The “Vertical” L-Tracker Concept

Motivation:

In this scheme, all straw chamber modules are “vertical”. The gravity Vector is parallel to all modules. This greatly simplifies mechanical Construction. We can easily keep the straws straight using a few CF support threads.

Chamber Layout:

One triplet plane every 10 cm. See next slide

To determine the Figure of Merit, we need:

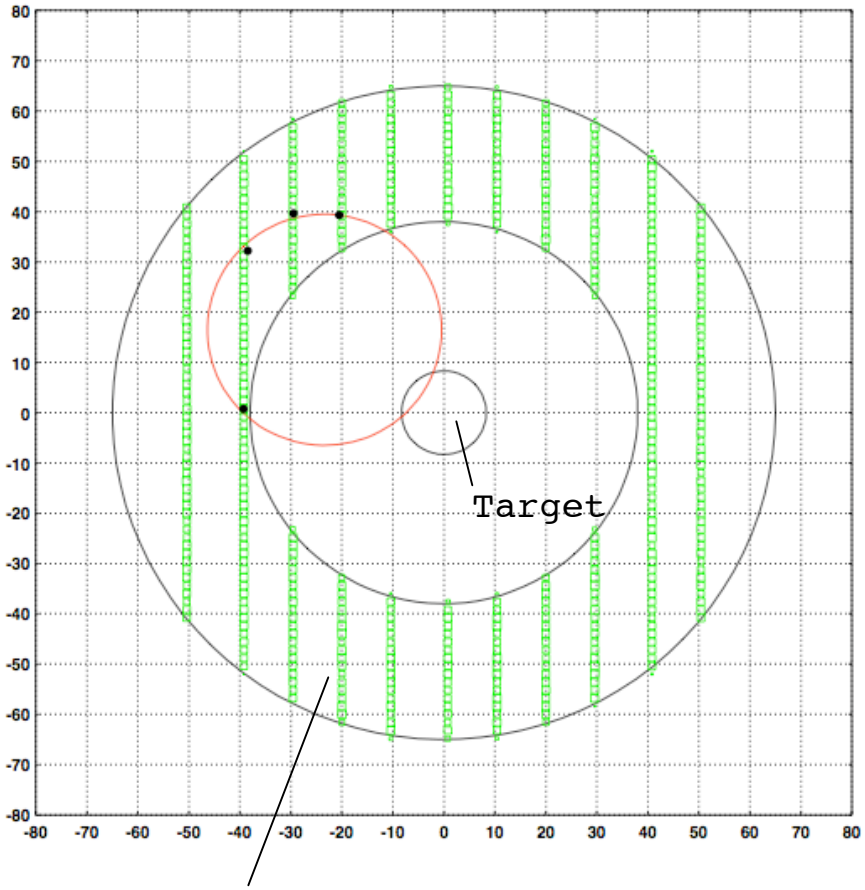
(1) A Ray-tracing tool to determine the Average Number of Clusters Per turn for Signal (105 MeV) electrons

(2) To Evaluate how often we can reconstruct the electron momentum

(3) Comparison with baseline L-tracker

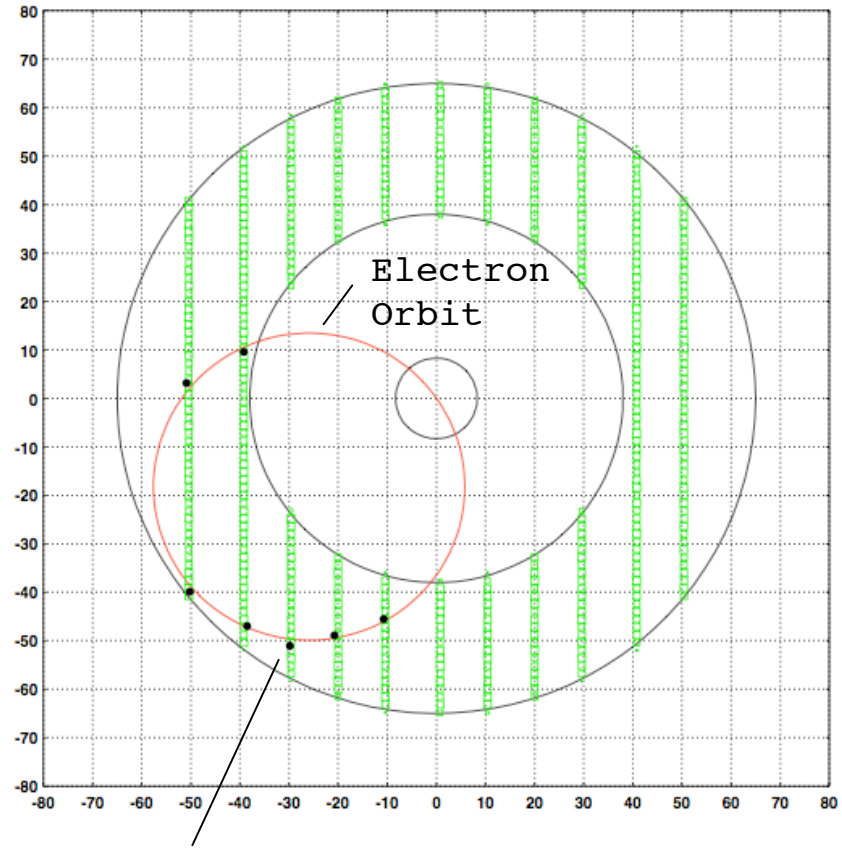
(Hogan Nguyen, June 15 2009)

Event with 4 Clusters per turn

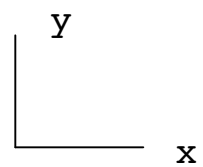


Vertical Chamber Vanes (Green)

Event with 7 clusters per turn



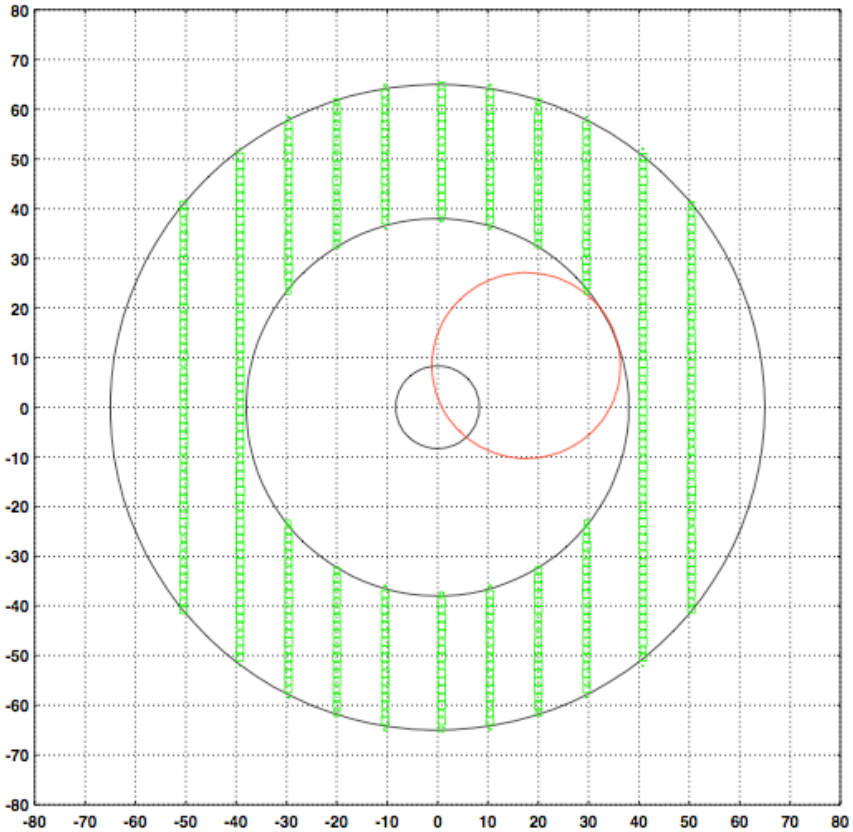
Clusters in Chambers



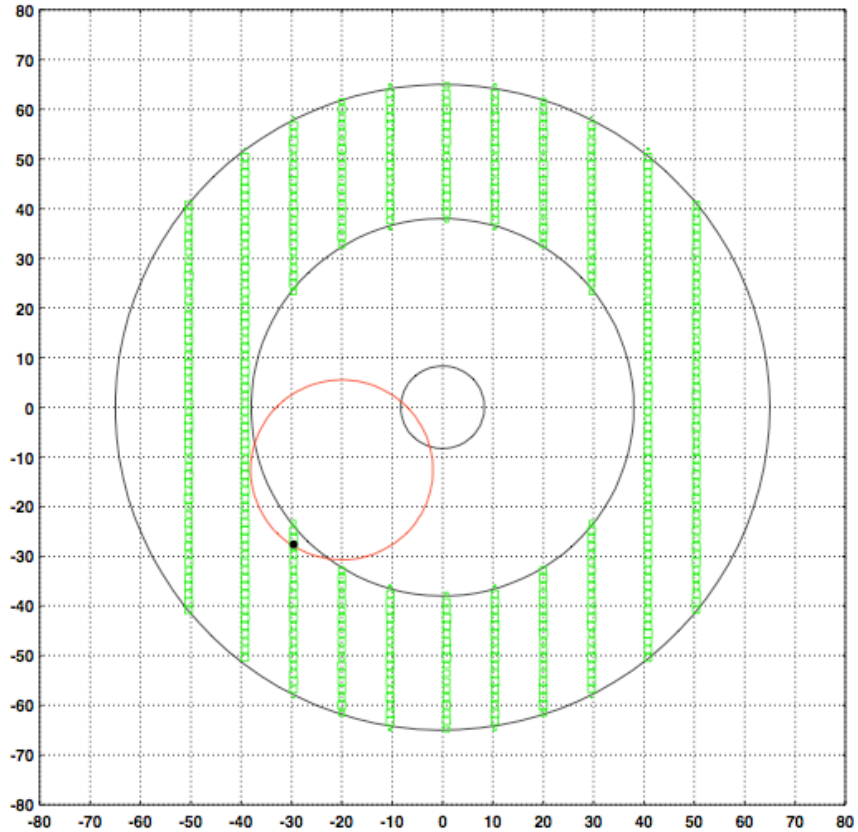
Vertical L-Tracker Configuration

Z (into page)

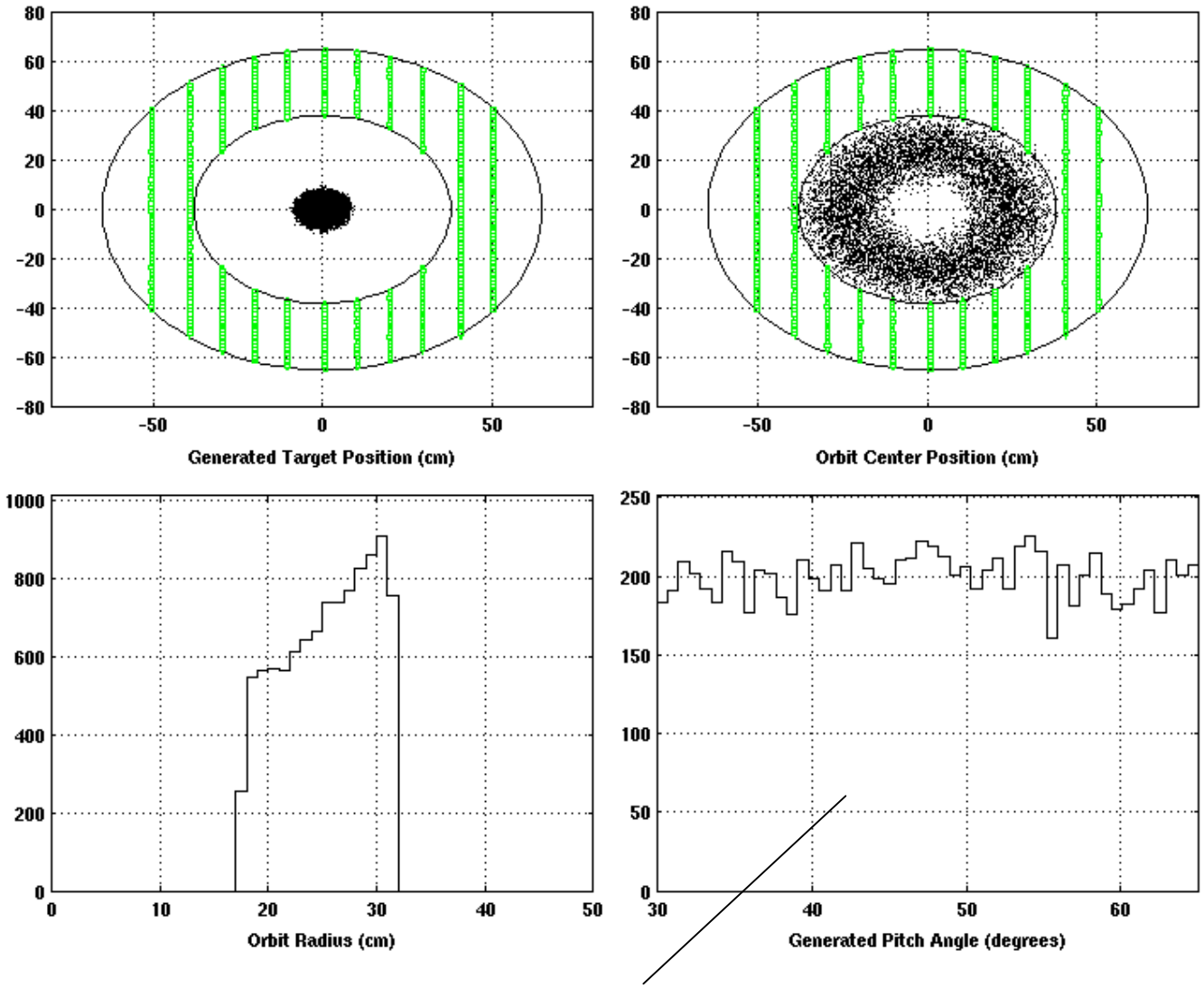
Event with No Intersection with Chamber



Event with 1 Cluster per turn



Random Generation of 105 MeV electrons emanating from the Stopping Target



Generated Flat Pitch Angle Distribution from 30 to 65 deg,
O.K. For this Study

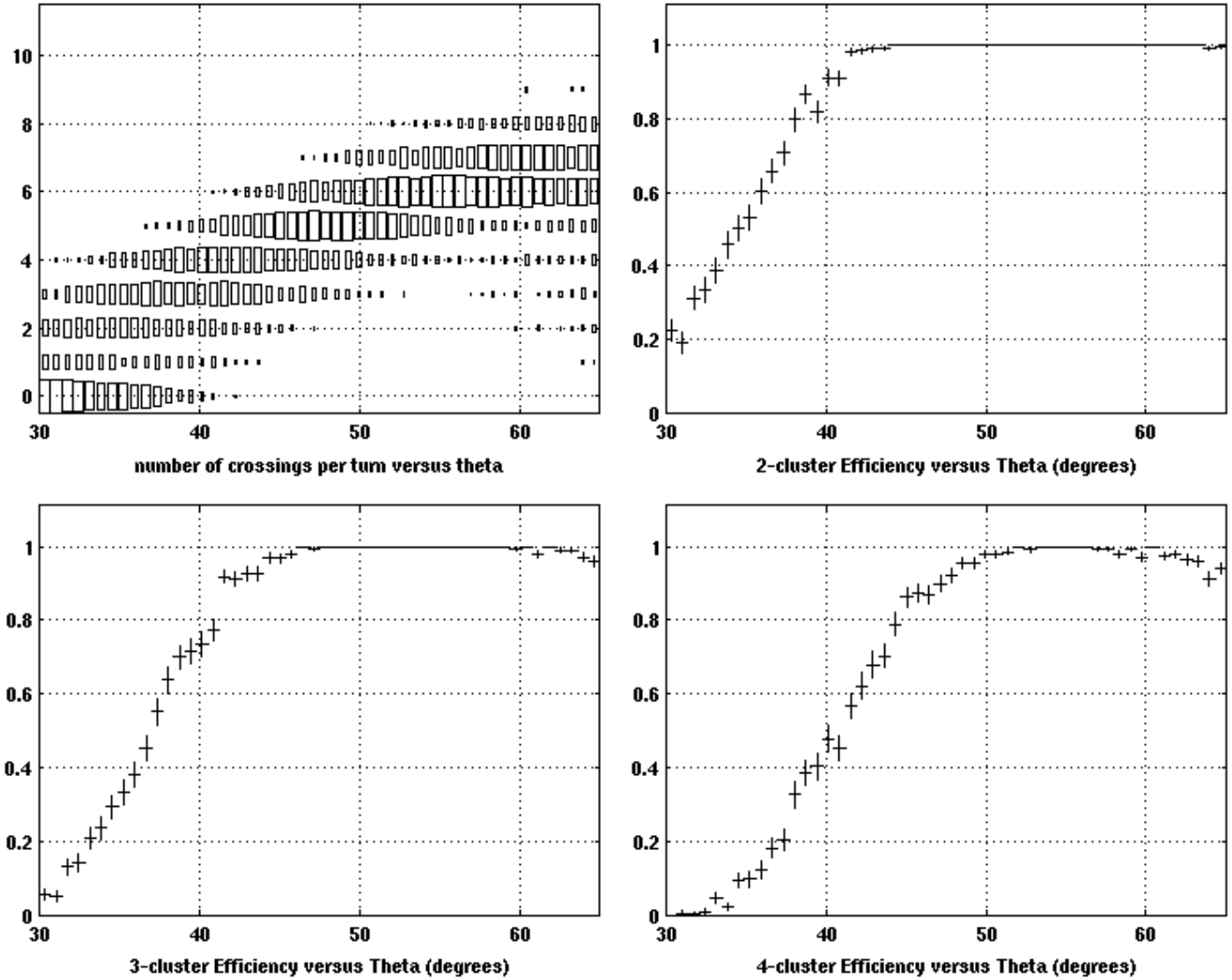
- ONLY 2 Clusters Per Turn are Needed to Determine the Momentum.

This is POSSIBLE since the electron will make MANY turns within the tracker. Thus we have information on the periodicity, which is used to constrain the momentum.

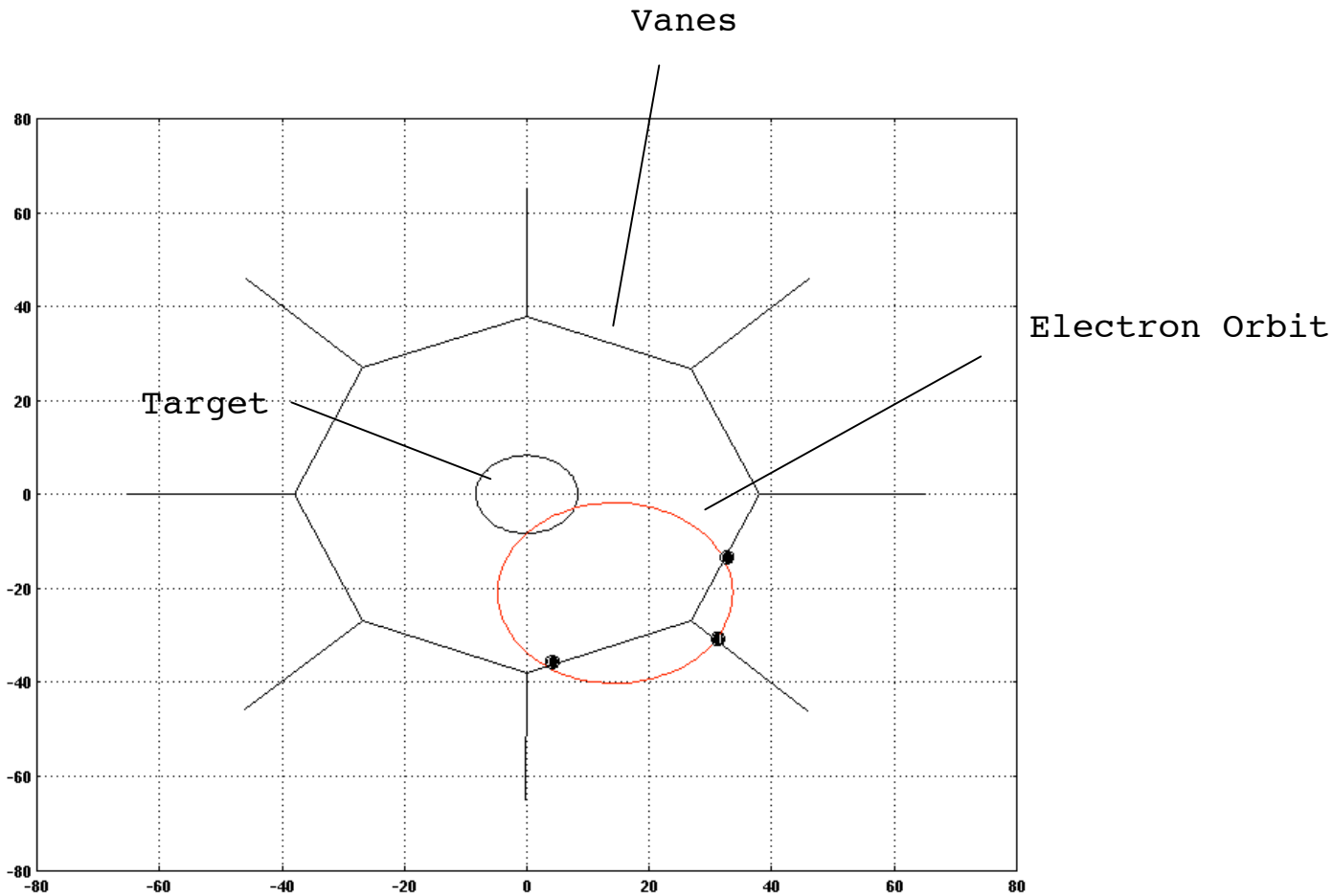
- 3 Clusters Per Turn is Needed to Over-Constrain the Momentum

- **Figure of Merit: Rate for >1, >2, >3 … clusters per turn (assume 100% chamber efficiency)**

Figure of Merit for Vertical L-Tracker



3 cluster (per turn) event in L-tracker



Dimension in centimeters

4 cluster (per turn) event in L-tracker

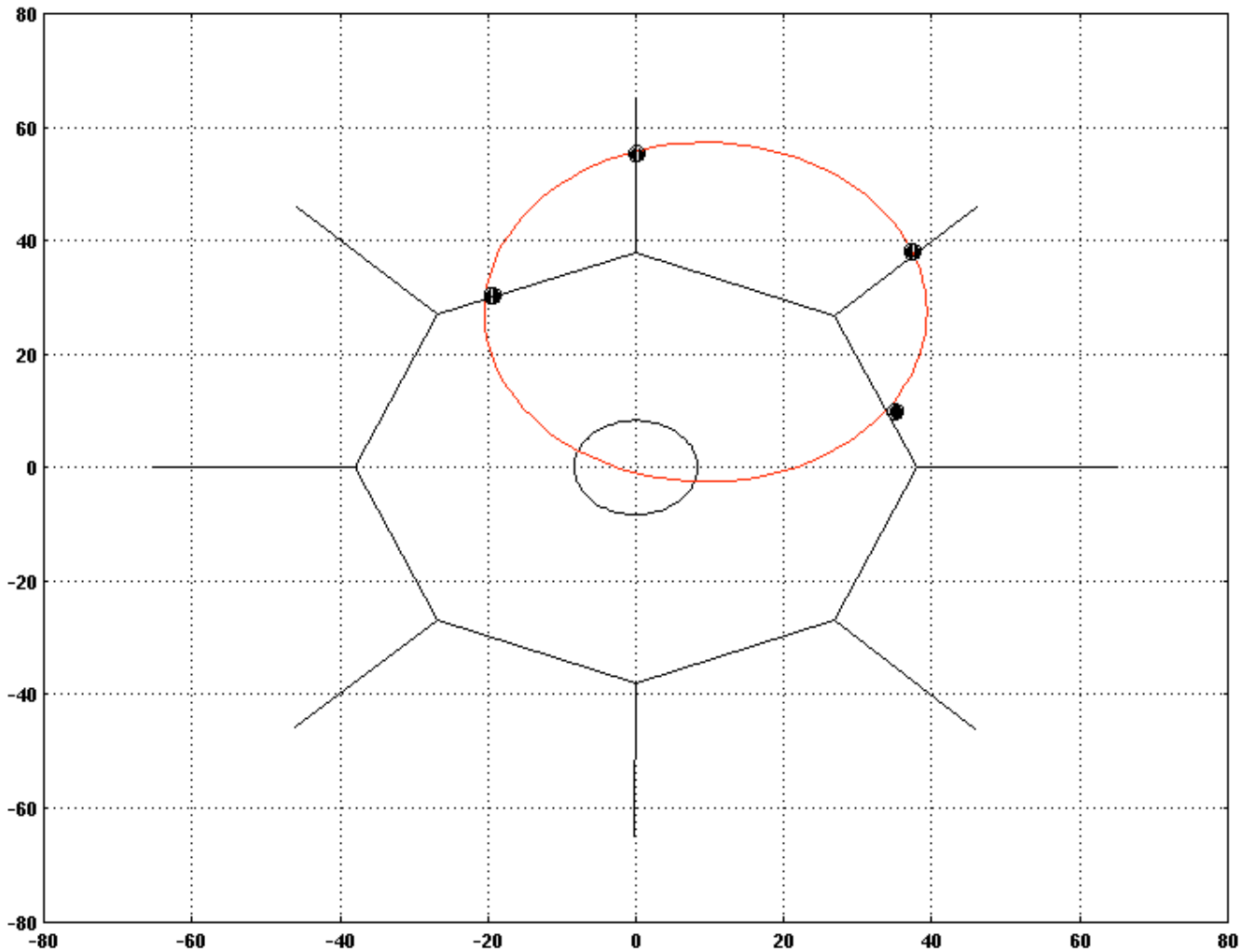
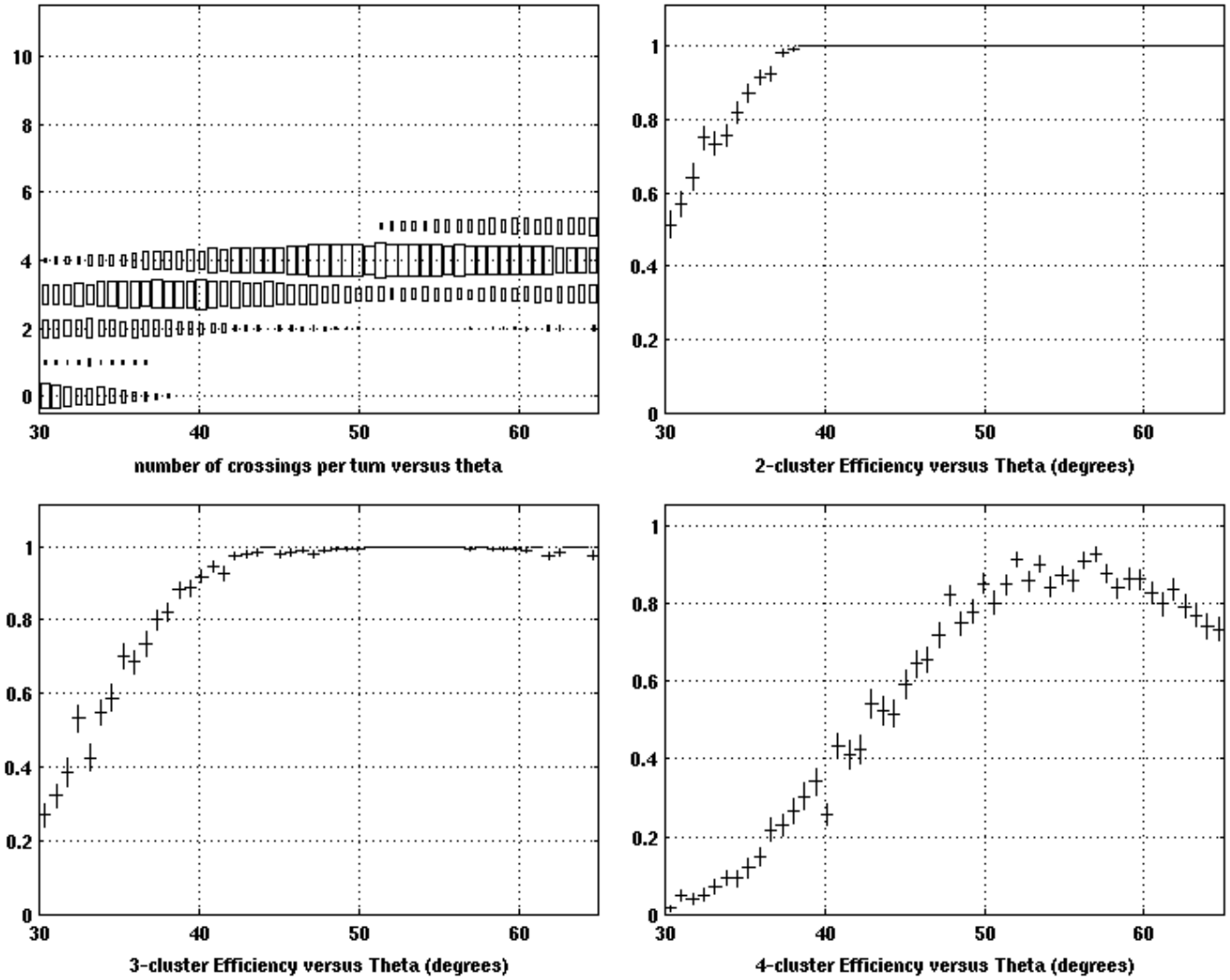


Figure of Merit for L-tracker (compare with Page 6):



Conclusions

L-tracker has slightly better acceptance to signal electrons with pitch angle < 40 degrees

L-tracker and Vertical L-tracker has similar acceptance for Pitch angle > 40 degrees

Vertical L-tracker has more clusters (ie. 50% more material) than L-tracker at pitch angle > 40 degrees. The increase in material probably doesn’t matter, since we care more about material seen by background electrons.