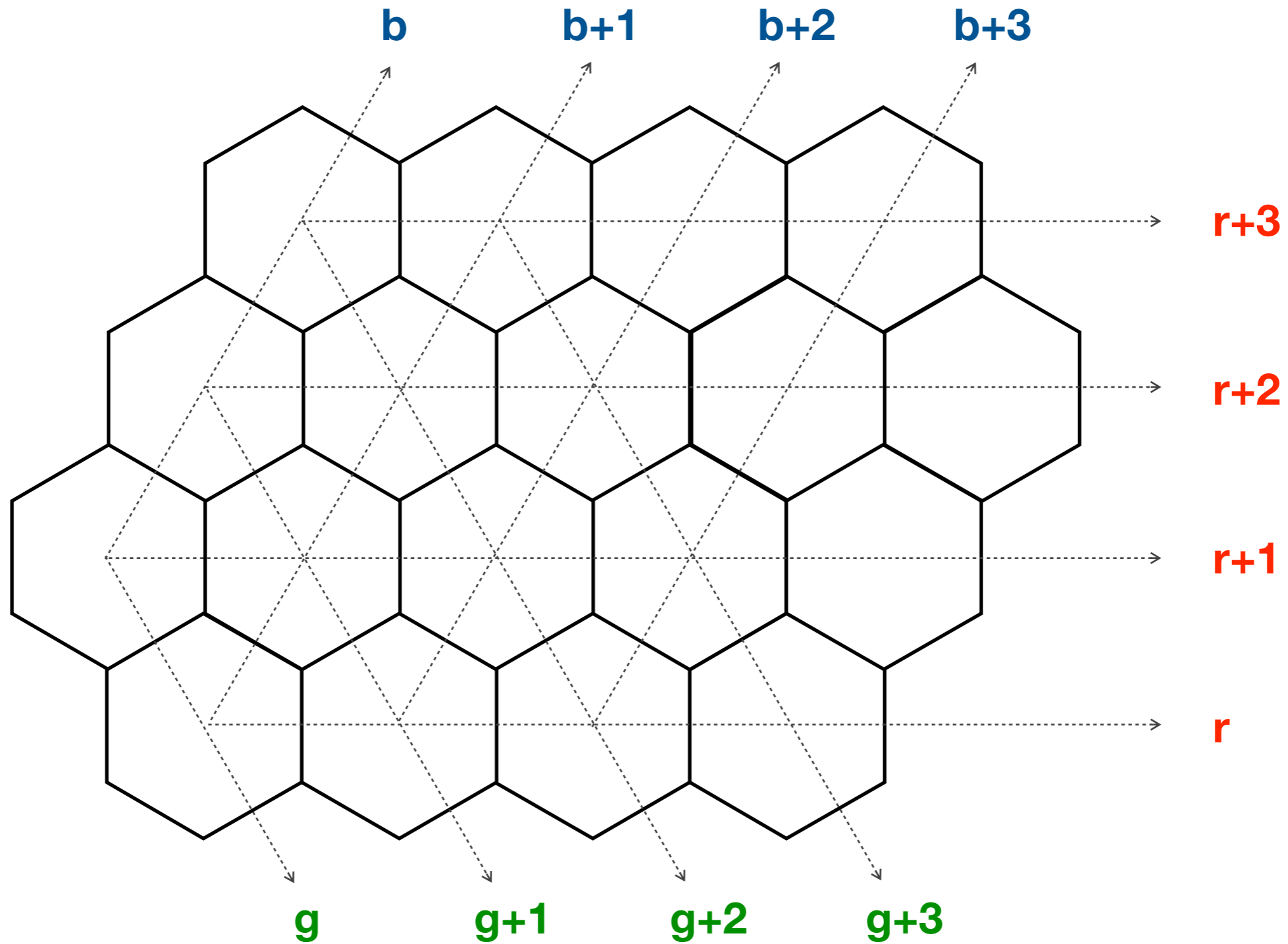


TPC Simulation

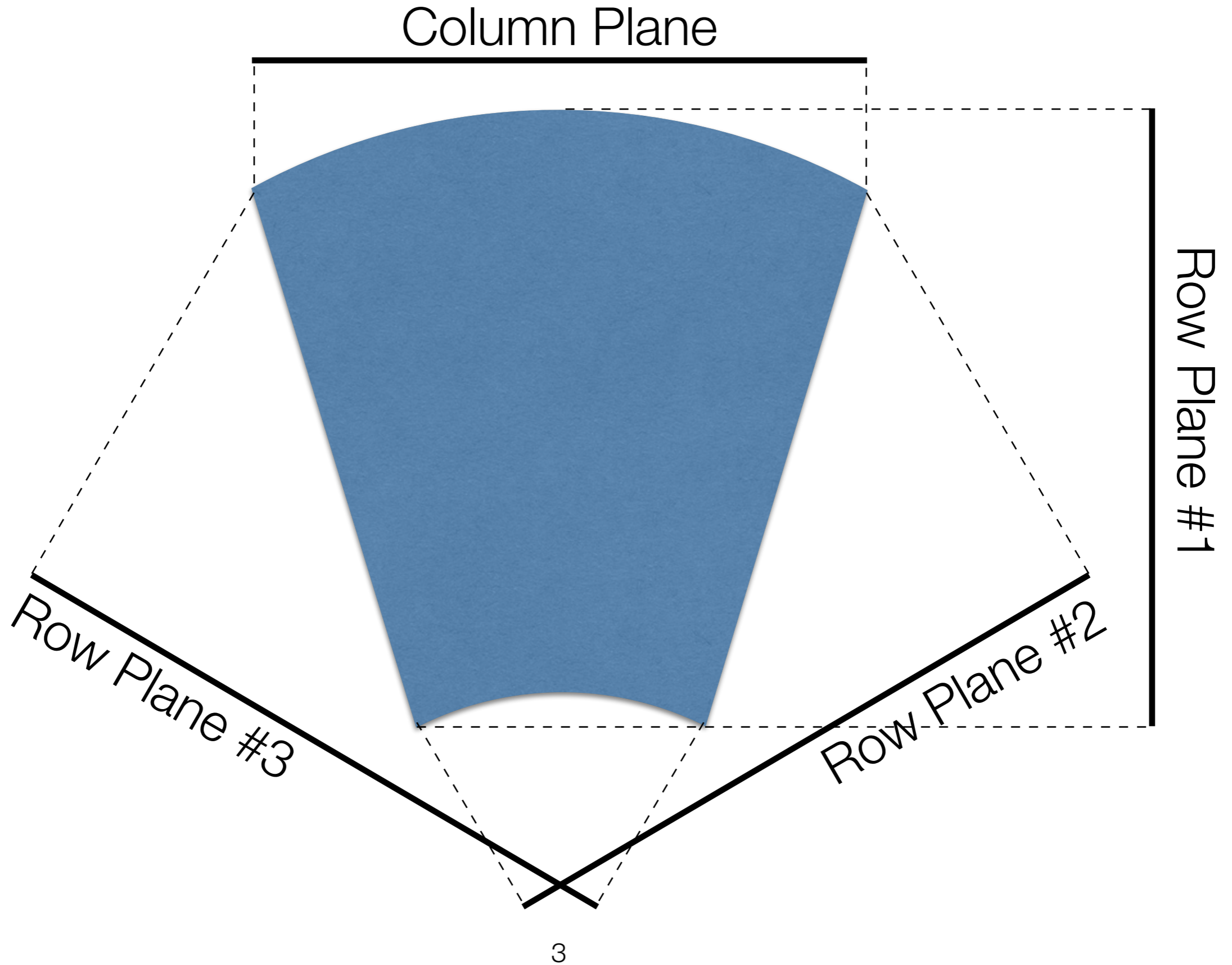
JungWoo Lee

Group Meeting 2013. 10. 28

Row Projection Planes

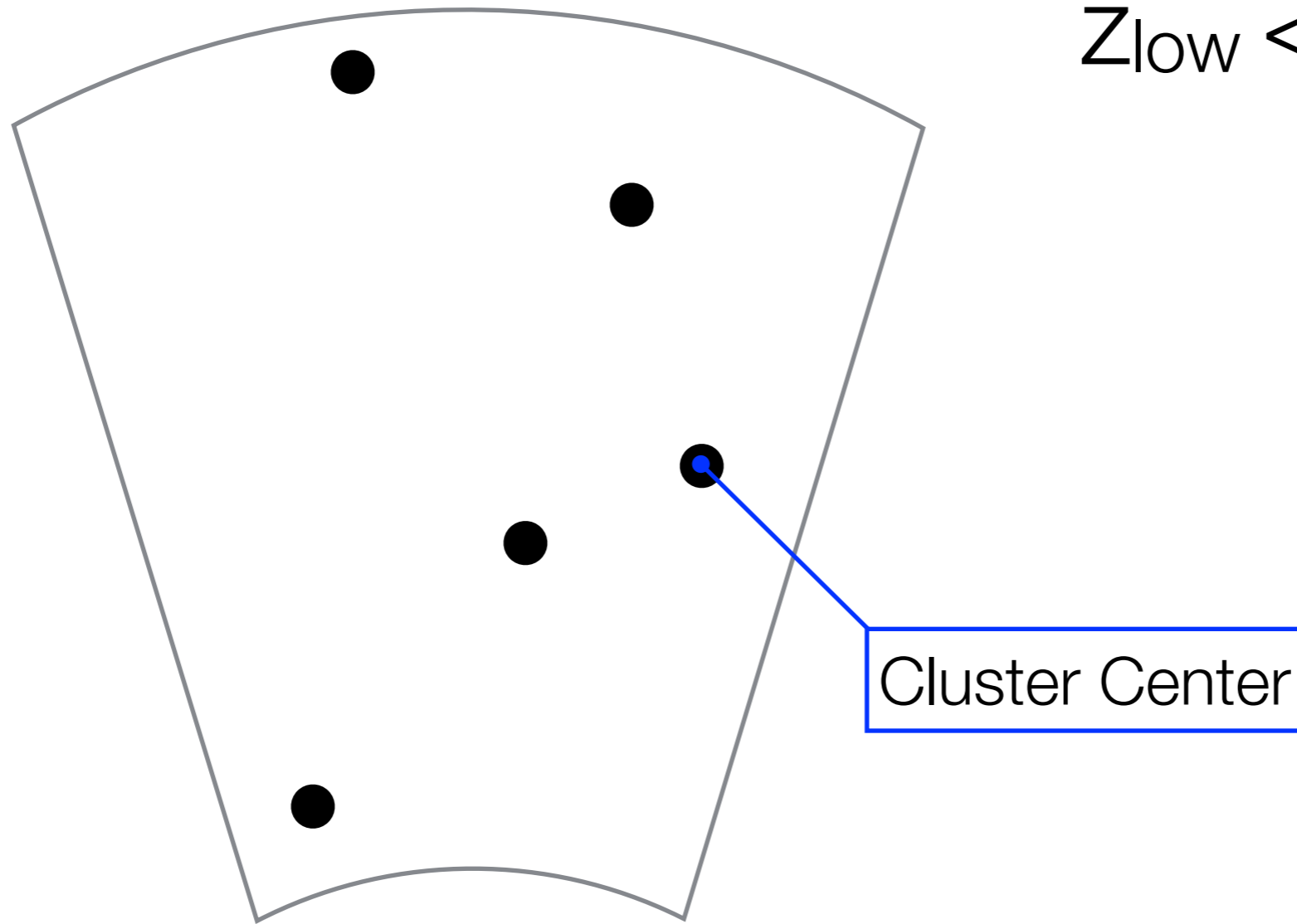


Projection Planes

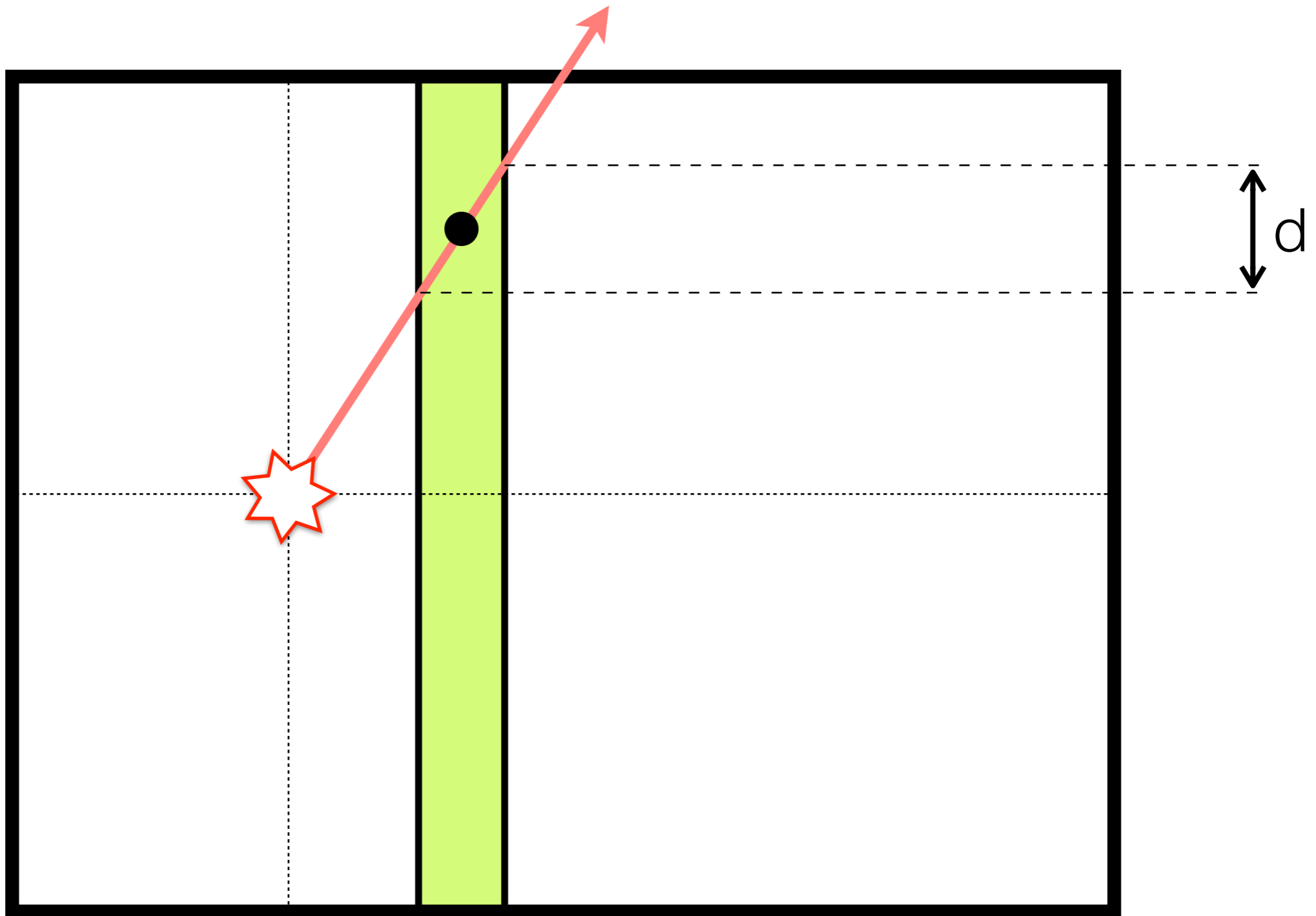


Cluster Size

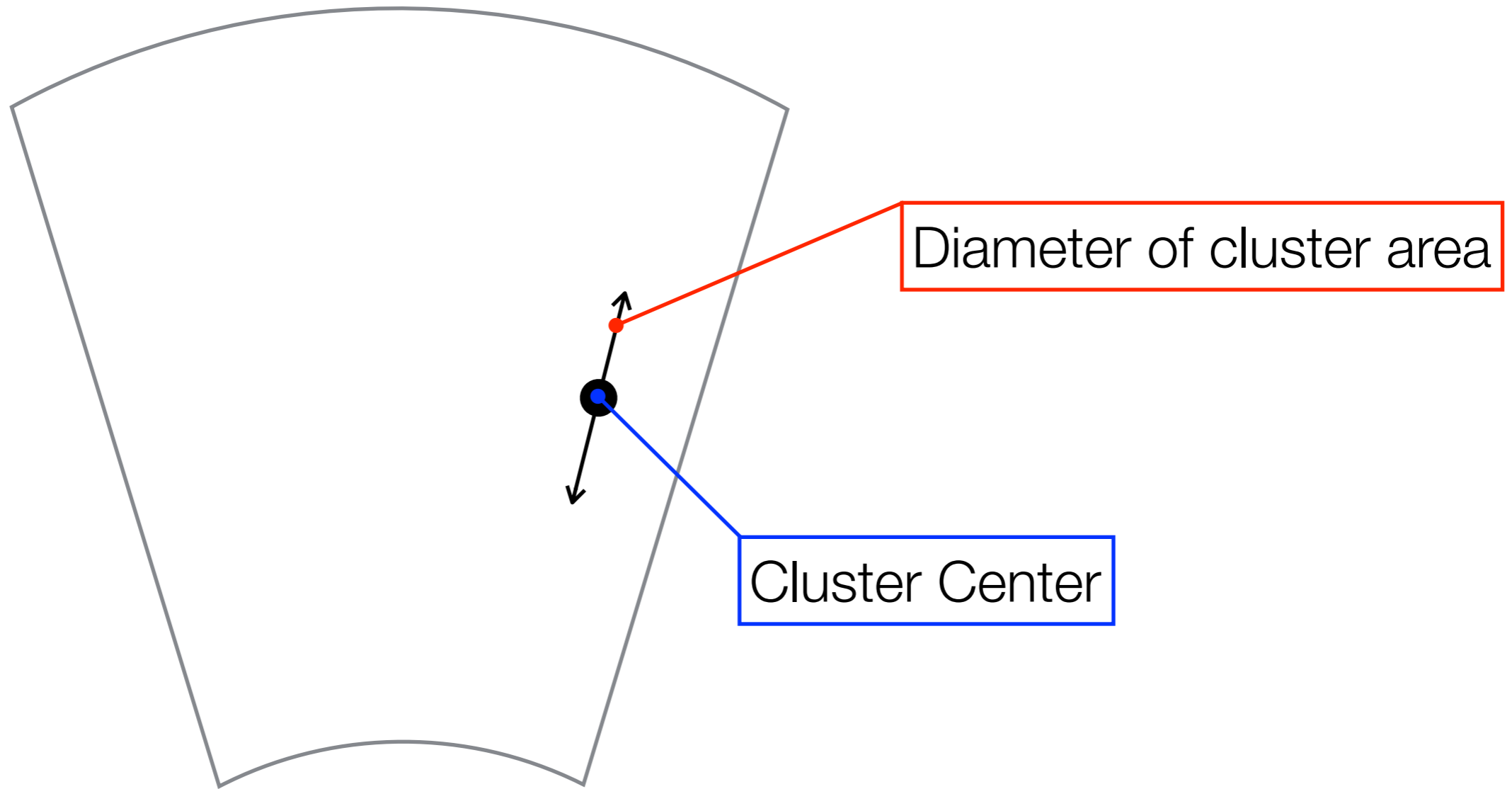
$$Z_{\text{low}} < Z < Z_{\text{high}}$$



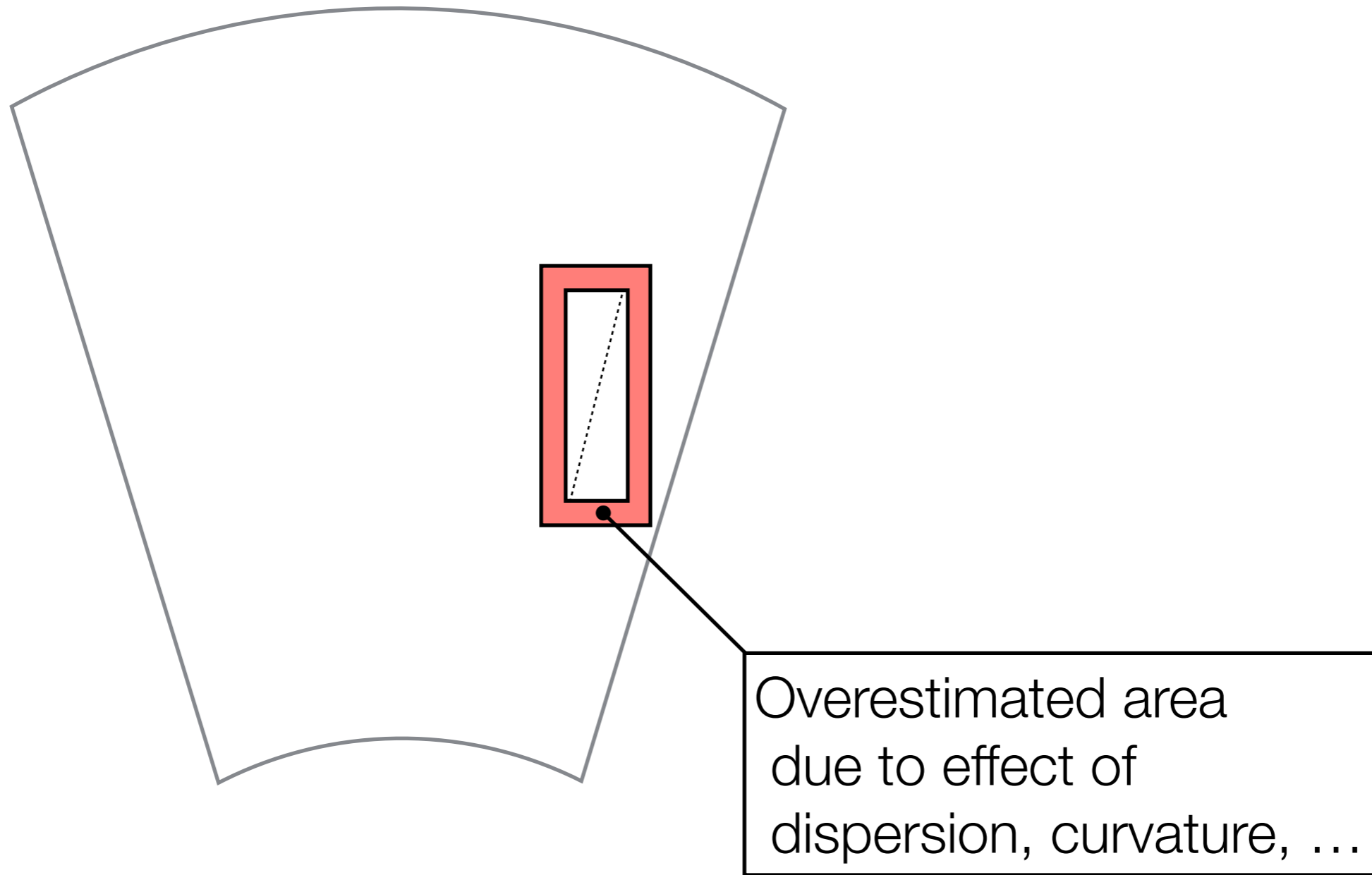
Cluster Size



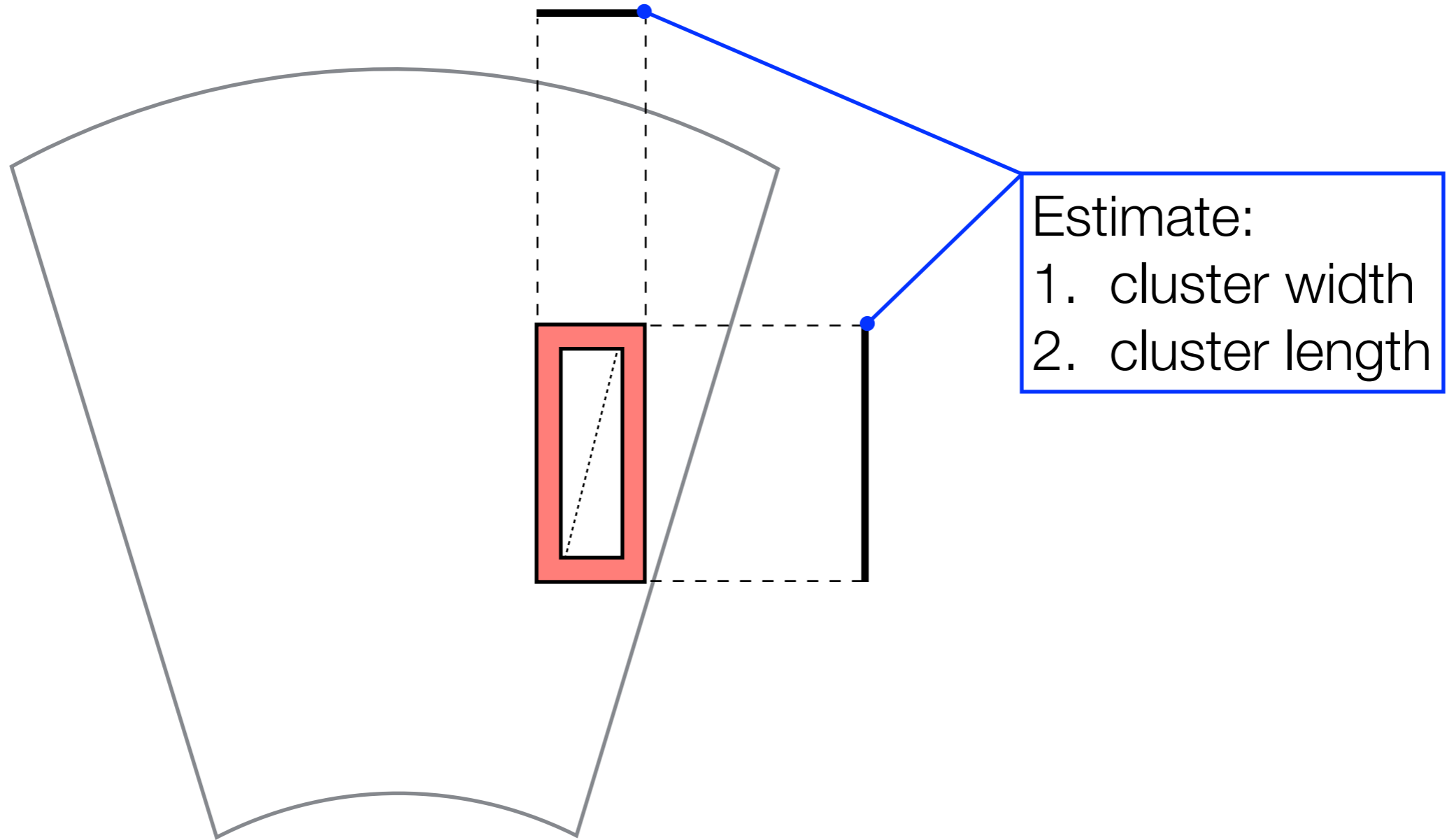
Cluster Size



Cluster Size



Cluster Size



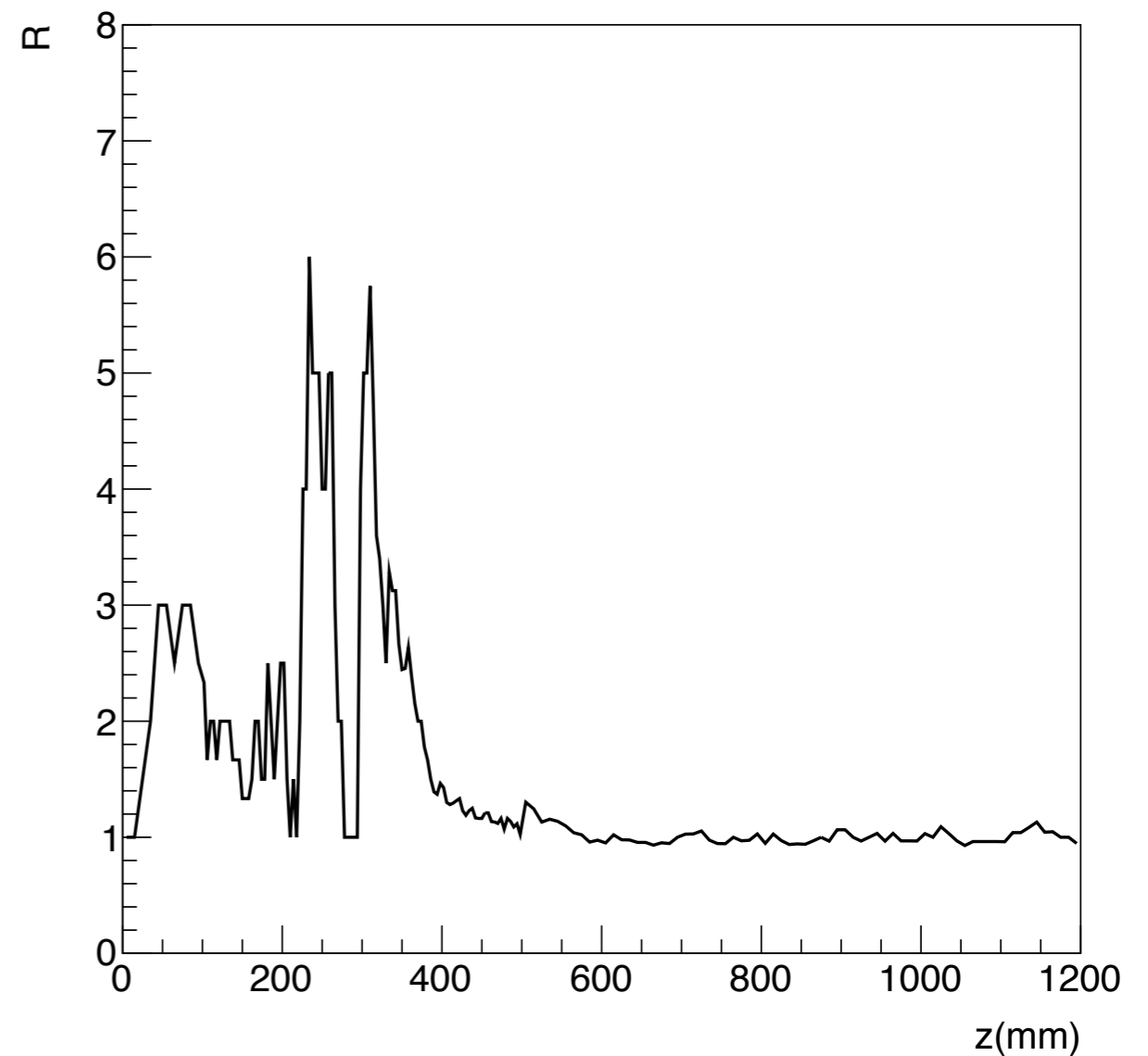
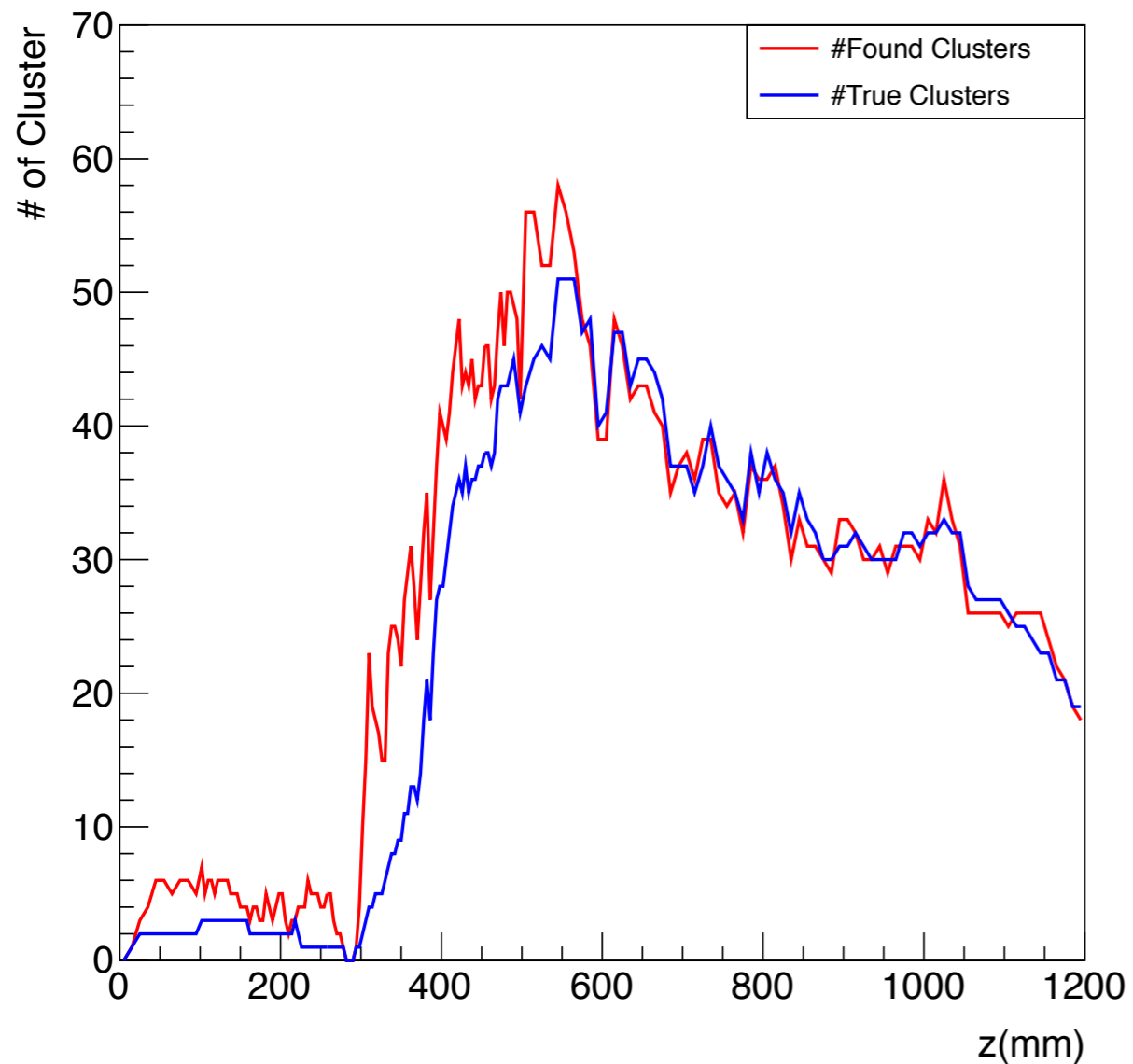
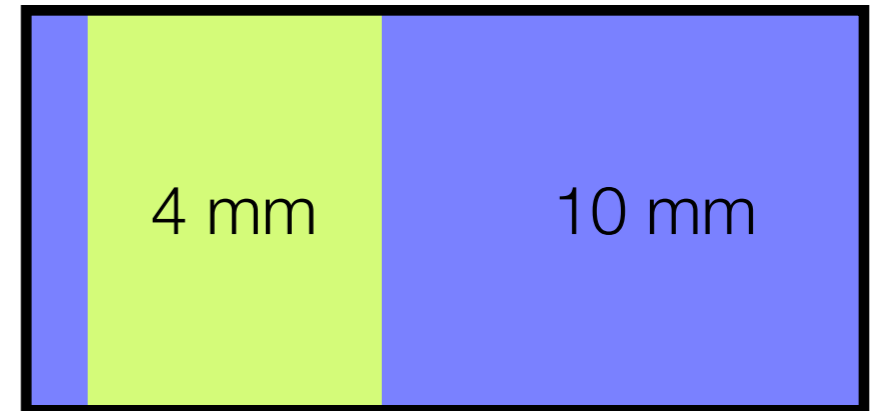
Cluster Size

- Cluster size changes due to z-position of bin(z_{bin}).
for z_{bin} near $z=300$, cluster length is long,
for z_{bin} far from $z=300$, cluster area is relatively symmetric.
- More accurate analysis can be done with local information.

Last Meeting

$z(\text{mm}) = 100 \sim 500$: (Bin size) = **4 mm**

$z(\text{mm}) \neq 100 \sim 500$: (Bin size) = **10 mm**

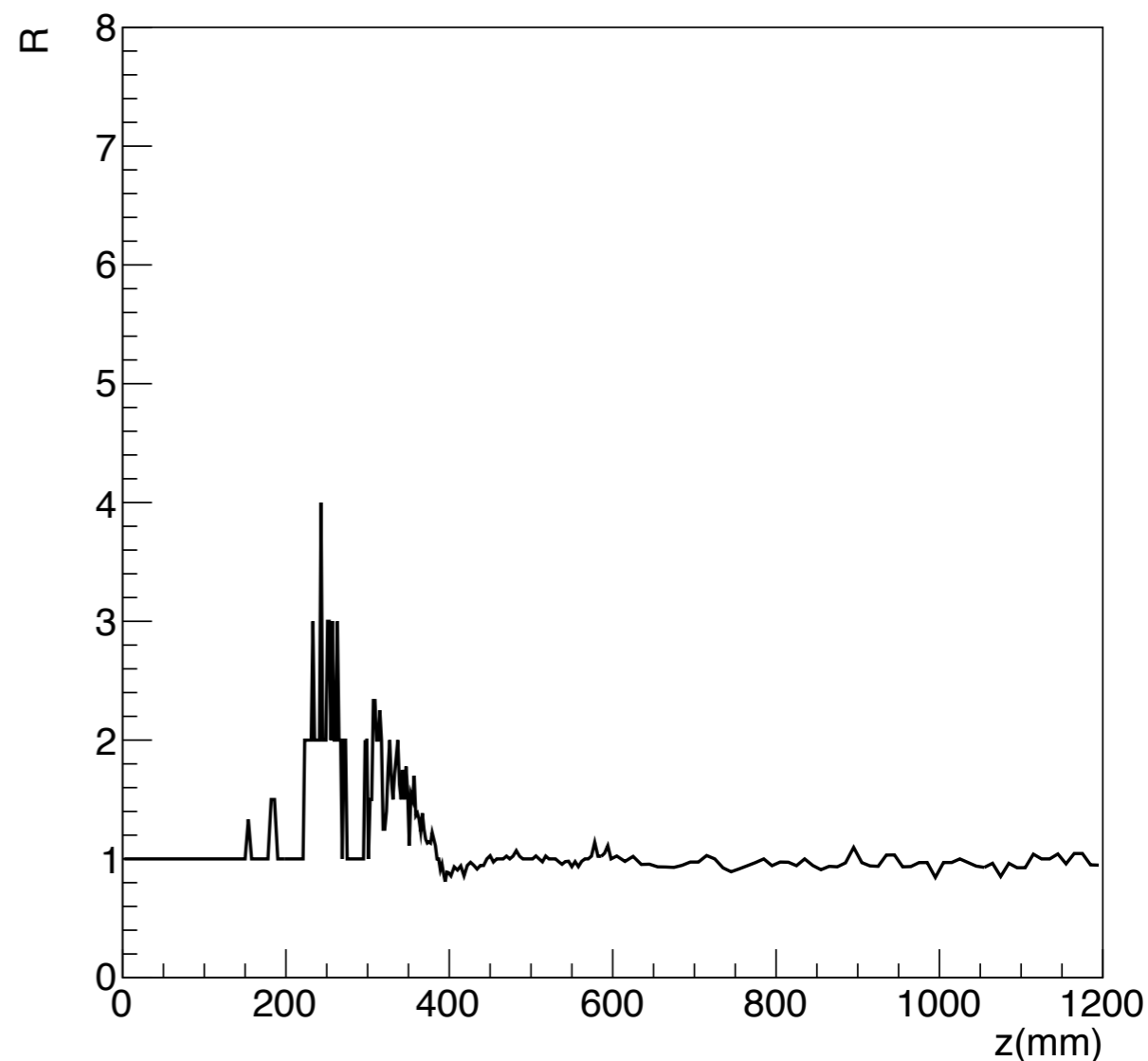
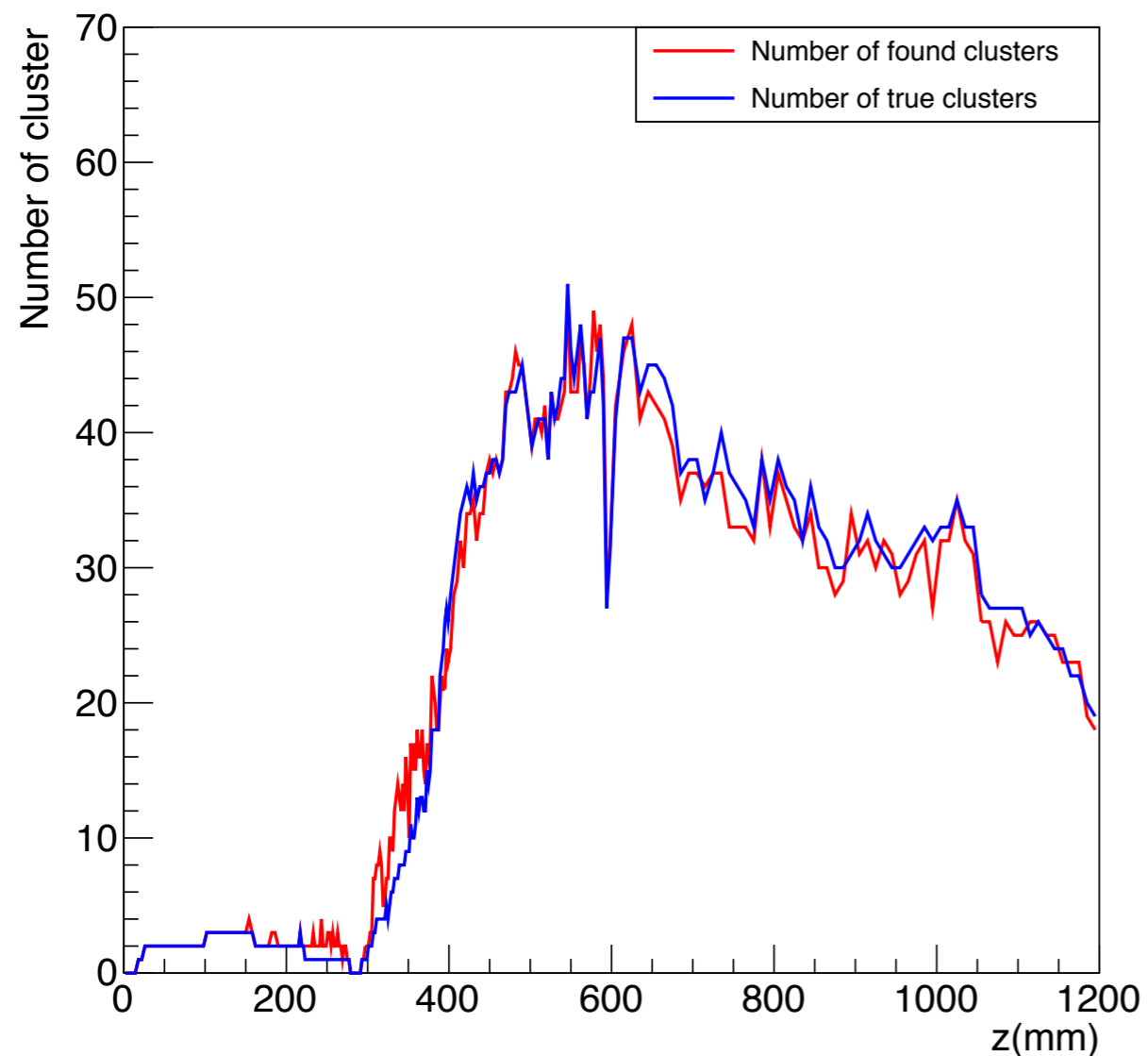
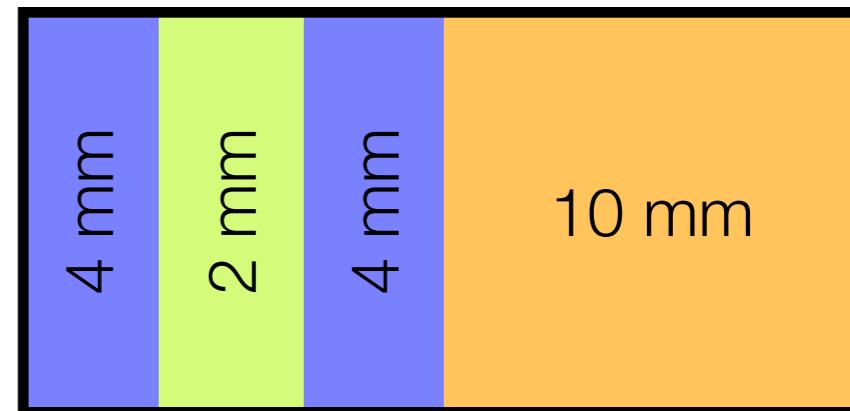


Modified Clustered Data

$z(\text{mm}) = 200 \sim 400$: (Bin size) = **2 mm**

$z(\text{mm}) = 0 \sim 200, 400 \sim 600$: (Bin size) = **4 mm**

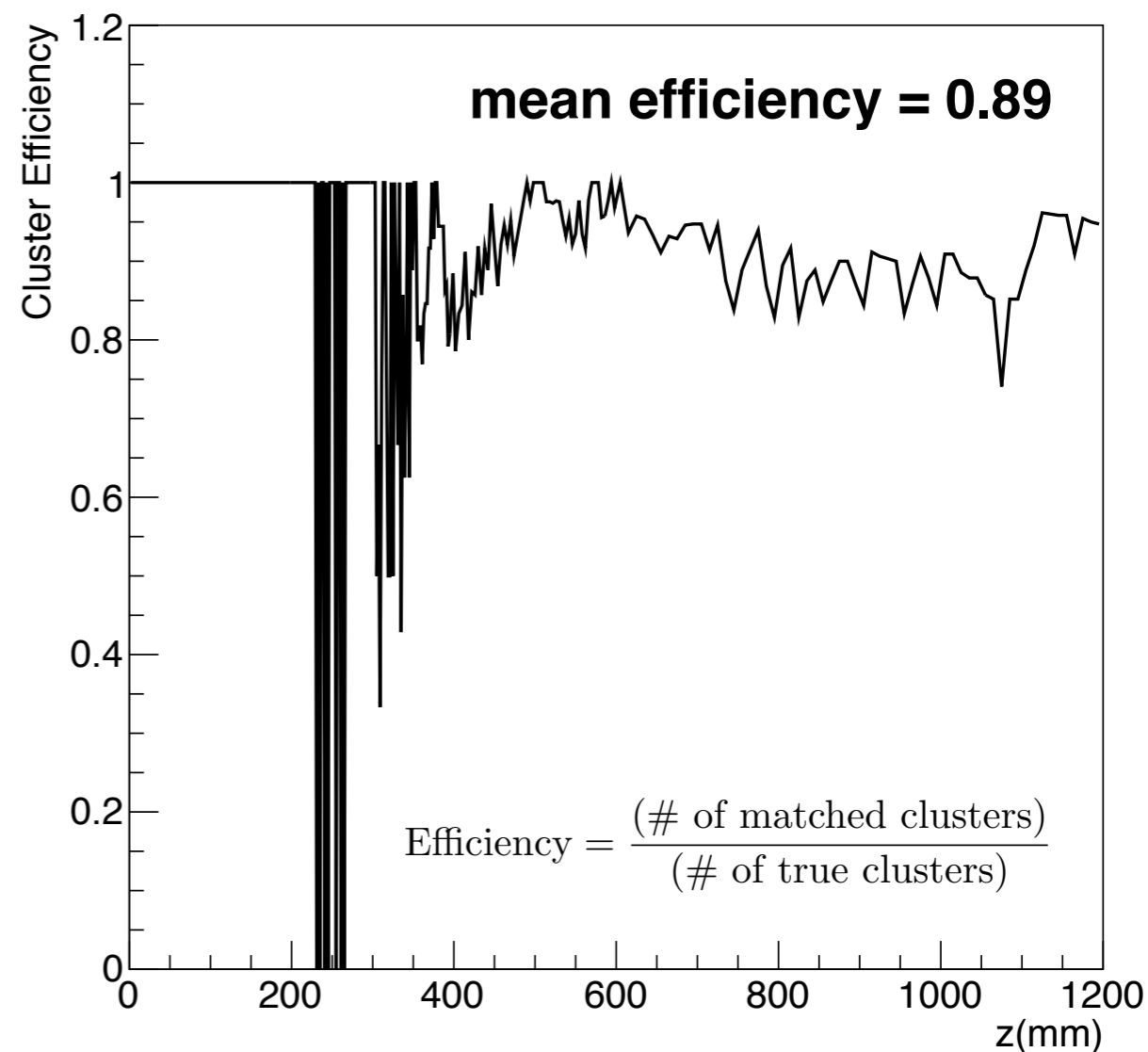
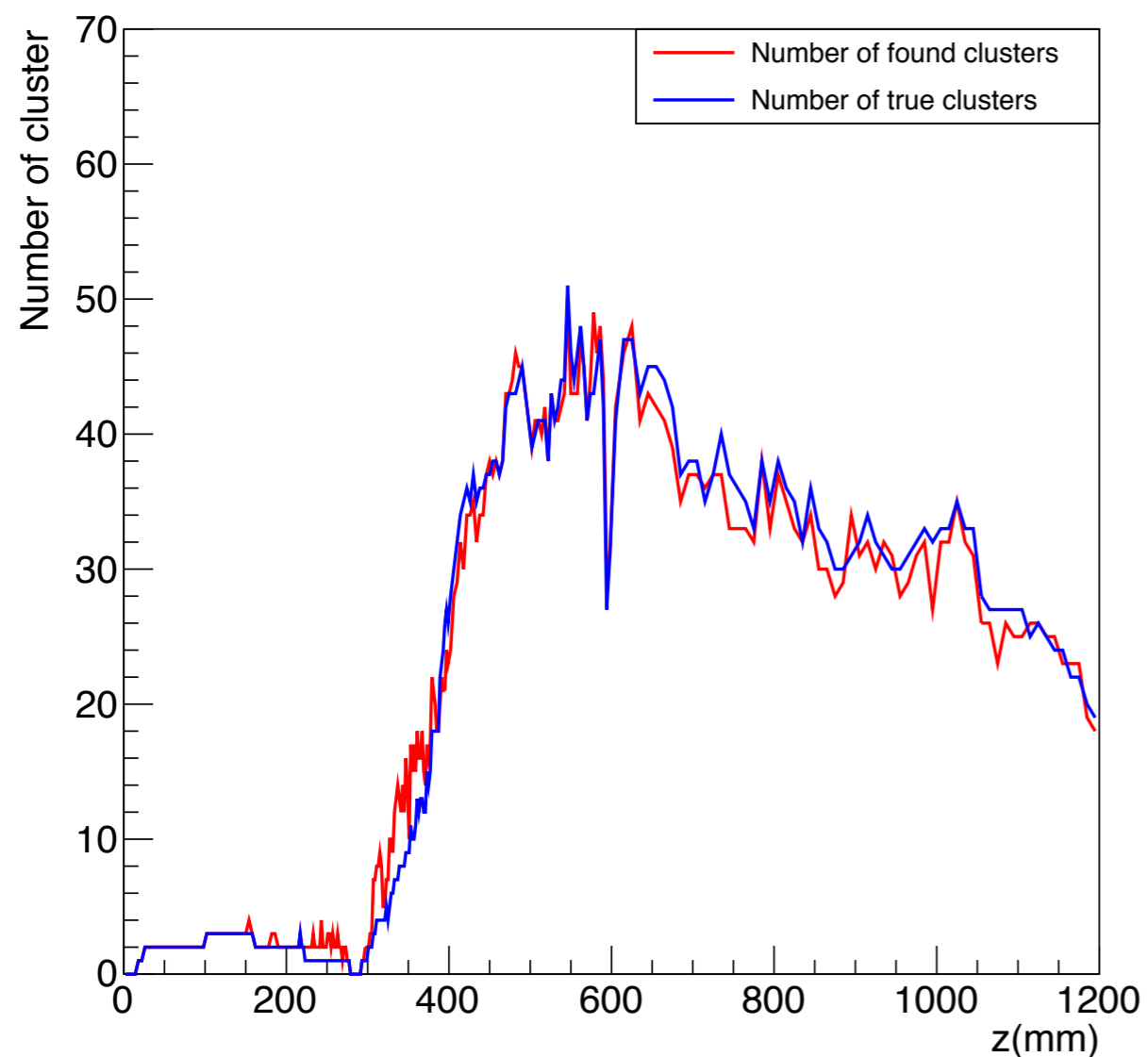
$z(\text{mm}) = 600 \sim 1200$: (Bin size) = **10 mm**



Modified Clustered Data

Cluster efficiency :
$$\text{Efficiency} = \frac{(\# \text{ of matched clusters})}{(\# \text{ of true clusters})}$$

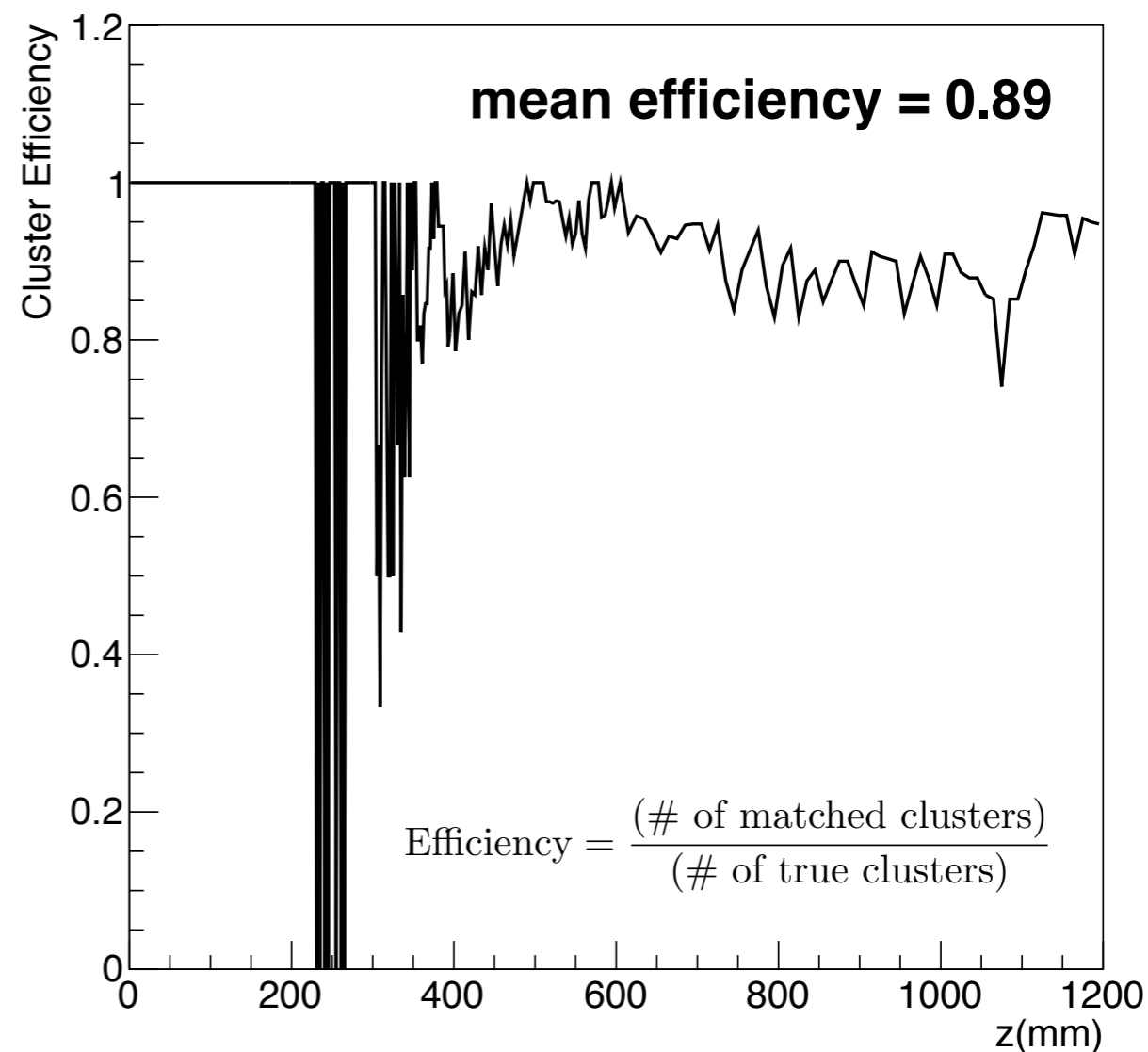
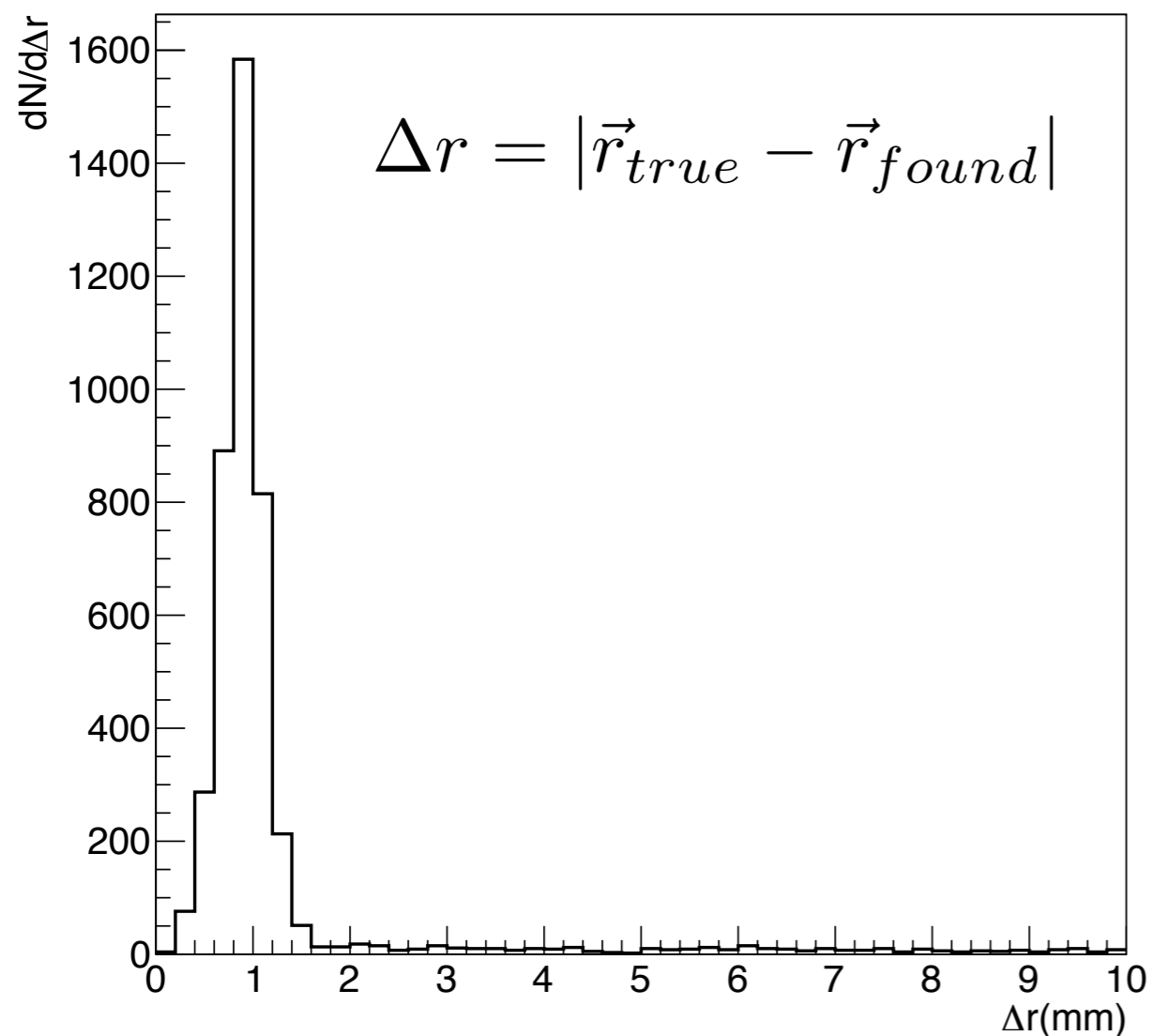
Maximum distance for matching condition = **10 mm** (pad diameter)



Modified Clustered Data

Maximum distance for matching condition = **10 mm** (pad diameter)

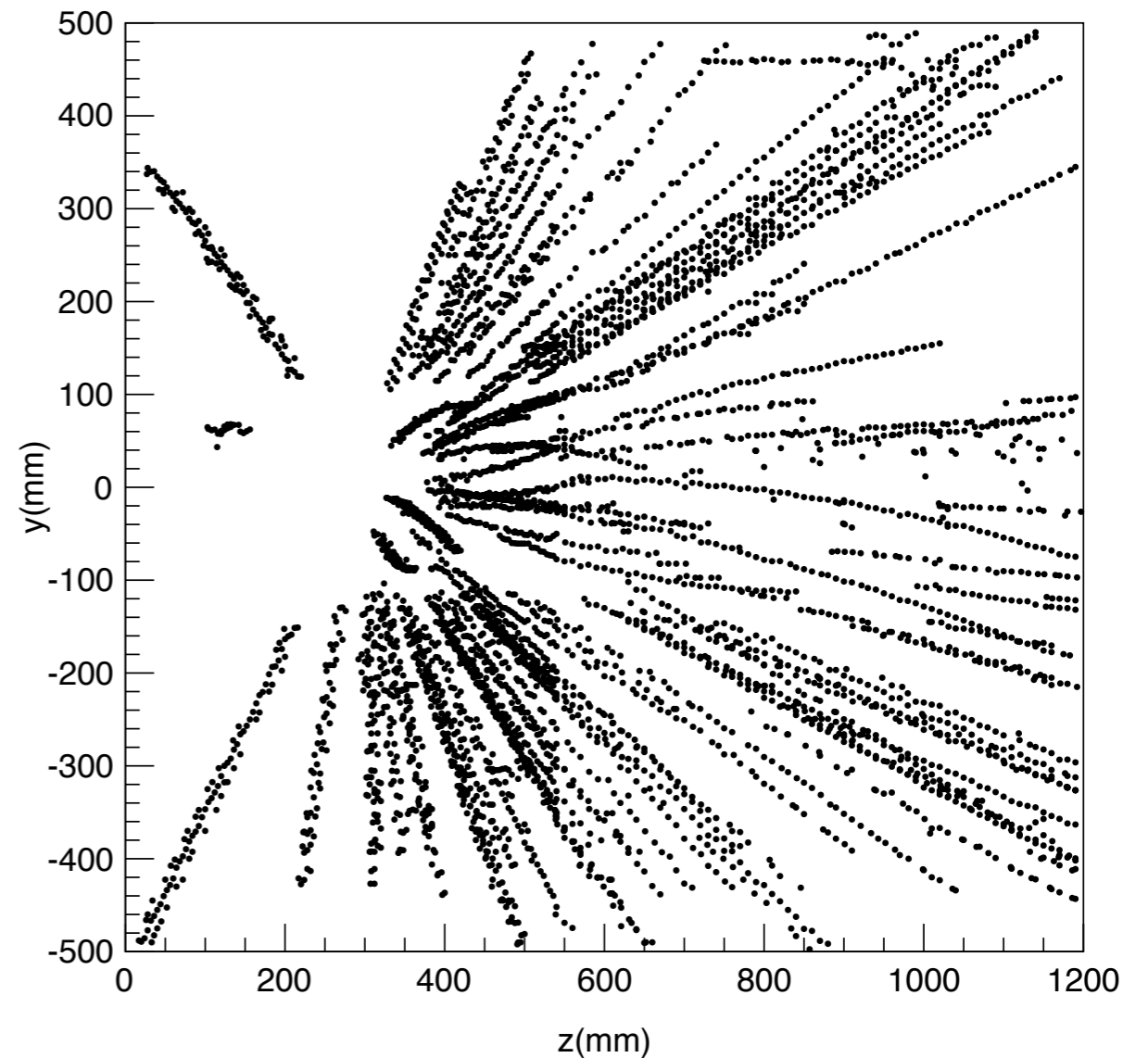
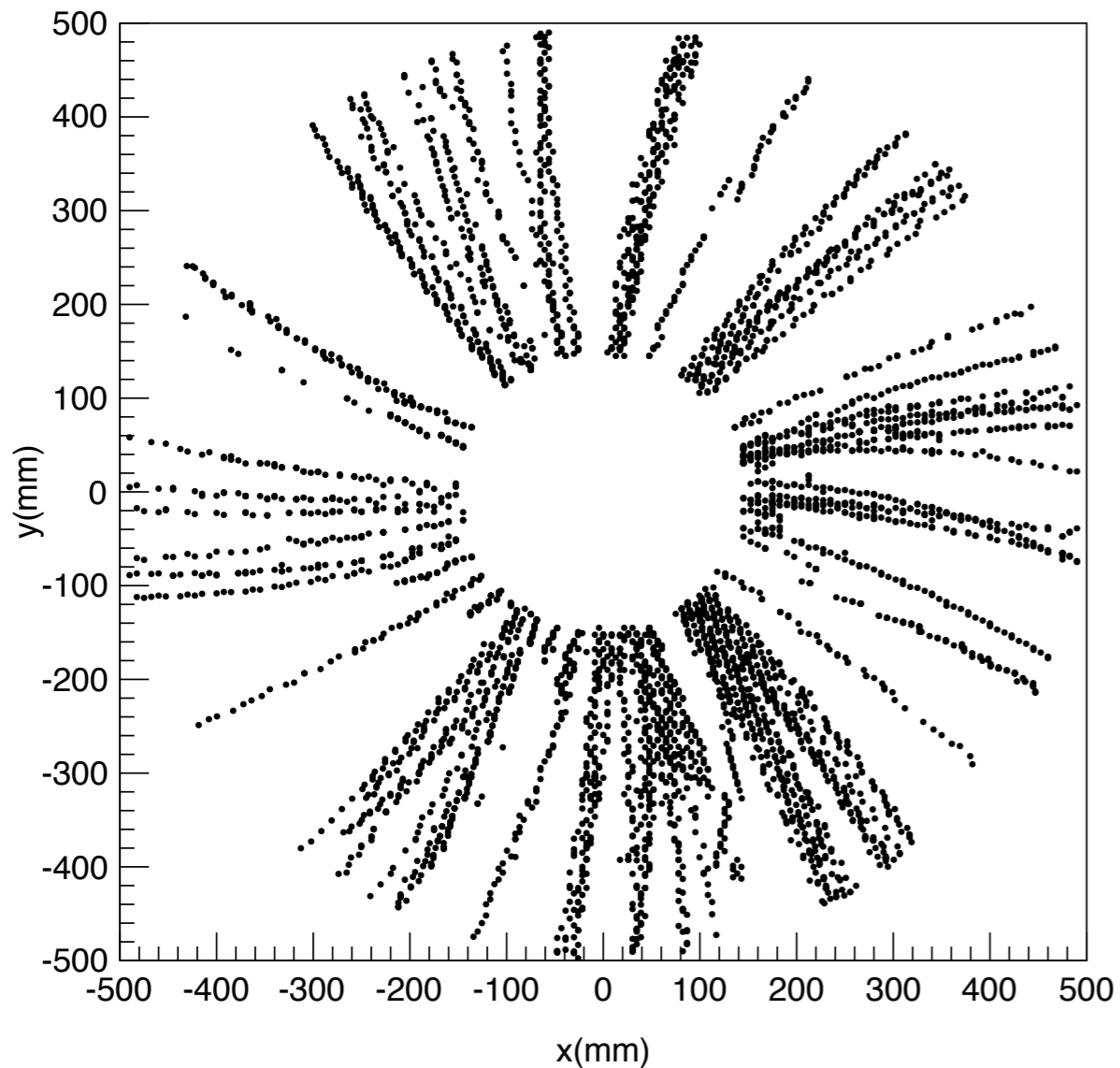
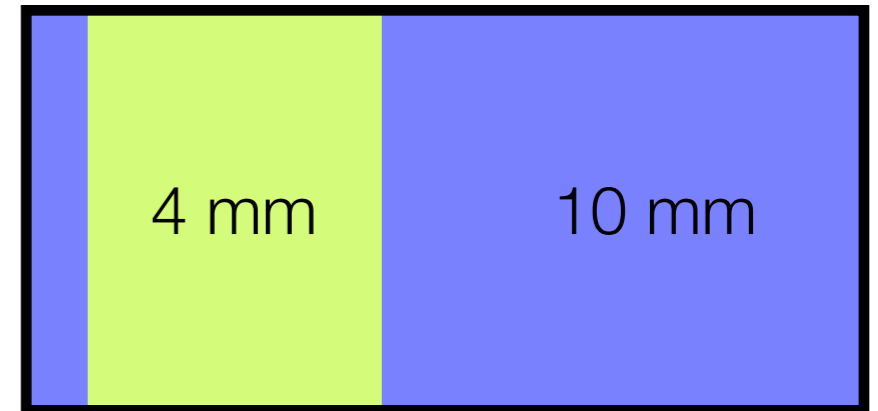
Δr = distance between true cluster and found cluster



Cluster Plot(Last Meeting)

$z(\text{mm}) = 100 \sim 500$: (Bin size) = **4 mm**

$z(\text{mm}) \neq 100 \sim 500$: (Bin size) = **10 mm**

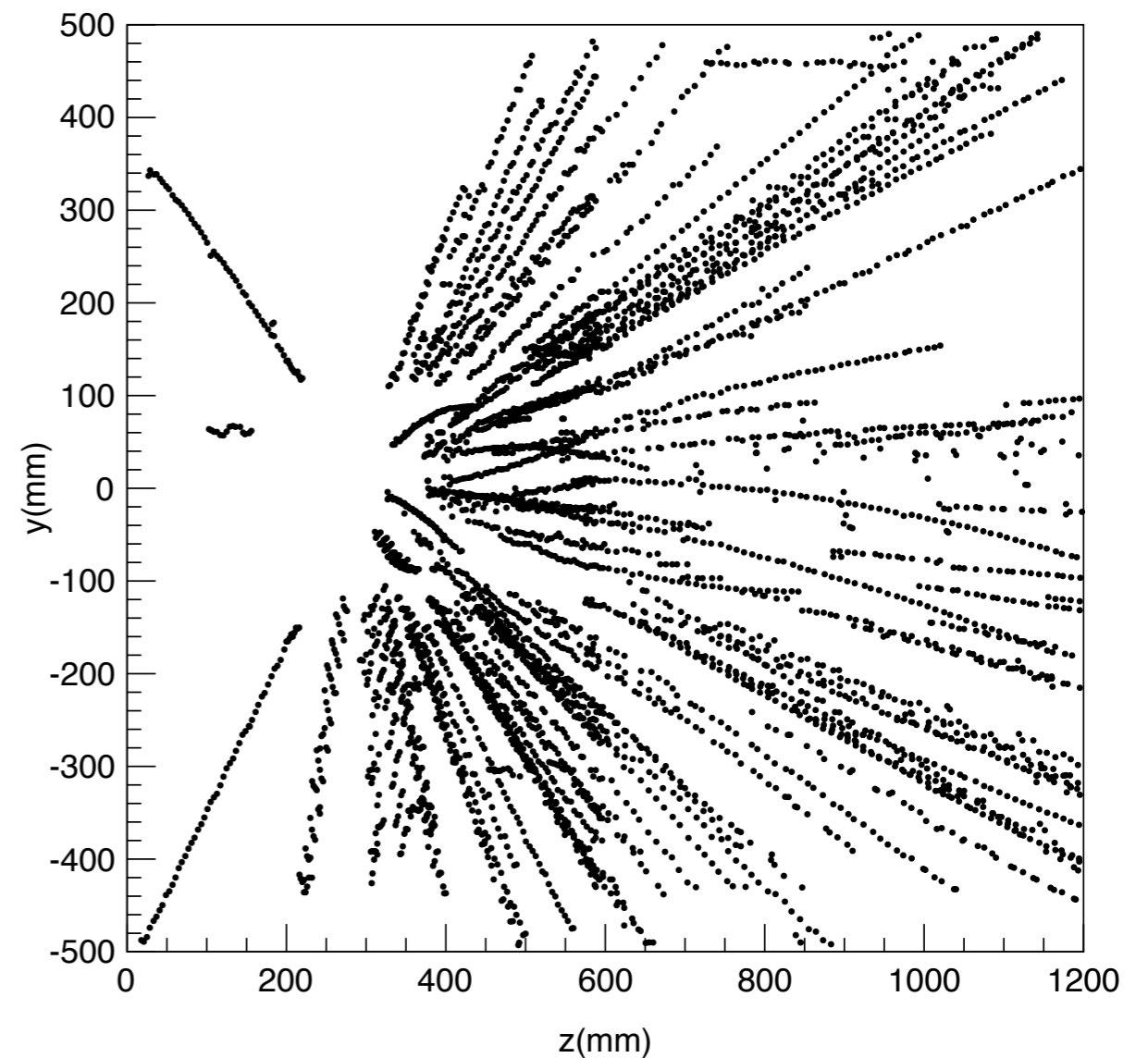
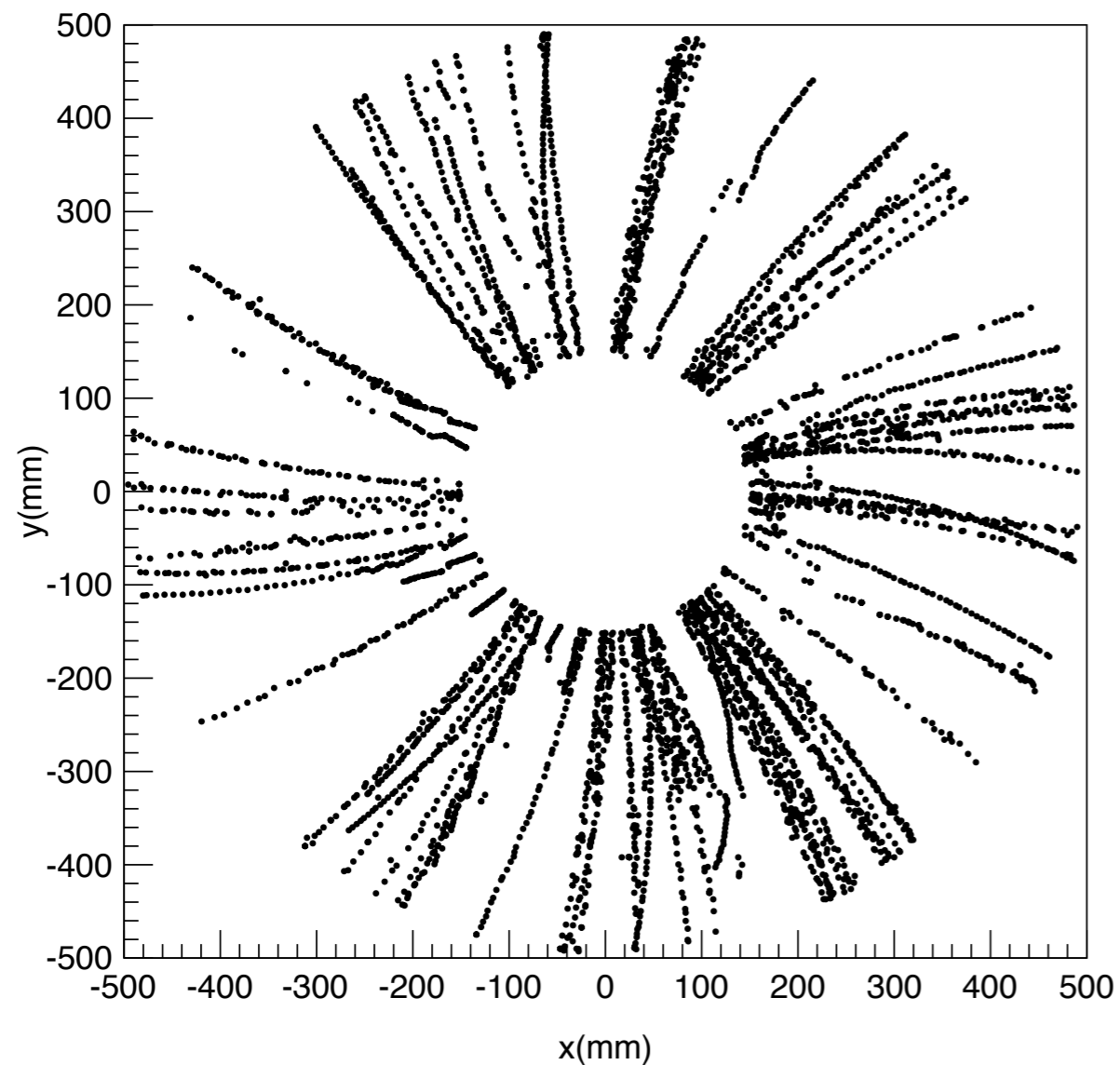
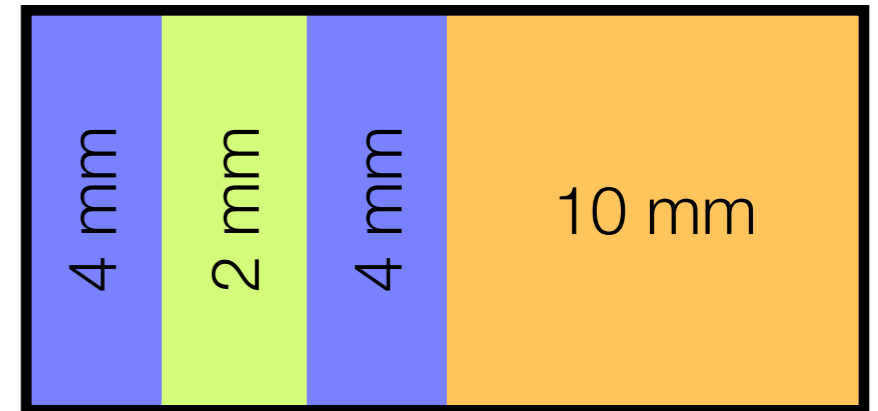


Modified Cluster Plot

$z(\text{mm}) = 200 \sim 400$: (Bin size) = **2 mm**

$z(\text{mm}) = 0 \sim 200, 400 \sim 600$: (Bin size) = **4 mm**

$z(\text{mm}) = 600 \sim 1200$: (Bin size) = **10 mm**

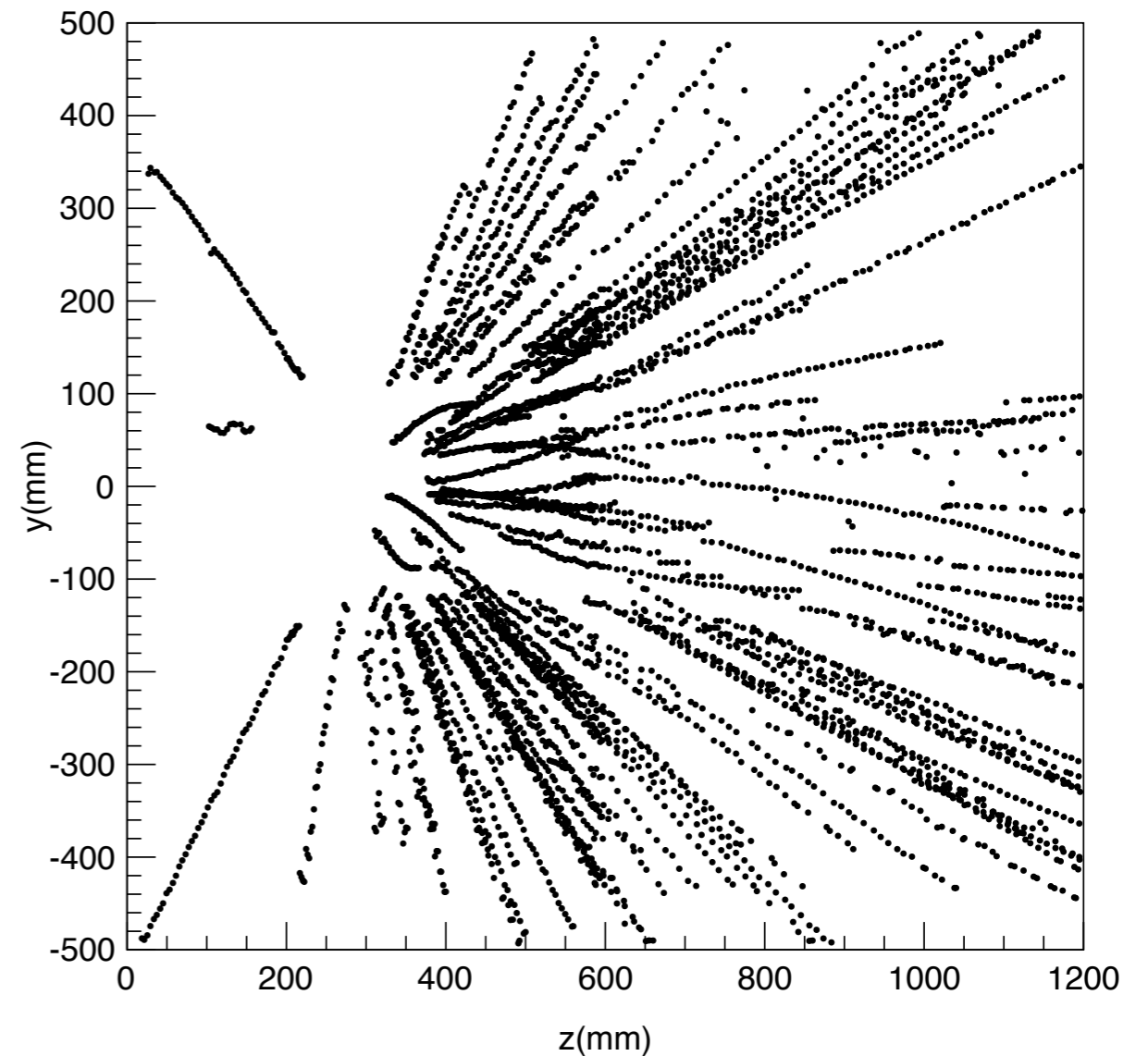
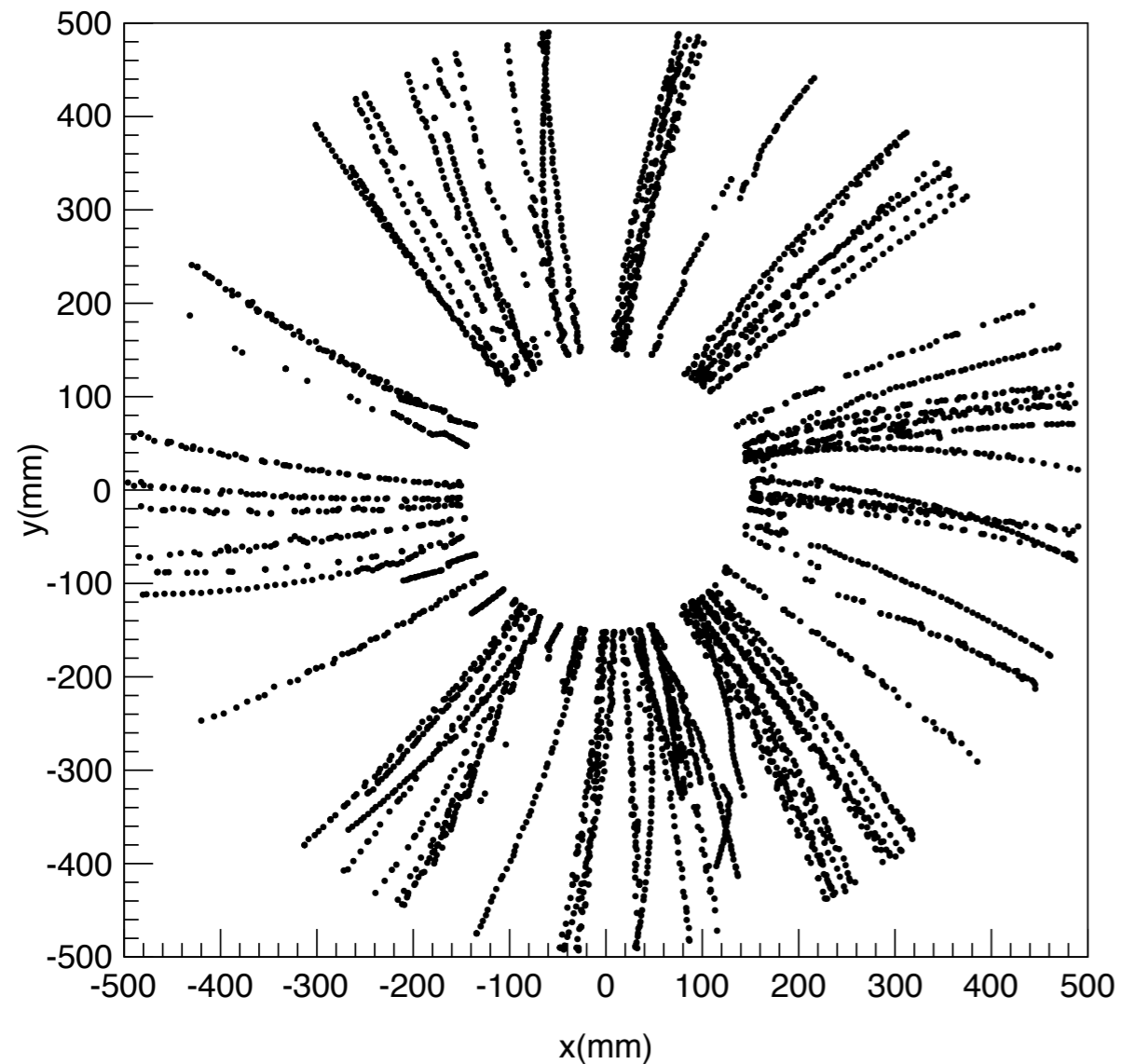
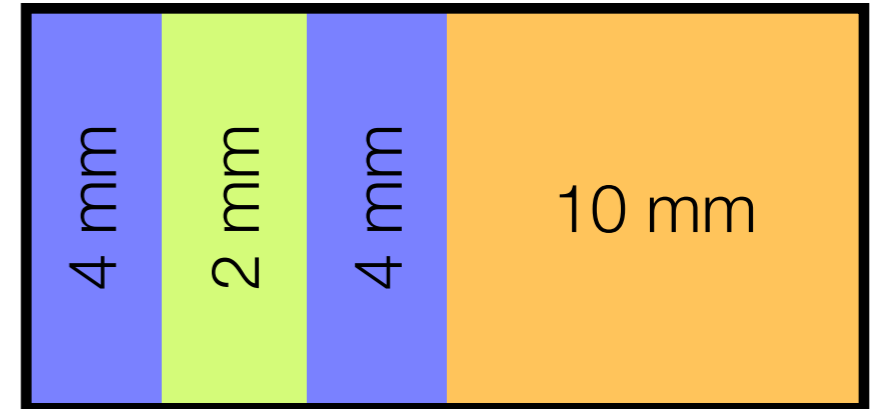


True Cluster plot

$z(\text{mm}) = 200 \sim 400$: (Bin size) = **2 mm**

$z(\text{mm}) = 0 \sim 200, 400 \sim 600$: (Bin size) = **4 mm**

$z(\text{mm}) = 600 \sim 1200$: (Bin size) = **10 mm**



Summary

- Row projection planes were used
- Rectangular cluster size was assumed in function of z-position of cluster center.
→ Showed better performance than fixed cluster size.
- Cluster efficiency

$$\text{Efficiency} = \frac{(\# \text{ of matched made clusters})}{(\# \text{ of true clusters})} \sim 0.9$$

- Still not working in $200 < z(\text{mm}) < 400$.

To do

- Charge sharing
- Other shaped cluster area
- Tracking code