Guard Ring Size Studies

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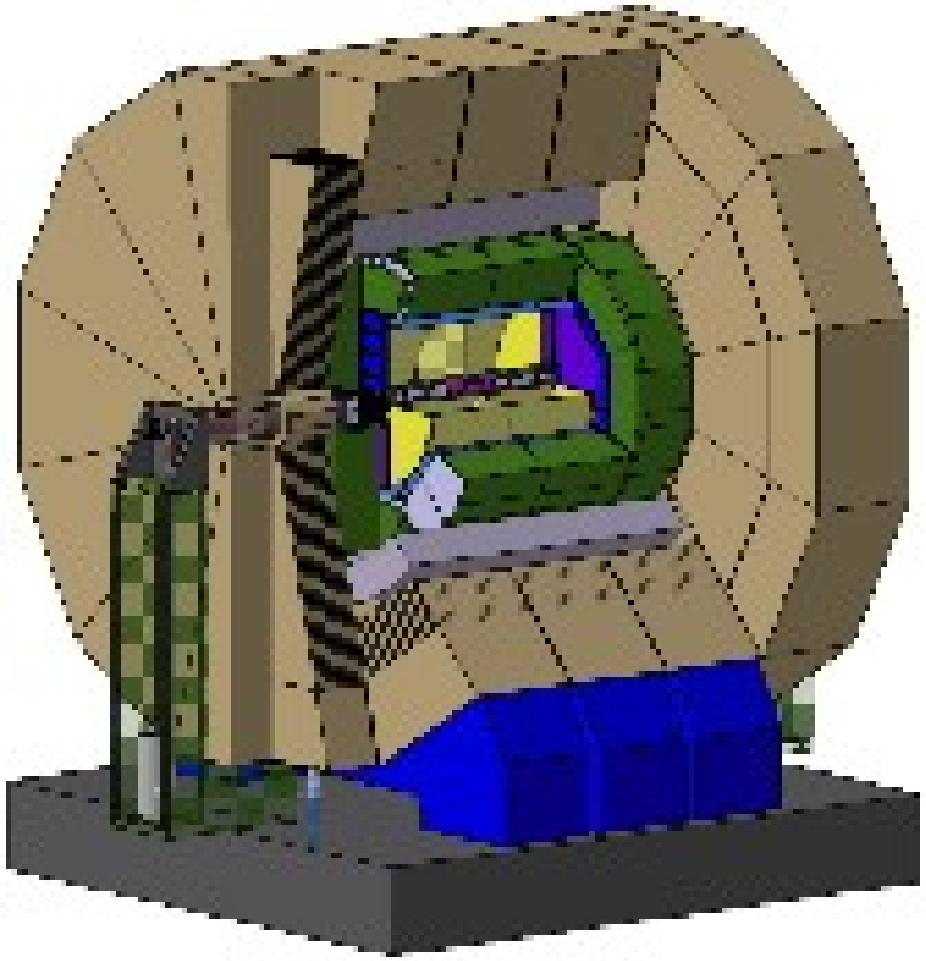
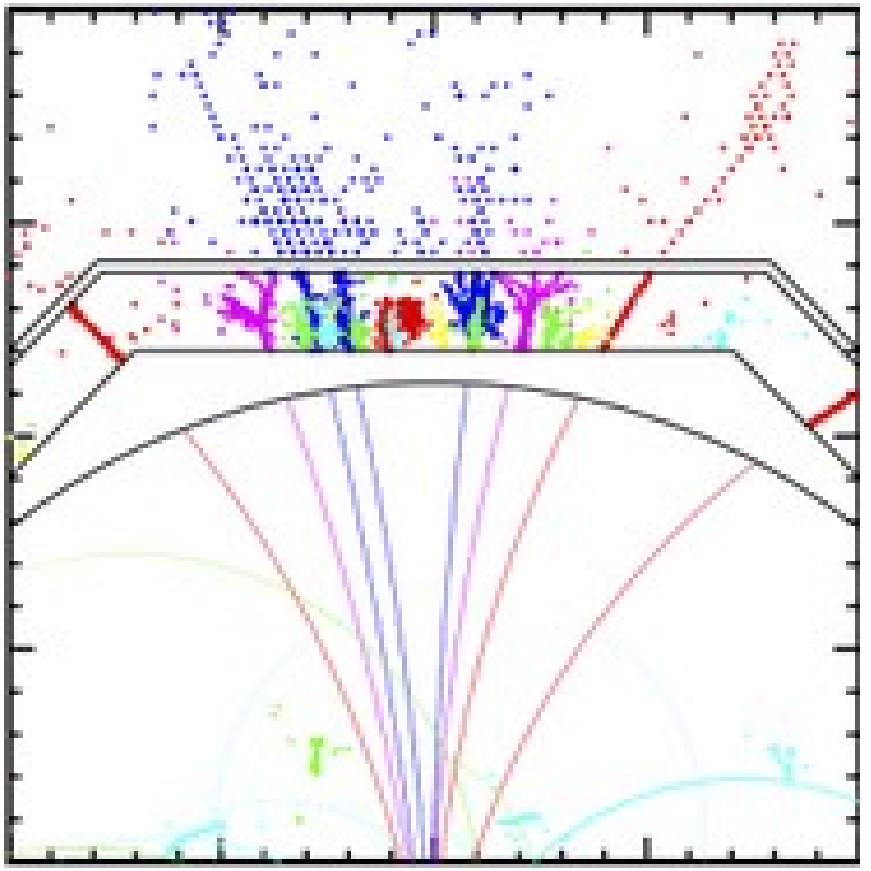
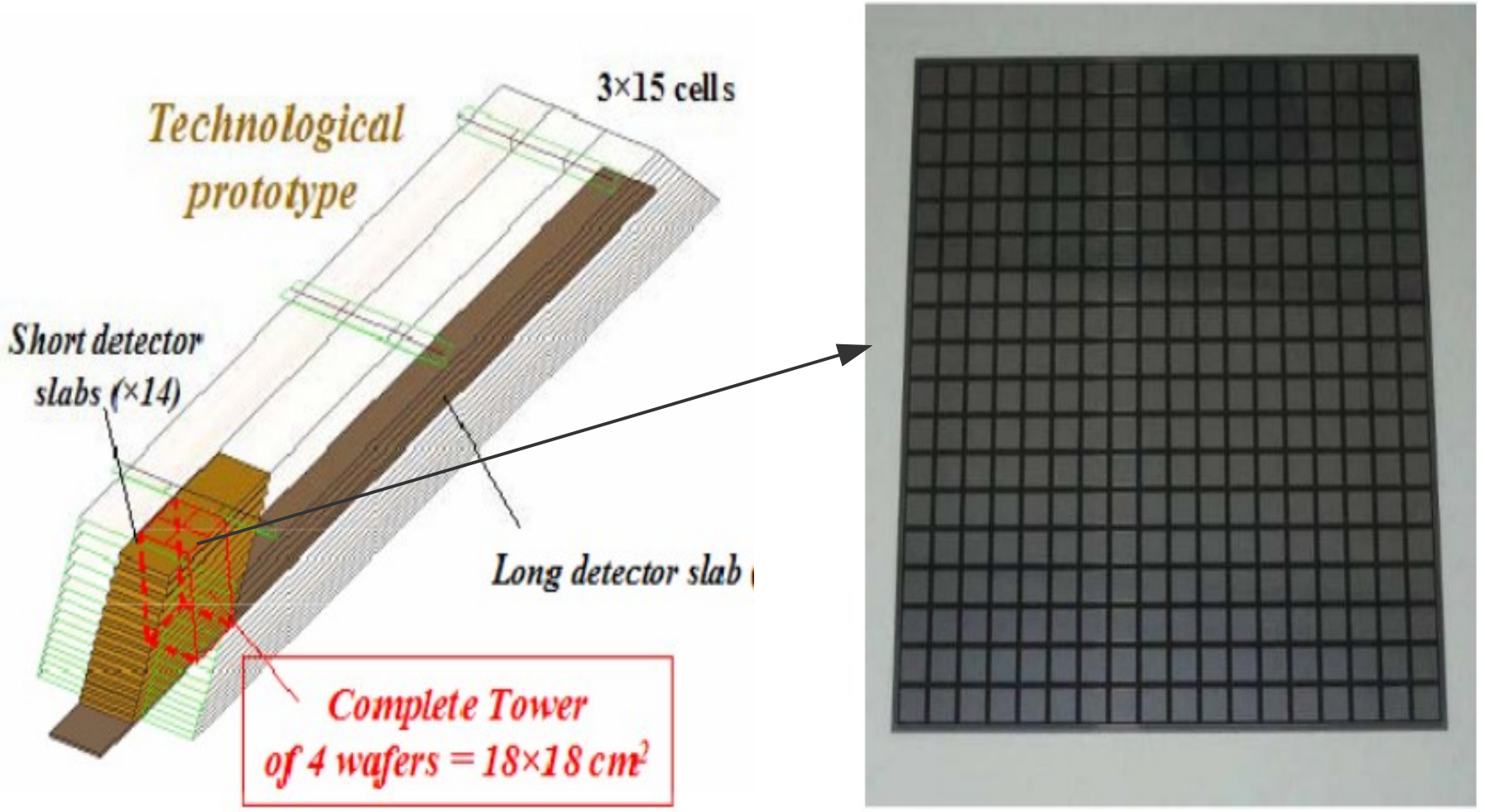
ILD-ECAL





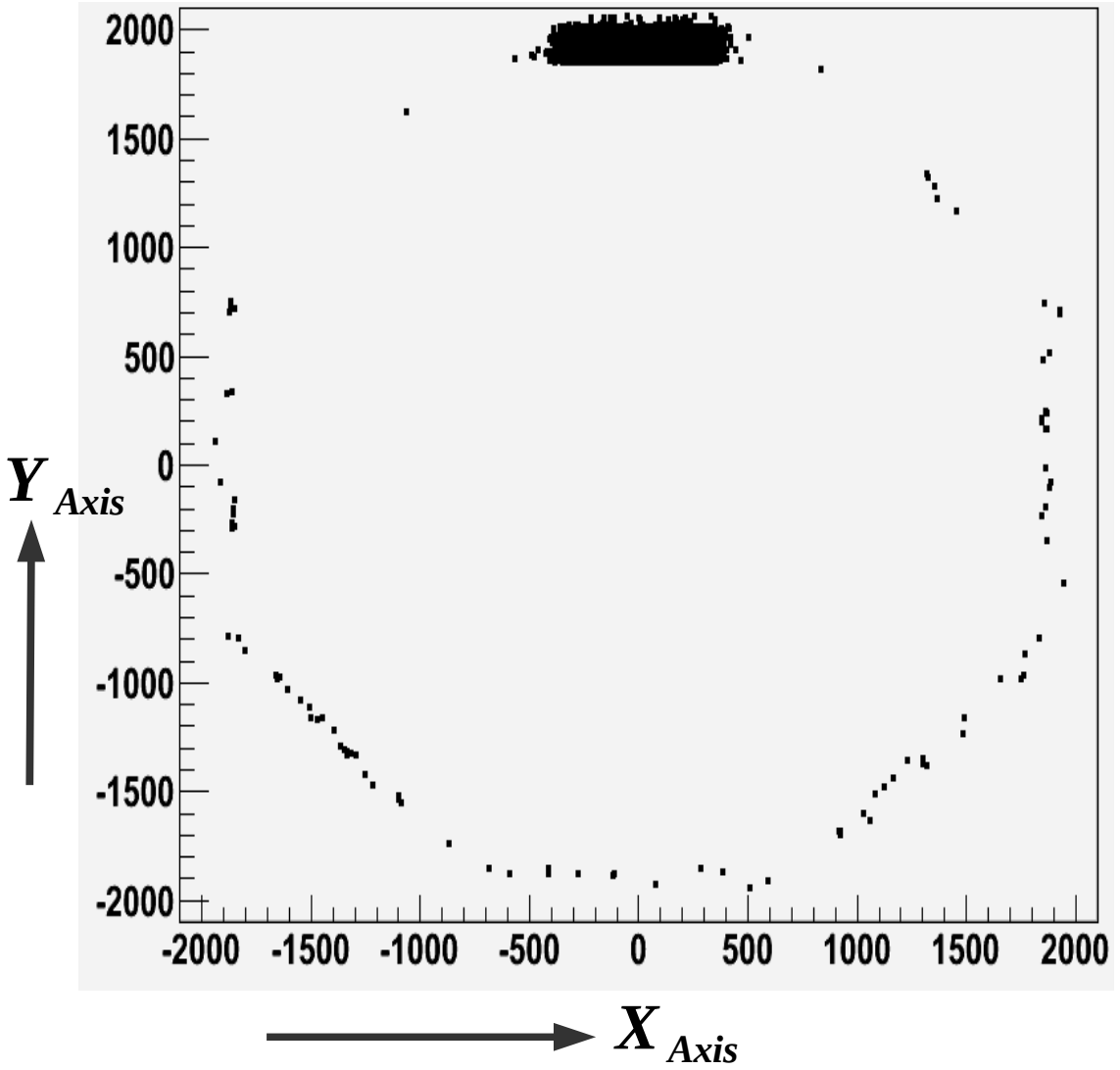
Technological Prototype and Silicon Wafer



Technological Prototype and Silicon Wafer

- The wafer is surrounded by a guard ring to control the leakage currents.
- The silicon wafer for Technological Prototype will consist of 16X16 Cells. These studies were done for 18X18 Cells Wafer {Mokka Implementation}.
- Each cell is of the size 5mm X 5 mm.
- The typical Guard Ring Size is 0.5 mm.
- Purpose of the study is to optimize the guard ring size.

The Studies



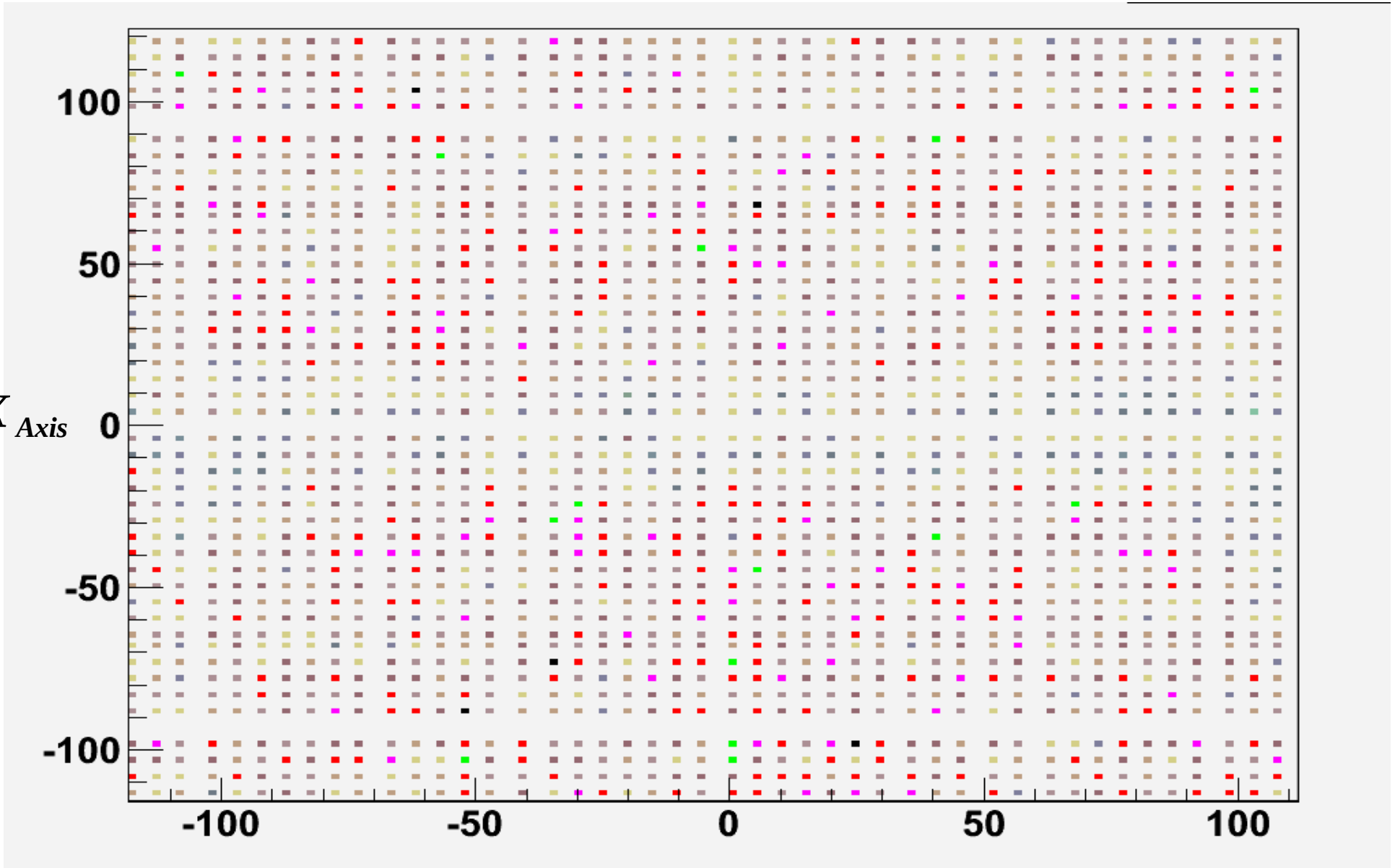
The Studies are performed with Single Photons Events at 2 GeV and also with Jet Events Z -> uds at 91 GeV.

For the single Photon events we test three different sizes to see the effects, 0.001mm (~0) ,0.5 mm and 1 mm.

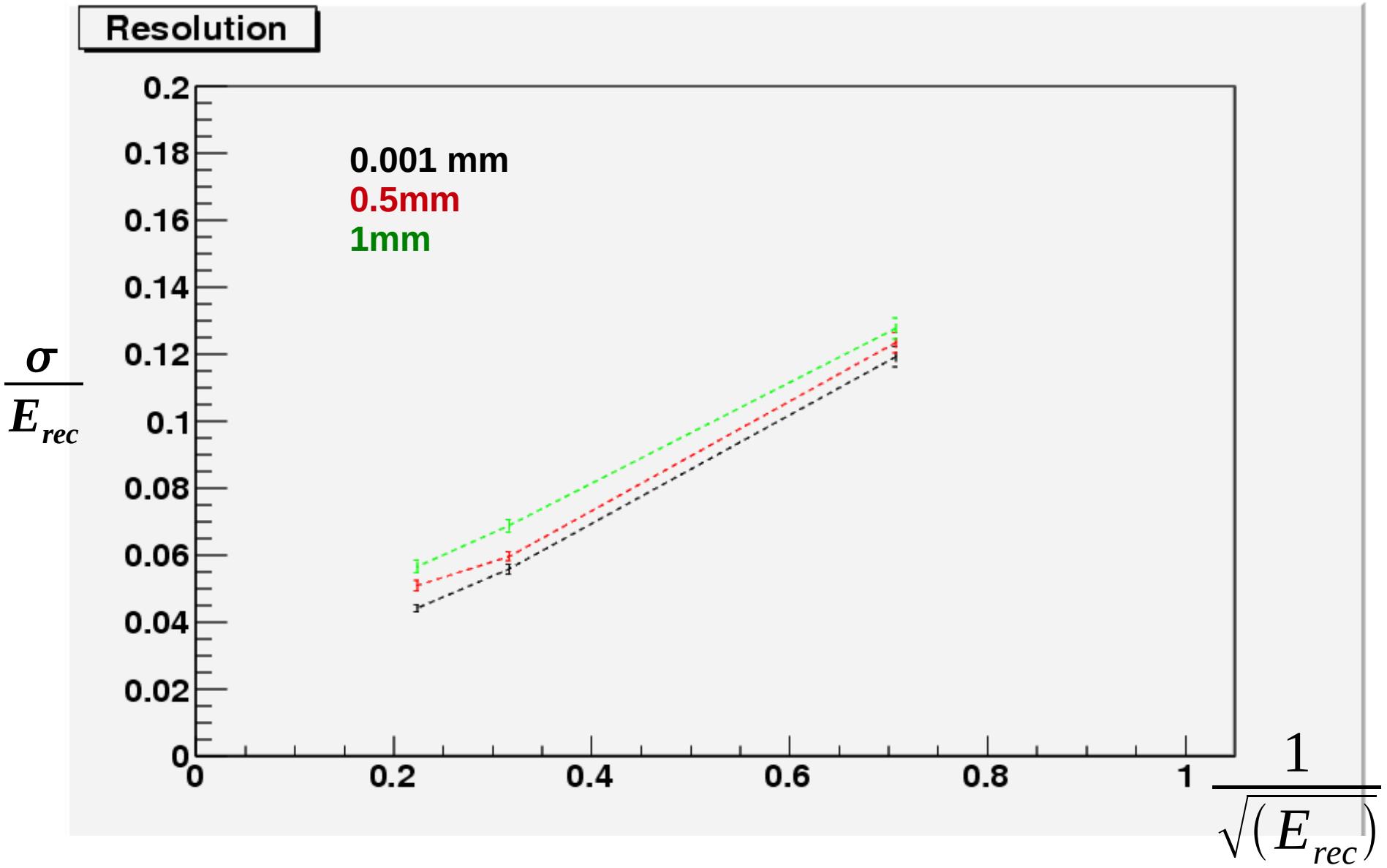
The Effects over Energy Reconstruction and Hits recovery are in addition to those with Inter-wafer gaps. The study concentrates on the effects induced by varying the Guard Ring size.

A Theta and Phi smearing of initially 10 Degree and later on of 4 Degree was applied to zoom into a particular region.

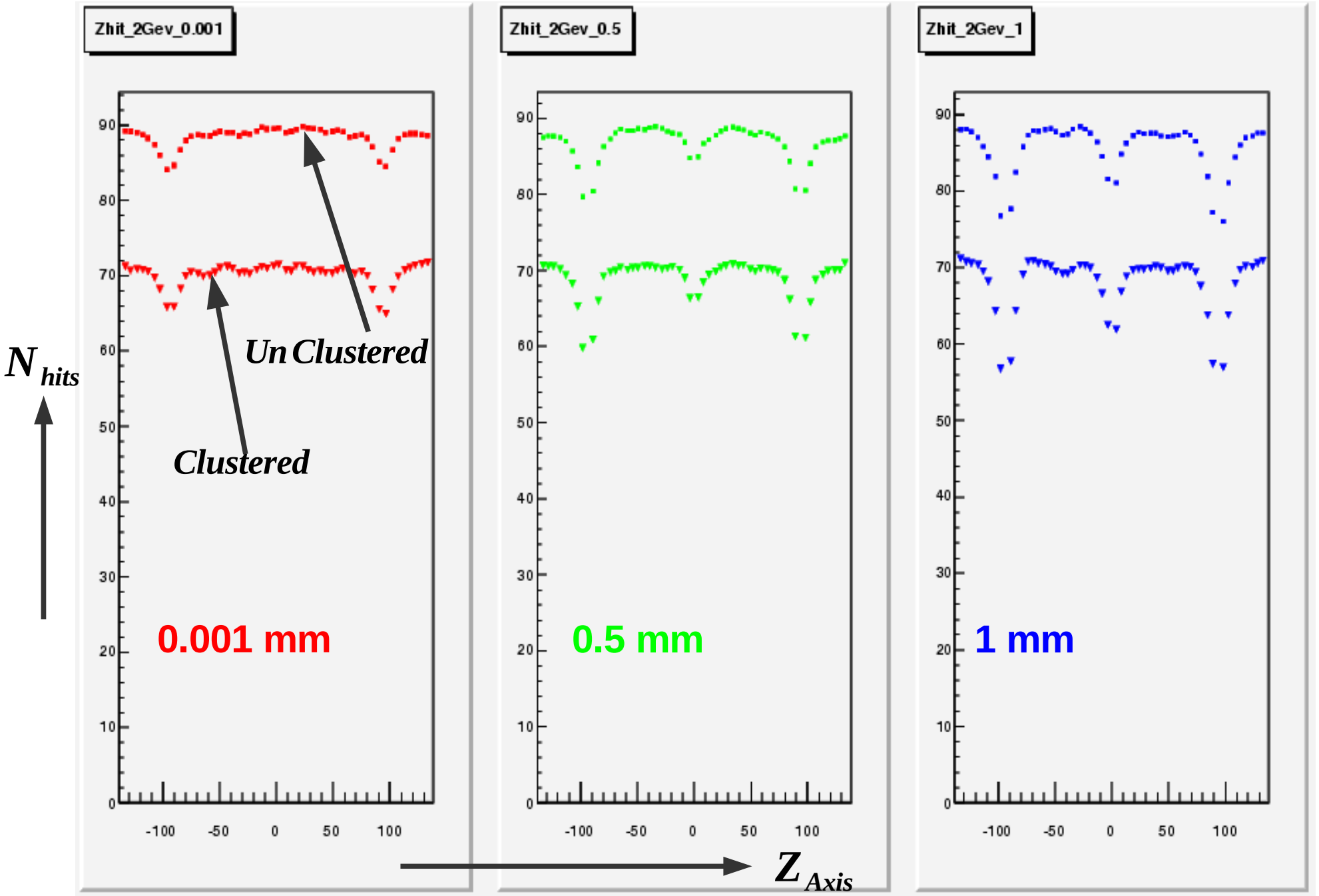
The Wafer Map



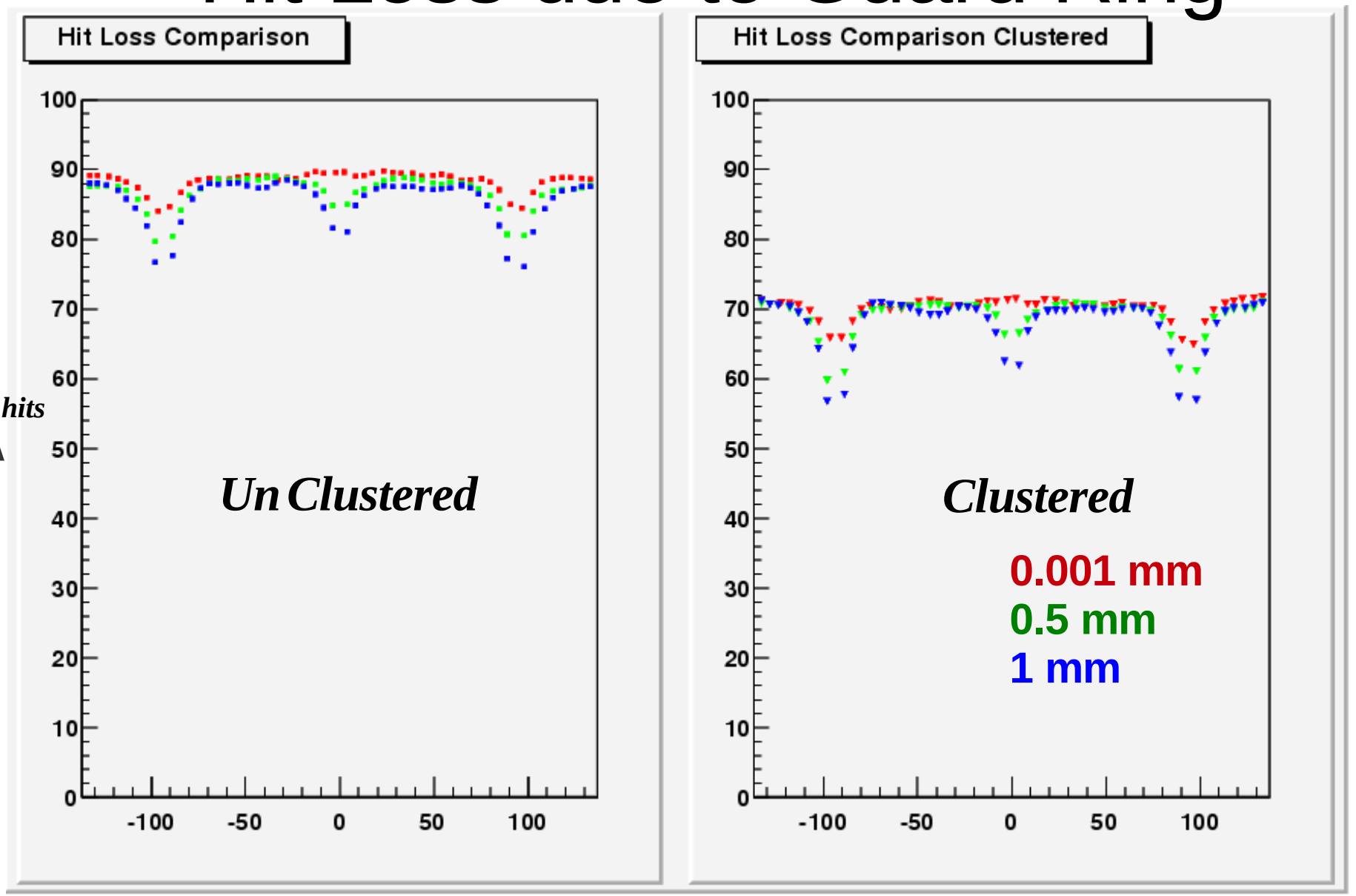
Effect on Resolution of ECAL



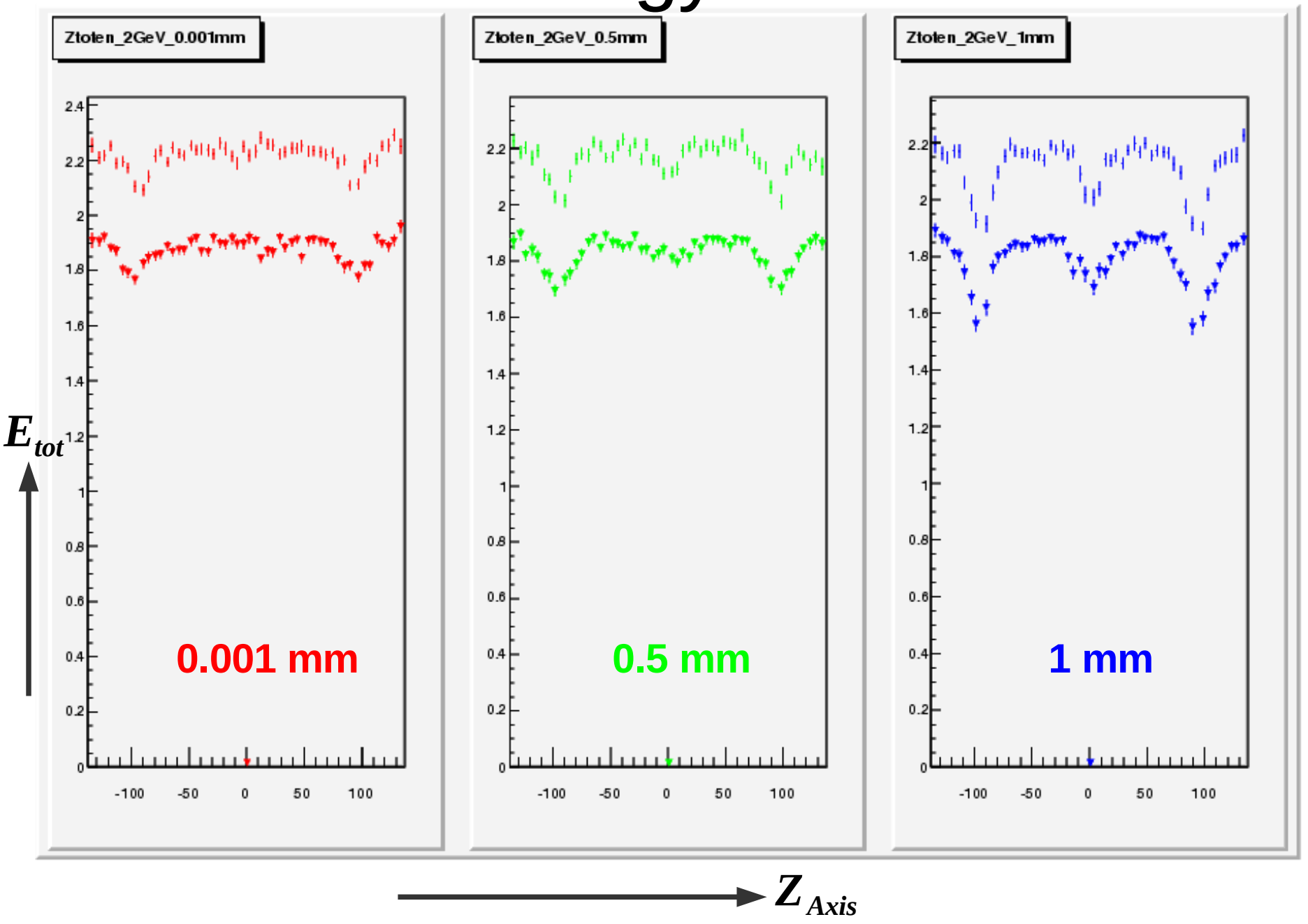
Effects on Hits



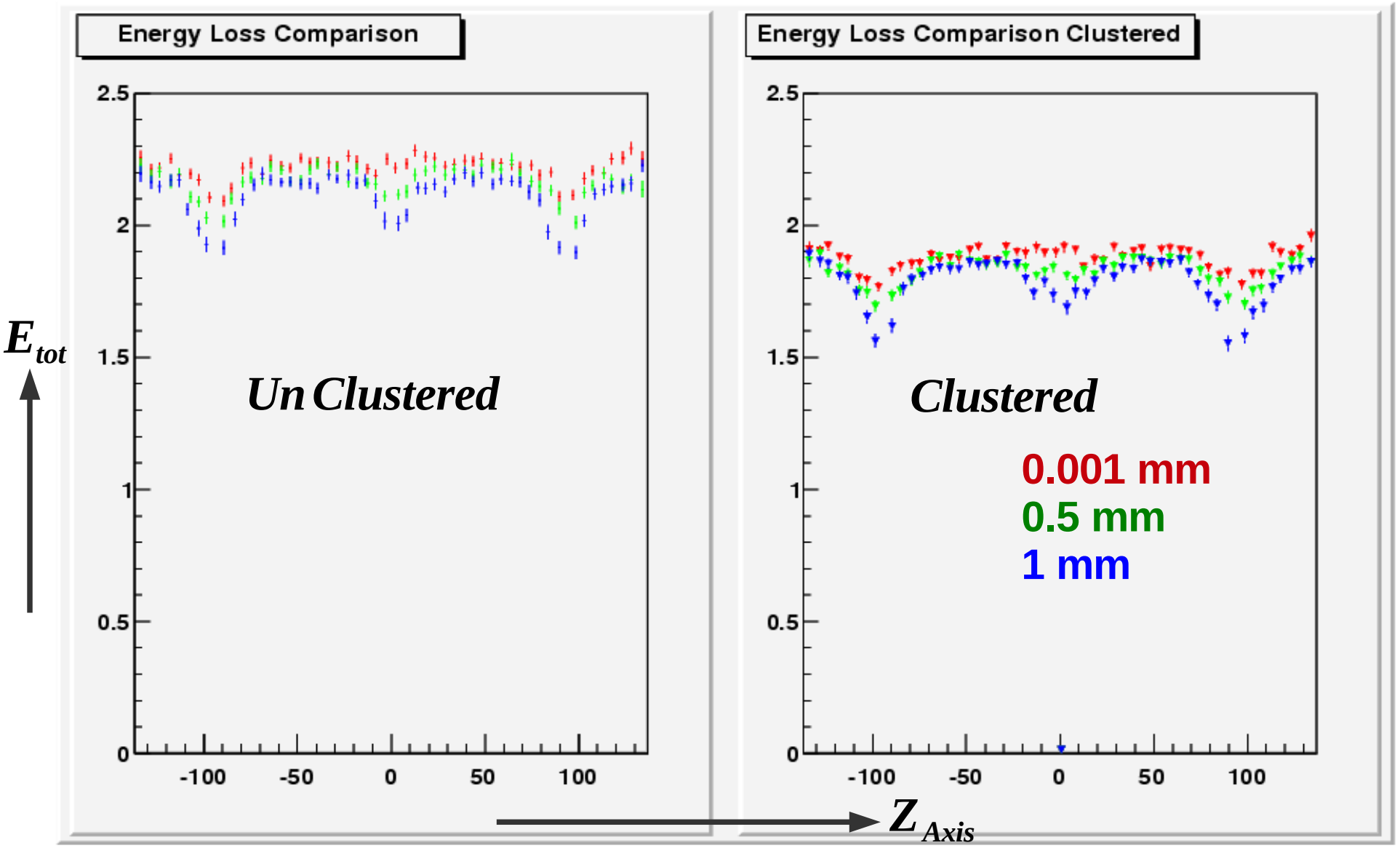
Hit Loss due to Guard Ring



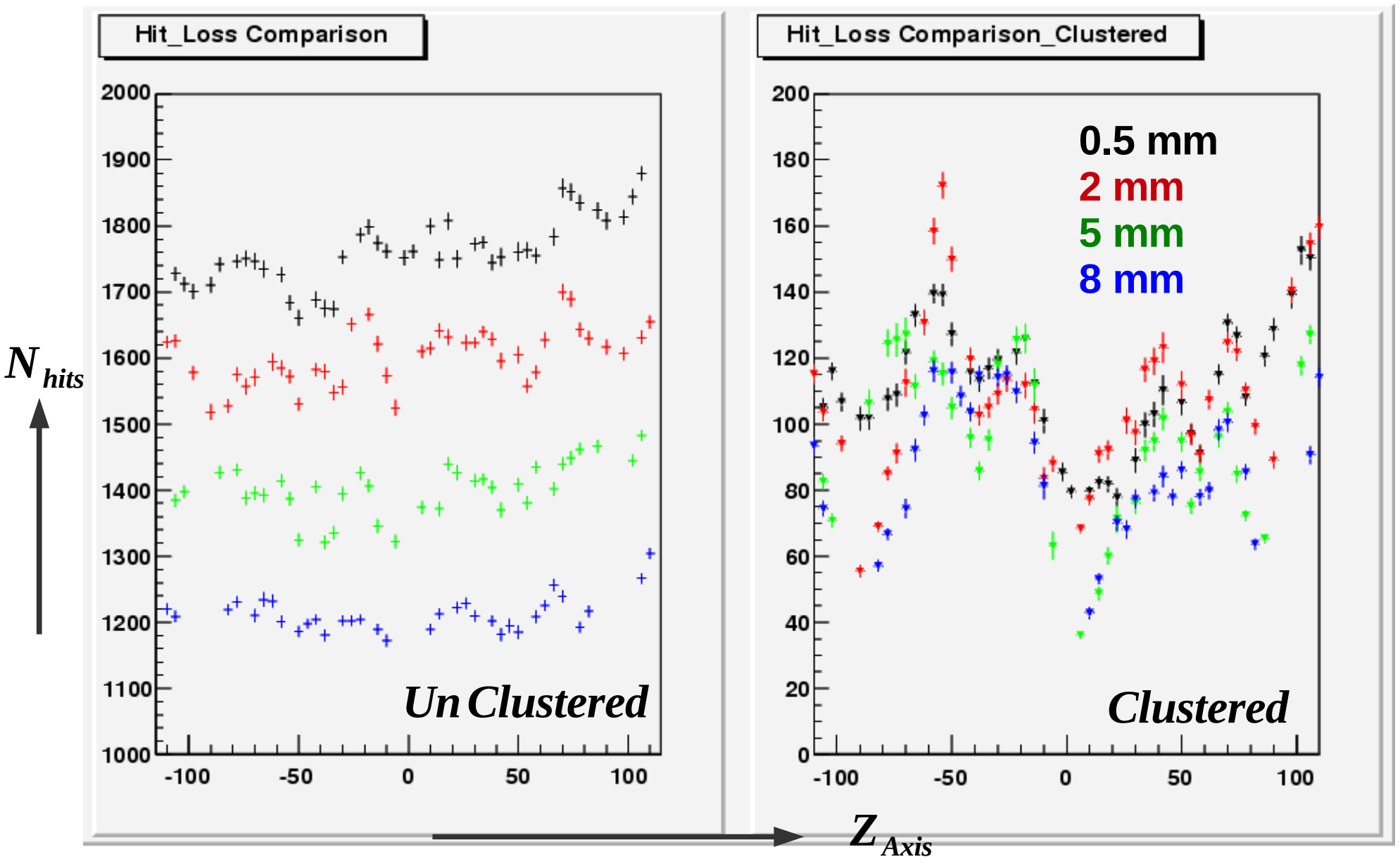
Effect on Energy Reconstruction



Energy Loss due to Guard Ring



Jets Z -> uds at 91 GeV



Outcomes and Perspectives

- To continue these Studies for the Jets and observe the possible effect on Energy and Resolution
- To study the effect on real Physics Channels, especially ee->HZ Channel.
- Optimization of Guard Ring Size is an important step in the R&D of ECAL, keeping in view the upcoming talks with Hamamatsu and DBD.