

INTT クラスタ一検出効率 進捗報告

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現在の解析状況


- シミュレーションの解析が終わり、現在は実データの解析を行っている。
- 元々はppのデータを解析する予定であったが、ストリーミングデータしかないため、Cheng-Weiに用意してもらったAuAuのLow multiplicityのデータを解析している。
- 今回はその解析の進捗状況を報告する。

データの中身


Branches	example of the value	description
is_min_bias	0	Min. Bias. event
MBD_centrality	1	centrality
MBD_z_vtx	3.45	MBD vertex Z
NClus	4	INTT number of clusters
ClusLayer	(vector<int>*)0x4475a40	INTT cluster layer: 3, 4, 5, 6
ClusX	(vector<float>*)0x44627b0	cluster position [cm]
ClusY	(vector<float>*)0x4456650	cluster position [cm]
ClusZ	(vector<float>*)0x3f726f0	cluster position [cm]
ClusR	(vector<float>*)0x3f54930	cluster Radius [cm] w.r.t origin (0,0,0)
ClusPhi	(vector<float>*)0x4439870	cluster phi [radian] w.r.t origin (0,0,0)
ClusEta	(vector<float>*)0x3f77ff0	cluster eta w.r.t origin (0,0,0)
ClusAdc	(vector<unsigned int>*)0x4480330	cluster adc sum value
ClusPhiSize	(vector<float>*)0x2b048b0	cluster size
ClusLadderZId	(vector<unsigned char>*)0x438d550	cluster Z ID
ClusLadderPhiId	(vector<unsigned char>*)0x29d62d0	cluster ladder phi ID
InttBcoFullDiff_next	1256	event bco spacing btw this evt and next evt
INTTvtxZ	3.25	reco INTT vertex Z by CW
INTTvtxZError	0.13	reco INTT vertex Z error by CW
TrapezoidalFitWidth	2	reco INTT vertex Z QA quantity1 by CW
TrapezoidalFWHM	5	reco INTT vertex Z QA quantity2 by CW

イベントカット


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 is_min_bias = 1

 $-10 \leq \text{MBD_z_vtx} \leq 10$

 $15 \leq \text{NClus} \leq 150$

 InttBcoFullDiff_next > 61

 $-3.5 \leq \text{MBD_z_vtx} - \text{INTTvtxZ} \leq 4.5$

 $1.5 \leq \text{TrapezoidalFitWidth} \leq 10$

 $2 \leq \text{TrapezoidalFWHM} \leq 14$

現在考えている外層クラスターカット

- クラスター密度カット (現在: クラスター間距離 $d > 1\text{cm}$)
- ADC カット (現在: $60 \leq \text{ADC} \leq 255$)
- クラスター-size カット (現在: $\phi \text{ size} \leq 3$)

導入予定

- MultiPlicity カット
- Φ カット (バレル接合部エリアのカット)

検出効率の定義

$$\varepsilon = \frac{\textit{outer cluster of good pair}}{\textit{all outer cluster}^{\ast}}$$

※ *bad pair* + *No pair* + *good pair*

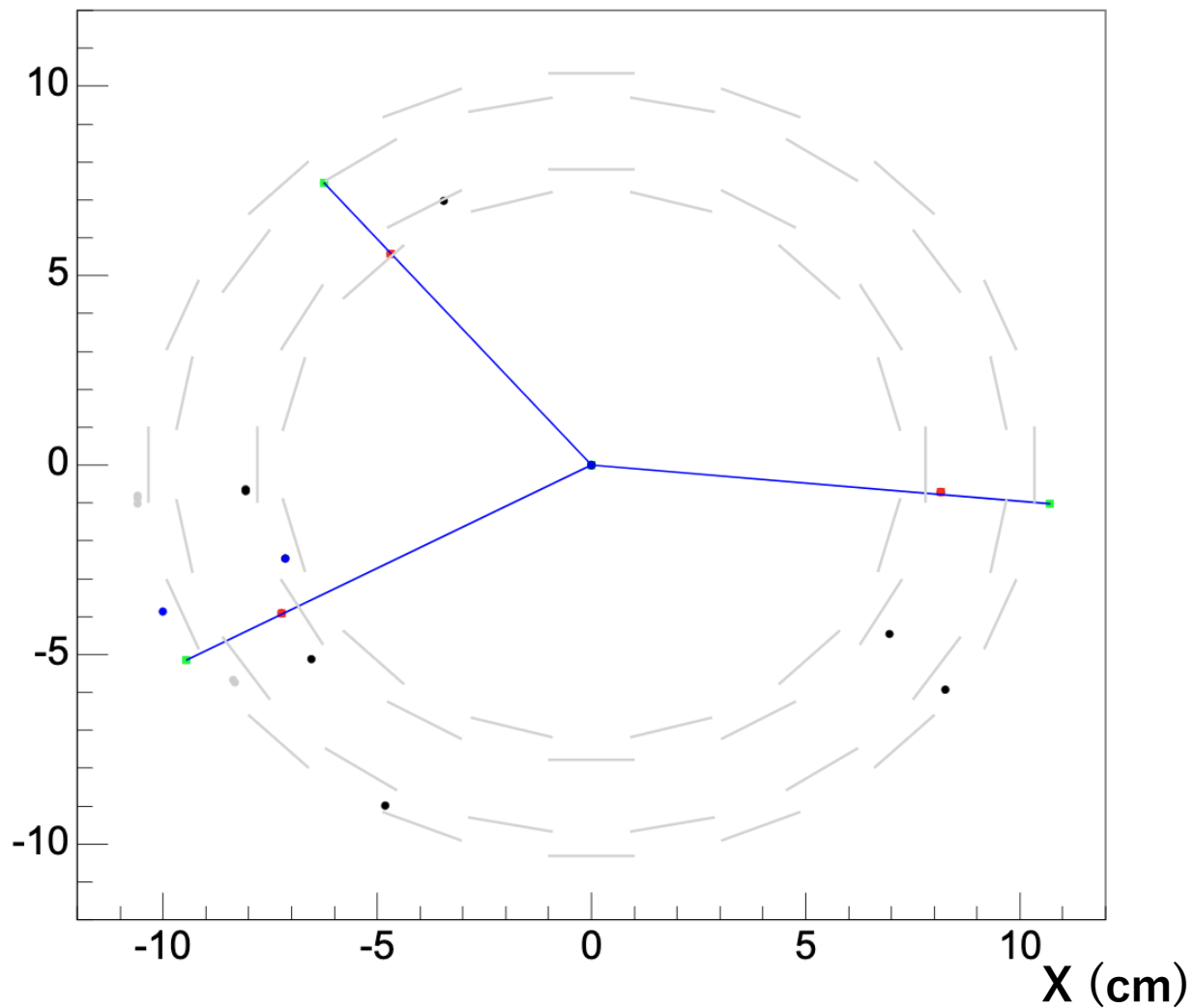
ペア条件

$$|\textit{residual XY}| < 2\text{cm} \ \&\& \ |\textit{residual RZ}| < 4\text{cm}$$

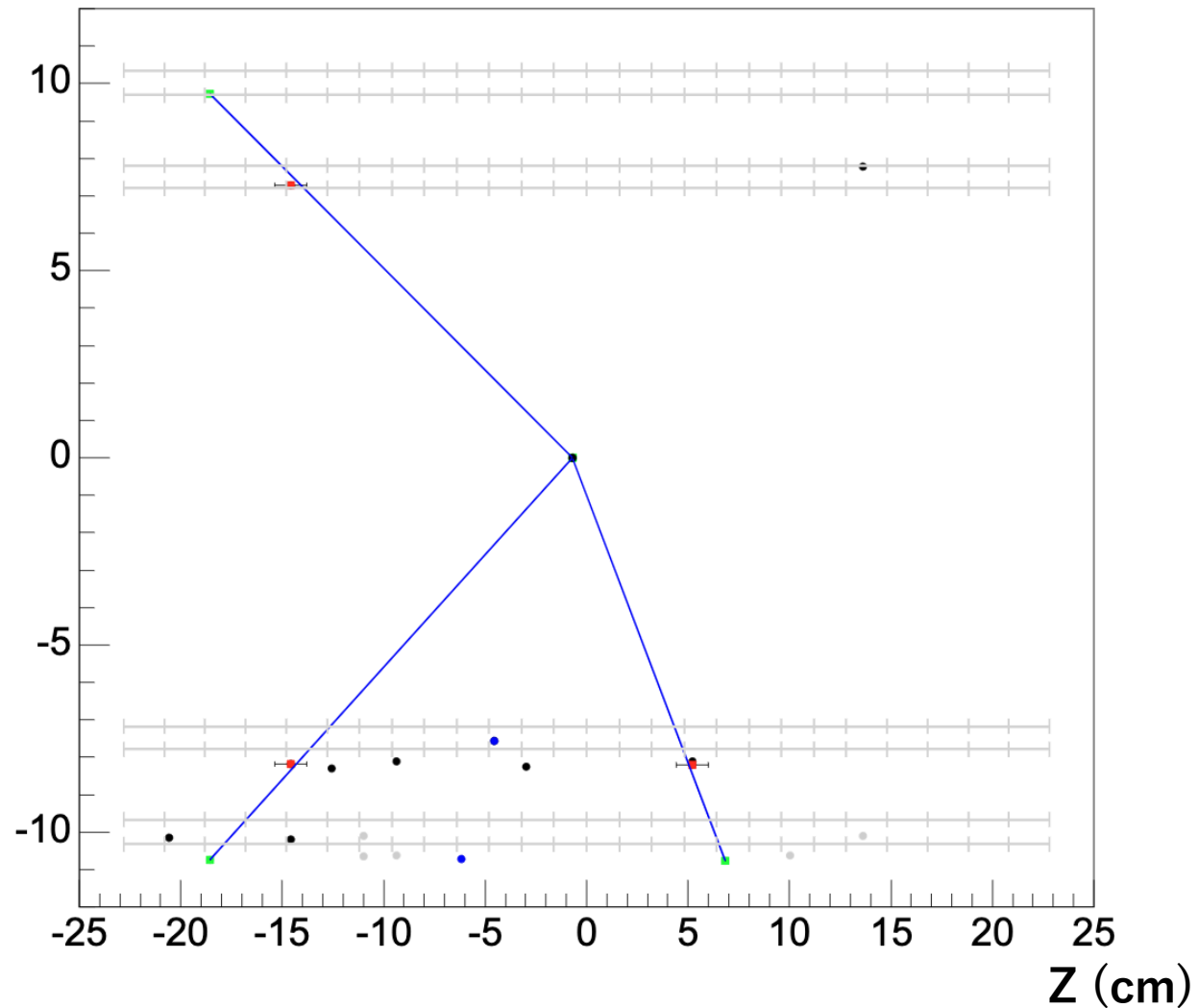
悪いクラスターがペアを作らないようにするため

Event Display

Y (cm)

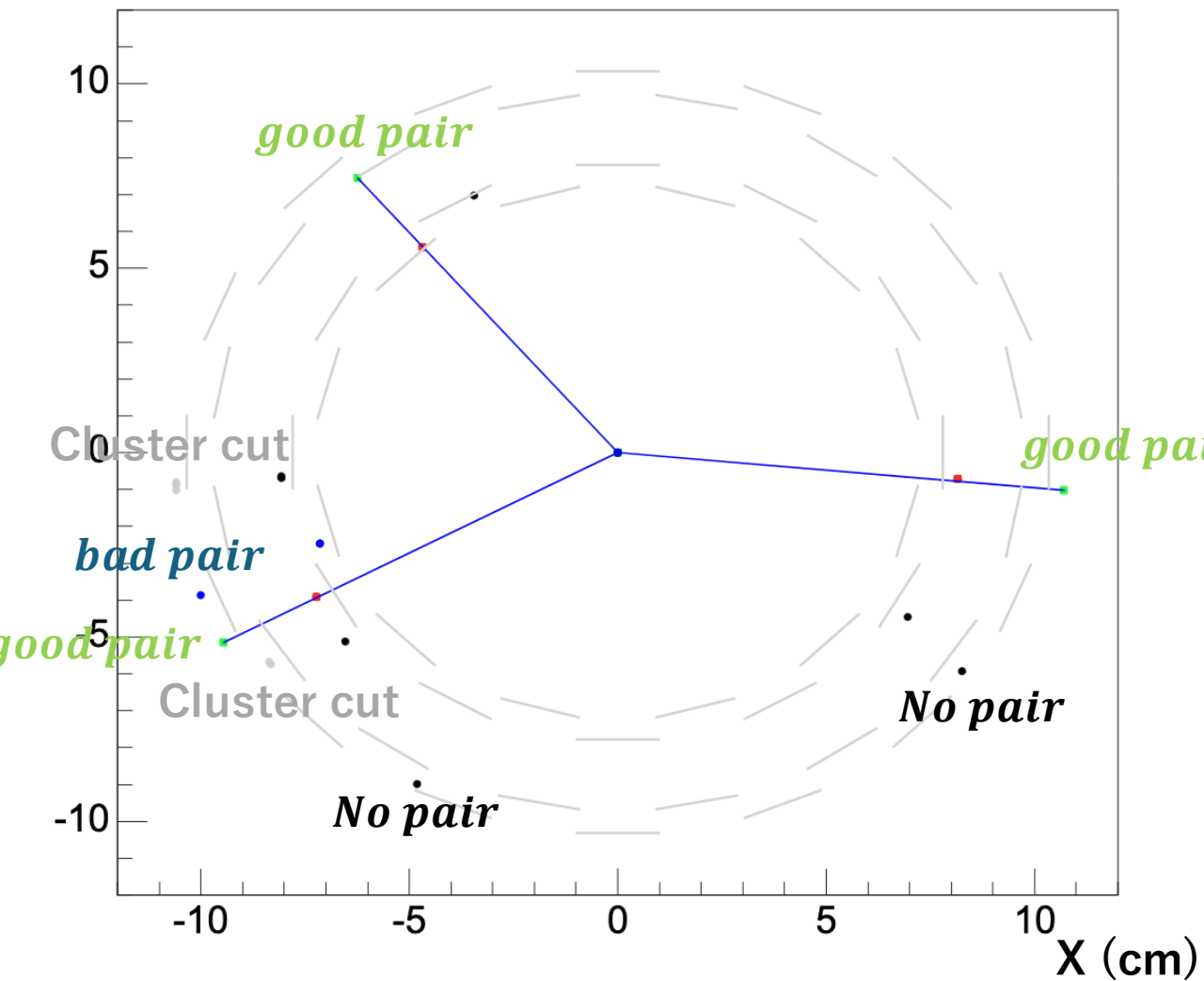


$R = \sqrt{x^2 + y^2}$ (cm)

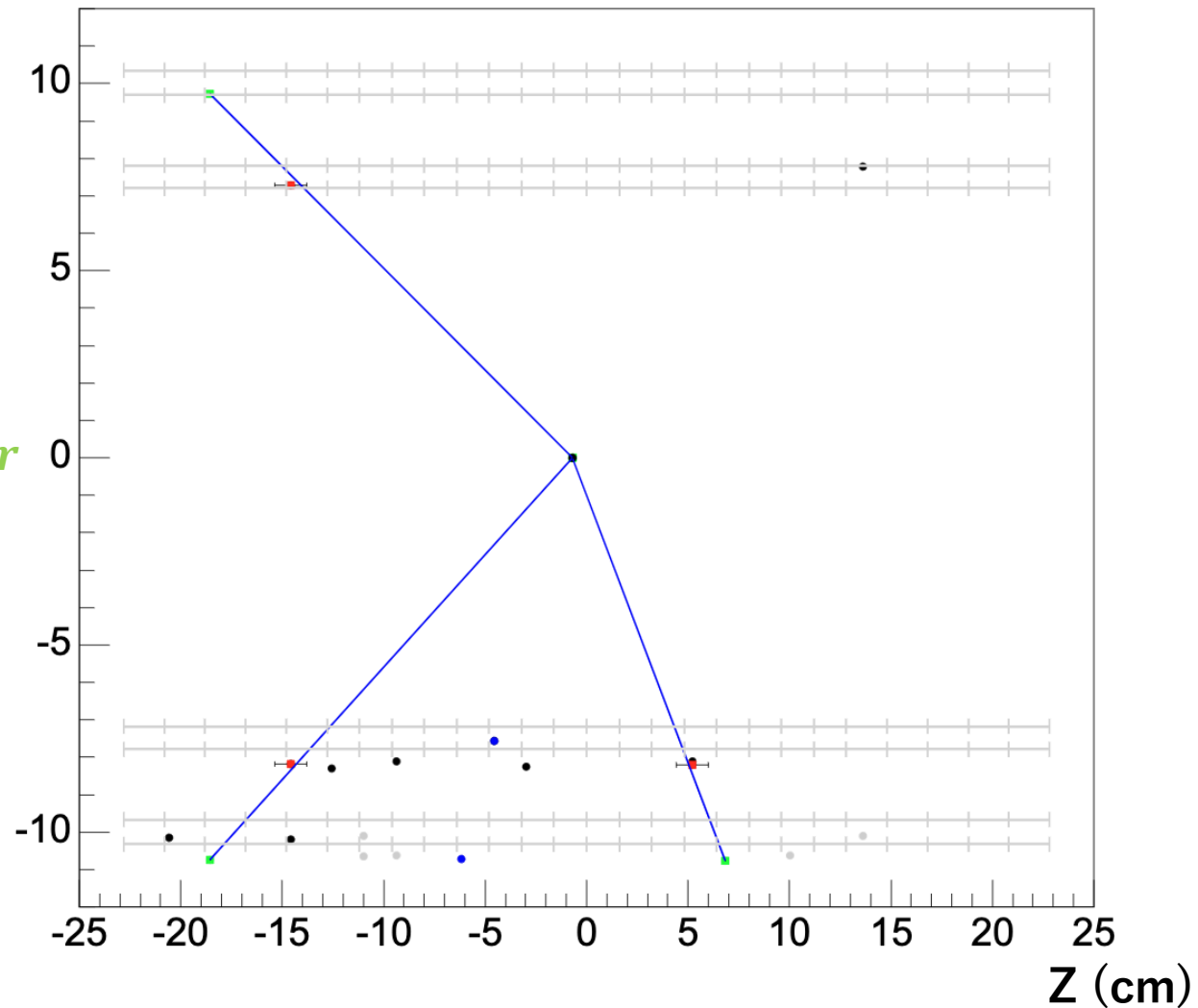


Event Display

Y (cm)

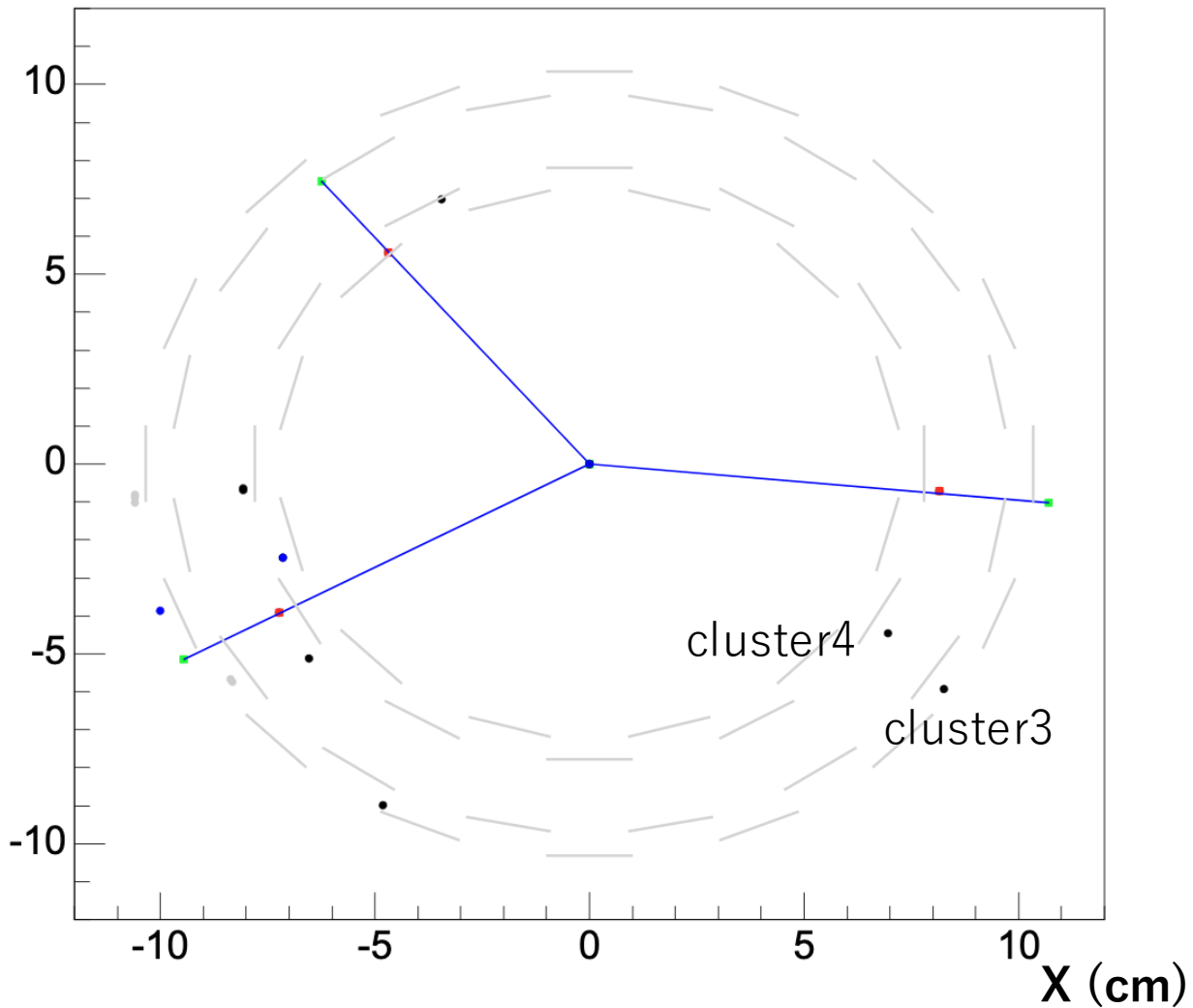


$R = \sqrt{x^2 + y^2}$ (cm)

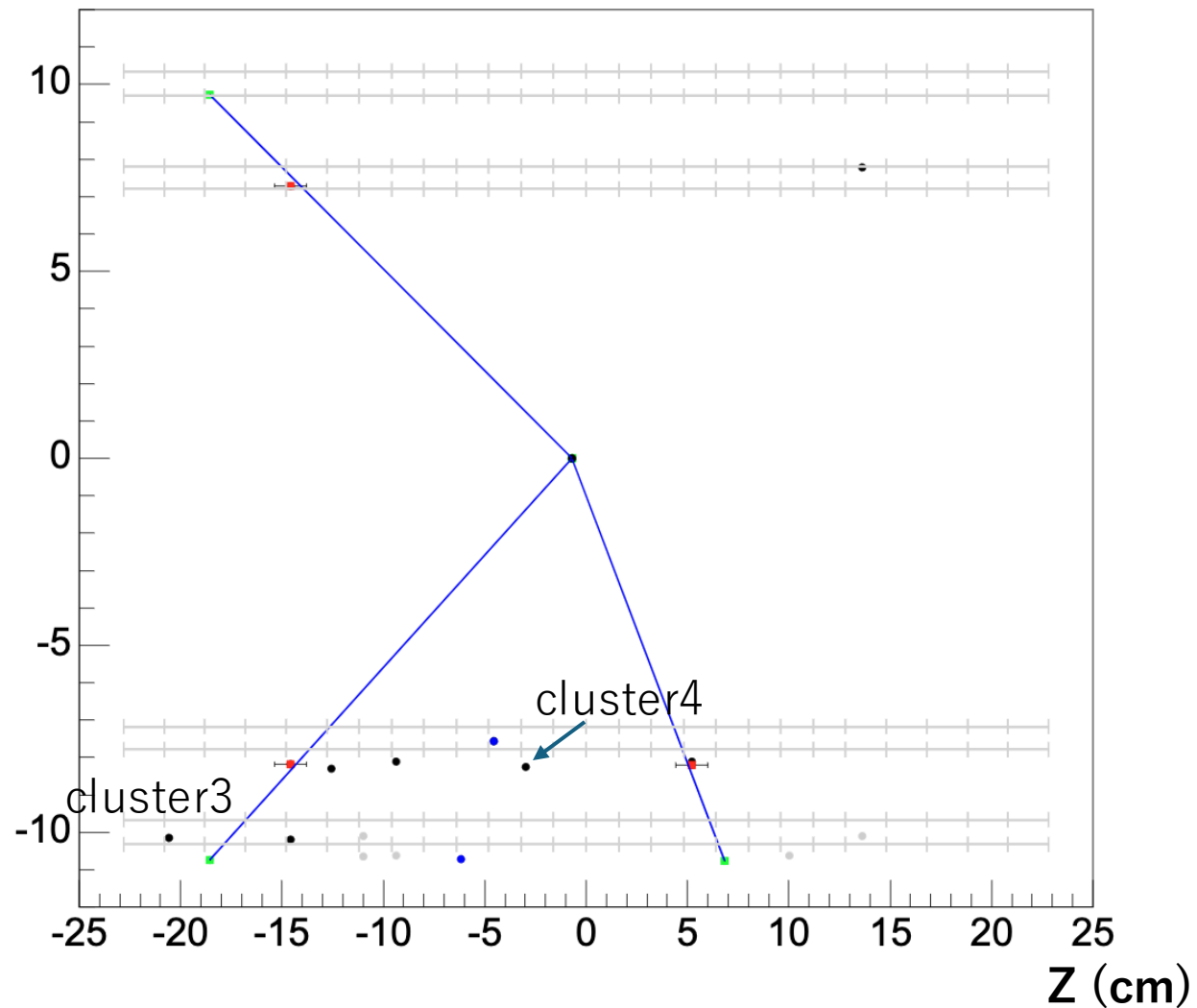


Event Display

Y (cm)

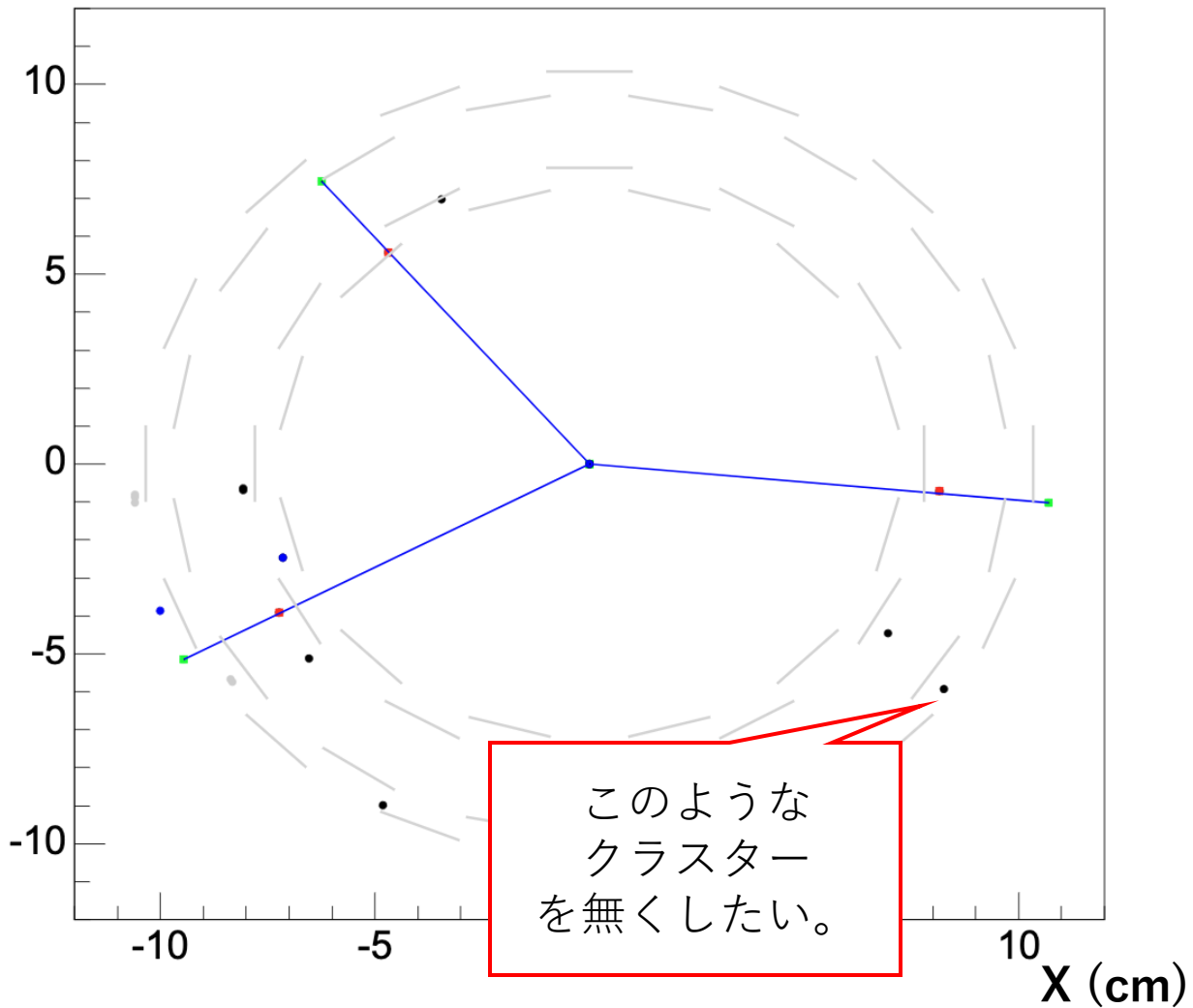


$R = \sqrt{x^2 + y^2}$ (cm)

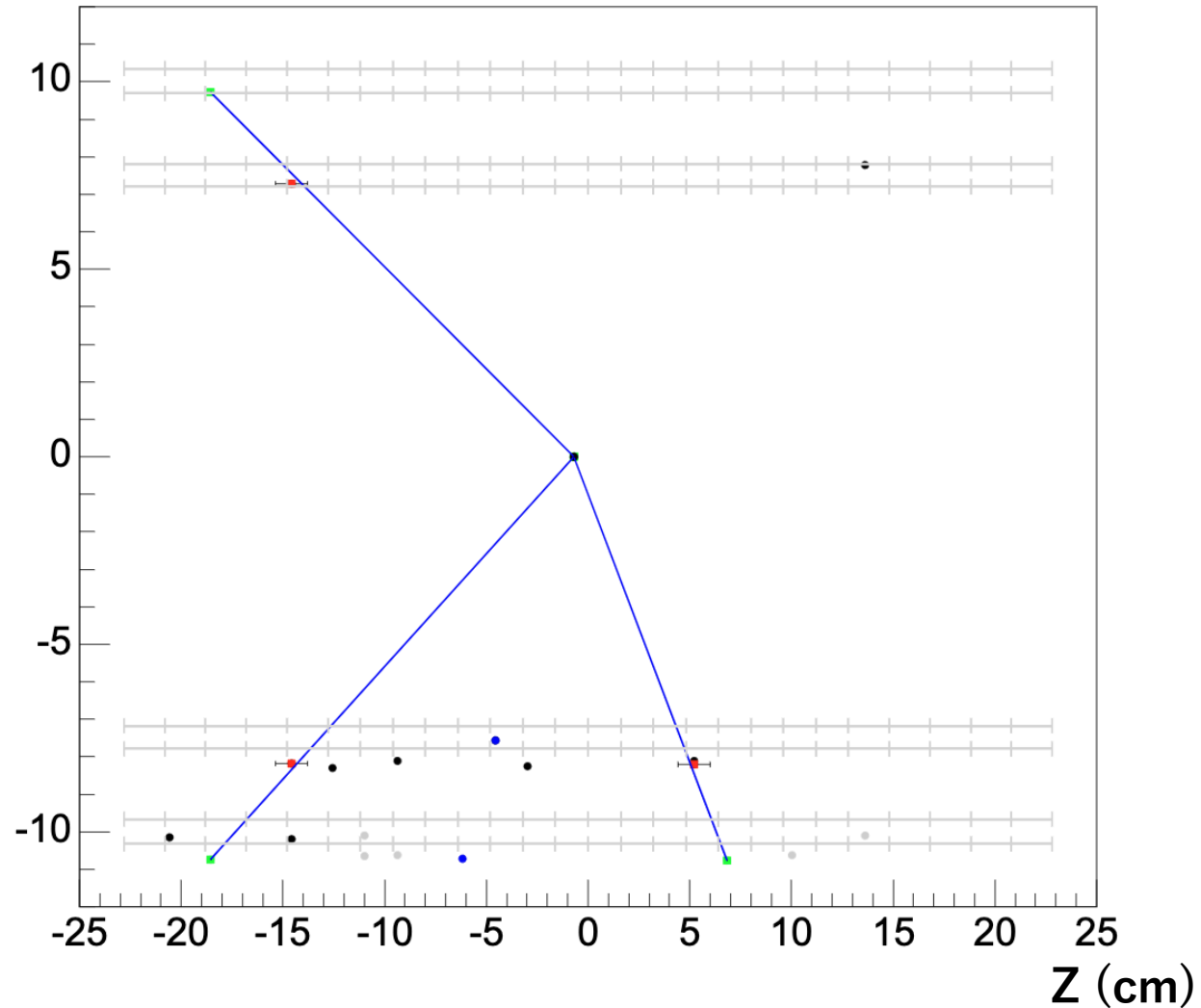


Event Display

Y (cm)



$R = \sqrt{x^2 + y^2}$ (cm)



bad pair

No pair

good pair

ADC Cut Scan (window = 2cm)

	No pair	Good pair	Efficiency
$0 \leq ADC \leq 35$	60	106	63.8%
$0 \leq ADC \leq 60$	337	981	74.4%
$60 \leq ADC \leq 90$	509	2016	79.8%
$60 \leq ADC \leq 180$	1187	4919	80.5%
$60 \leq ADC \leq 255$	1558	6324	80.2%
all	1978	7244	78.5%

Size Cut Scan (window = 2cm)

	No pair	Good pair	Efficiency
<i>size</i> ≤ 1	976	4123	80.85%
<i>size</i> ≤ 2	1152	4900	80.96%
<i>size</i> ≤ 3	1183	4918	80.6%
all	1187	4919	80.5%

Multiplicity Cut Scan (window = 2cm)

	No pair	Good pair	Efficiency
$15 \leq N_{clus} \leq 30$	1134	2802	71.18%
$30 \leq N_{clus} \leq 60$	1292	4629	78.17%
$60 \leq N_{clus} \leq 90$	1346	5731	80.98%
$90 \leq N_{clus} \leq 120$	1087	5572	83.67%
$120 \leq N_{clus} \leq 150$	1152	4900	86.7%
all	1978	7244	80.96%

Multiplicity Cut Scan

window =1mm

	Efficiency
$15 \leq Nclus \leq 30$	52.89%
$60 \leq Nclus \leq 90$	57.27%
$120 \leq Nclus \leq 150$	58.76%
all	57.00%

window =5mm

	Efficiency
$15 \leq Nclus \leq 30$	62.70%
$60 \leq Nclus \leq 90$	67.85%
$120 \leq Nclus \leq 150$	69.24%
all	67.10%