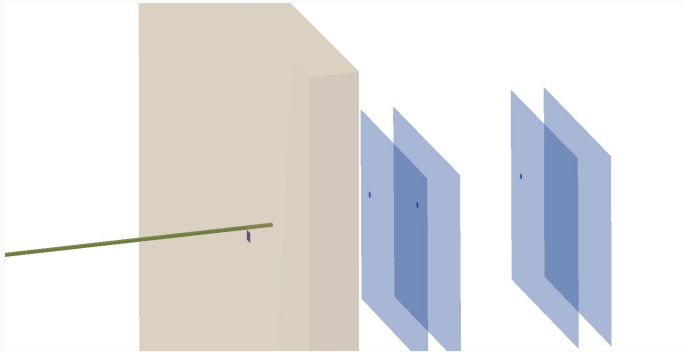
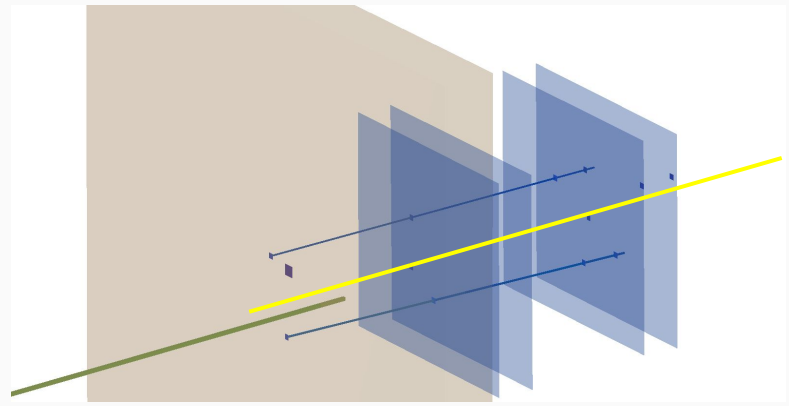
Event_display for p

Efficiency studies

- ❖ Event with 1 BM_track in the vertex acceptance
- Multiplicity of vertex with check that there is a matched vertex



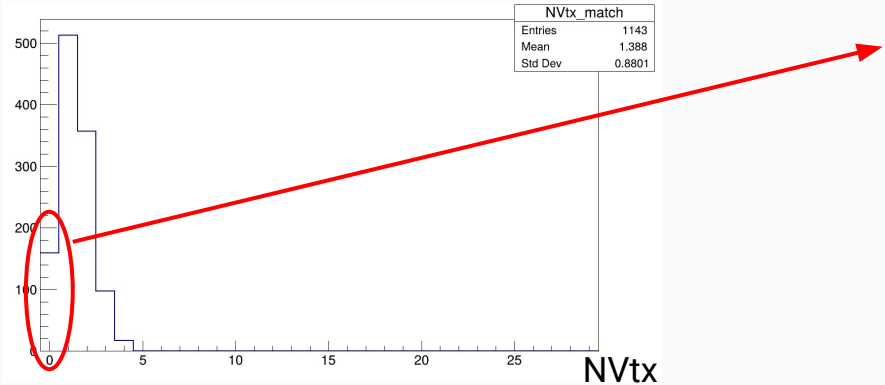
Bin 0 -> inefficiency_match



Event_display for p

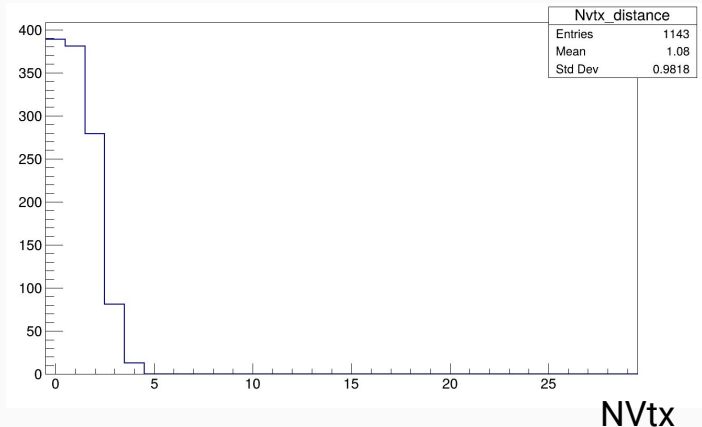
Efficiency studies

- ❖ Event with 1 BM_track in the vertex acceptance
- Multiplicity of vertex with check that there is a matched vertex



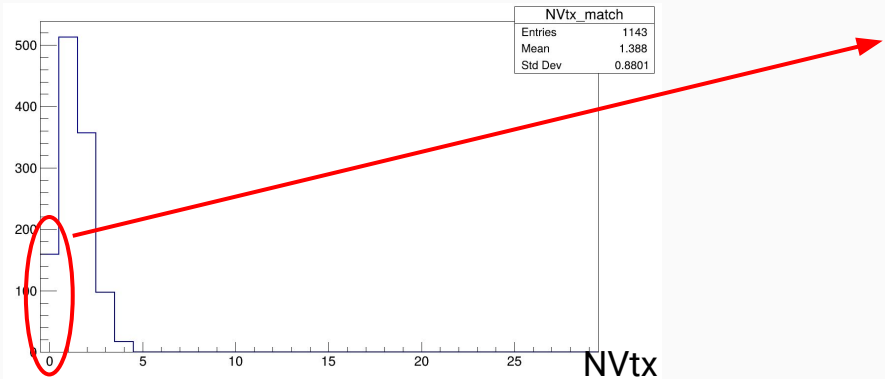
Bin 0 -> inefficiency_match

- Multiplicity of vertex (for protons vertex=track) with check that there is a matched vertex and that the distance between the BM_track projected on the target and the vertex is smaller than 0.4 cm



Efficiency studies

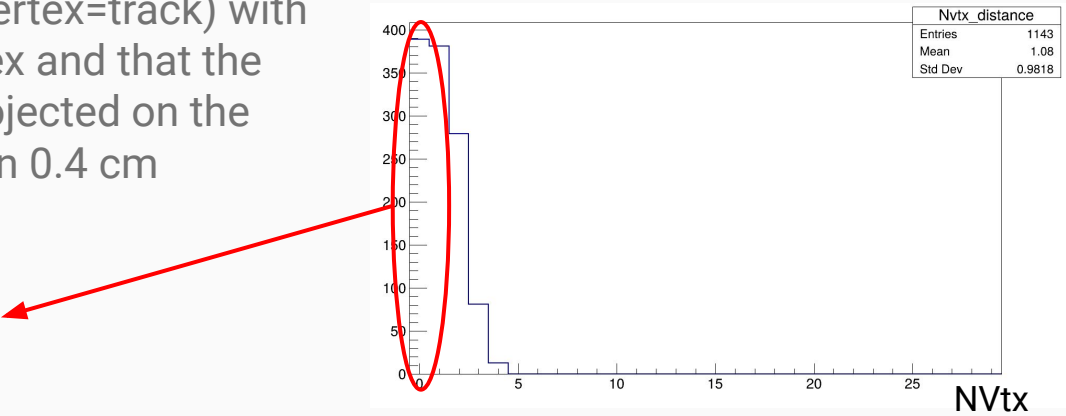
- ❖ Event with 1 BM_track in the vertex acceptance
- Multiplicity of vertex with check that there is a matched vertex



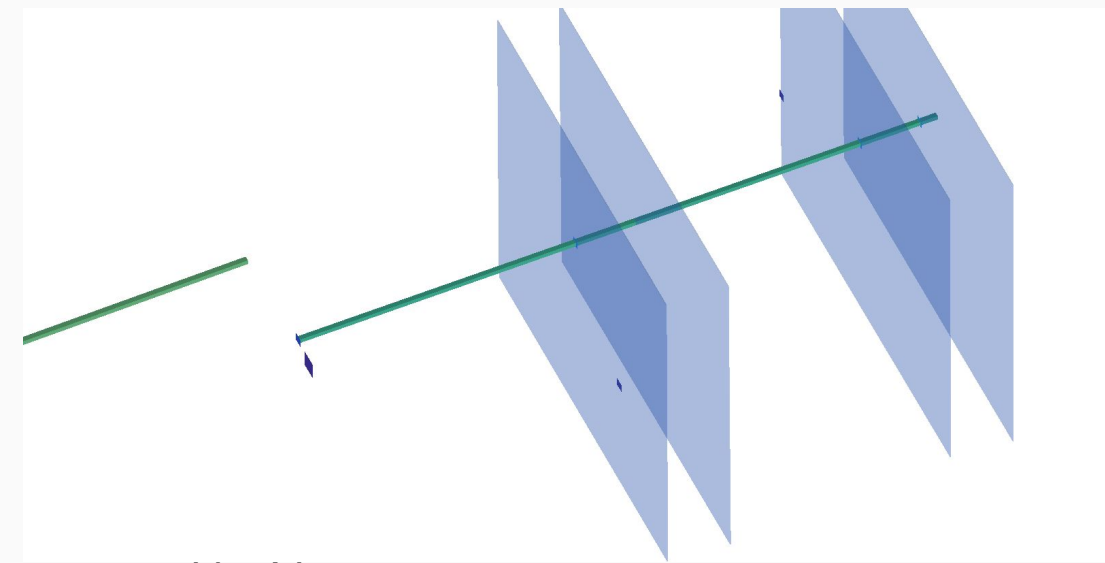
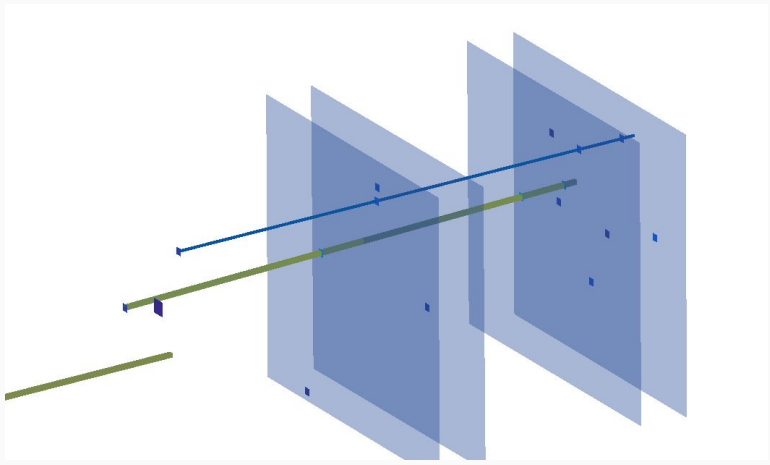
Bin 0 -> inefficiency_match

- Multiplicity of vertex (for protons vertex=track) with check that there is a matched vertex and that the distance between the BM_track projected on the target and the vertex is smaller than 0.4 cm

Bin 0 -> inefficiency_match_0.4

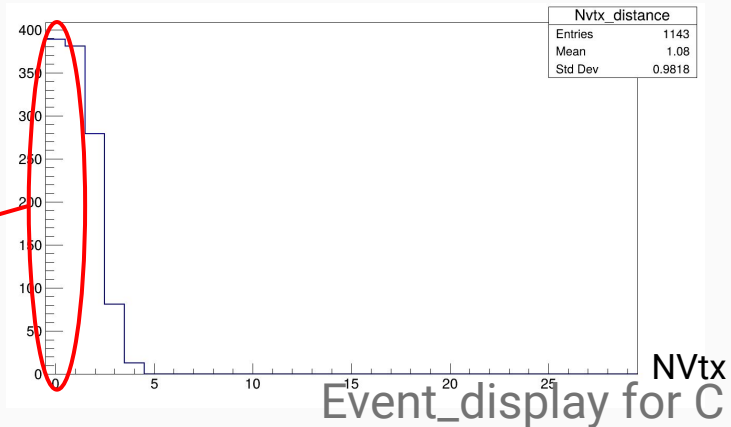


Efficiency studies

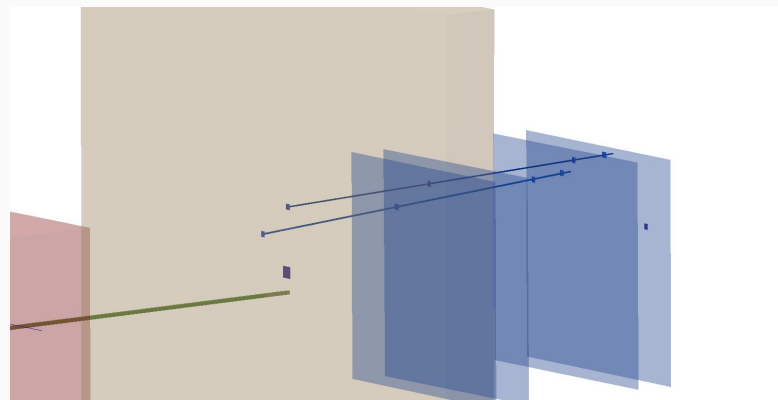
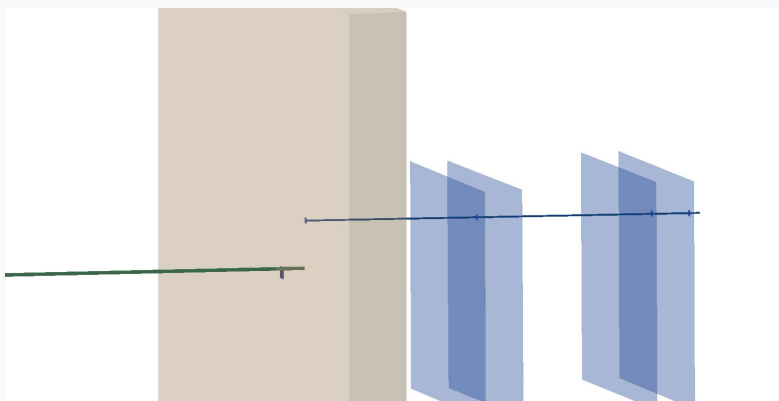


- Multiplicity of vertex (for protons vertex=track) with check that there is a matched vertex and that the distance between the BM_track projected on the target and the vertex is smaller than 0.4 cm

Bin 0 -> inefficiency_match_0.4

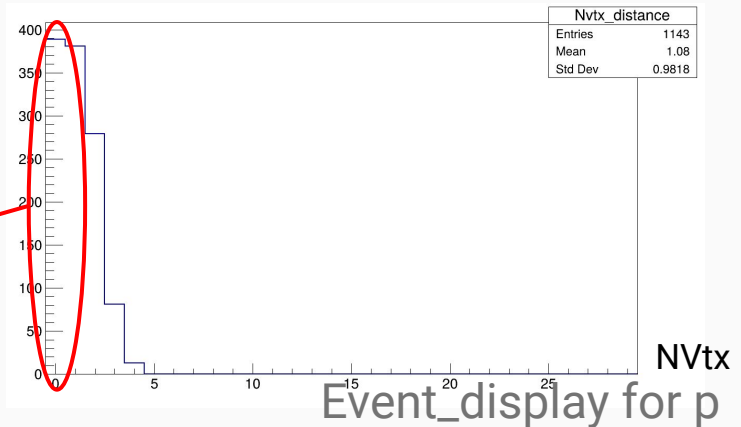


Efficiency studies



- Multiplicity of vertex (for protons vertex=track) with check that there is a matched vertex and that the distance between the BM_track projected on the target and the vertex is smaller than 0.4 cm

Bin 0 -> inefficiency_match_0.4



Runs with protons

“Run 6070-6075 vertex sensor
0 increase threshold of 10”

Run	DAQ event	Event: 1 BM_track in the vtx acceptance	Inefficiency_mach	Inefficiency_mach_0.4
6075	29198	1143	$(13.91 \pm 1.02)\%$	$(34.03 \pm 1.40)\%$
6076	4701	239	$(8.37 \pm 1.79)\%$	$(26.36 \pm 2.85)\%$
6077	2714	976	$(11.27 \pm 1.01)\%$	$(28.59 \pm 1.45)\%$
6078	4152	988	$(11.03 \pm 1.00)\%$	$(23.38 \pm 1.35)\%$
6079	9328	1941	$(11.13 \pm 1.71)\%$	$(29.42 \pm 1.03)\%$

- 125 MeV protons:
 - target: 2cm Al
 - MB trigger
 - no magnet
 - “Tracker test”

Run	DAQ event	Event: 1 BM_track in the vtx acceptance	Inefficiency_mach	Inefficiency_mach_0.4
6080	17077	330	$(9.70 \pm 1.63)\%$	$(30.30 \pm 2.53)\%$
6081	30237	625	$(7.68 \pm 1.07)\%$	$(26.56 \pm 1.77)\%$
6082	82051	1544	$(8.29 \pm 0.70)\%$	$(25.91 \pm 1.11)\%$
6083	22810	467	$(7.07 \pm 1.19)\%$	$(25.48 \pm 2.02)\%$
6084	164959	3282	$(7.68 \pm 0.46)\%$	$(25.96 \pm 0.77)\%$

- 125 MeV protons:
 - target: 2cm Al
 - TOF alone trigger
 - no magnet
 - “Tracker test”

- 200 MeV protons:
 - no target
 - TOF alone trigger
 - no magnet
 - “Tracker test”
 - “cluster size study, highest VTX IT threshold”

Run	DAQ event	Event: 1 BM_track in the vtx acceptance	Inefficiency_mat ch	Inefficiency_mat ch_0.4
6113	135351	128	(53.91 ± 4.41)%	(68.75 ± 4.10)%

- 100 MeV protons:
 - no target
 - TOF alone trigger
 - no magnet
 - “Tracker test”

Run	DAQ event	Event: 1 BM_track in the vtx acceptance	Inefficiency_mat ch	Inefficiency_mat ch_0.4
6115	45495	160	(30.00 ± 3.62)%	(48.75 ± 3.95)%
6116	96159	265	(40.00 ± 3.01)%	(61.89 ± 2.98)%

Runs with Carbon

Inefficiency_match= event with no matched vertex/event with 1 BM tracks in the vertex acceptance

Inefficiency_match_0.4= event with no vertex with a distance (BM-Vtx)<0.4 cm/event with 1 BM tracks in the vertex acceptance

- no target
- MB trigger
- “alignment with magnet”

Run	DAQ event	Event: 1 BM_track in the vtx acceptance	Inefficiency_match	Inefficiency_match_0.4
6093	150645	125473	(2.01 ± 0.04)%	(2.83 ± 0.05)%
6308	40769	57622	(2.51 ± 0.07)%	(4.29 ± 0.08)%

- no target
- MB trigger
- “alignment without magnet”

Run	DAQ event	Event: 1 BM_track in the vtx acceptance	Inefficiency_match	Inefficiency_match_0.4
6102	108606	89976	(1.81 ± 0.04)%	(2.39 ± 0.05)%
6103	15263	12656	(1.87 ± 0.12)%	(2.52 ± 0.14)%

- no target
- MB trigger
- magnet
- “background study”

Run	DAQ event	Event: 1 BM_track in the vtx acceptance	Inefficiency_match	Inefficiency_match_0.4
6117	93178	76846	(1.98 ± 0.05)%	(2.67 ± 0.06)%
6118	18960	15596	(1.88 ± 0.11)%	(2.60 ± 0.13)%
6119	23078	18888	(2.18 ± 0.11)%	(2.91 ± 0.12)%

Inefficiency of MC~ 0.26%

Next steps

- check of the work done, trying to improve the track selection criteria
 - estimate the efficiency of a single layer
 - turn on layer 2 where possible to see if we recover anything
 - VTX-DAQ synchronization checks
 - it is possible to estimate vtx efficiencies using MSD
-

With all the runs available the statistics remain low



we need data with protons and the BM optimized to detect them

CNAO2024

- scan with maximum threshold with protons and optimized BM to study CNAO2023 efficiencies
- scan in threshold to analyze the optimal configuration for efficiencies and keeping noise under control



Will it be possible to make a new Full setup acquisition in the 4 available days?

Thank you for your
attention!