Efficiency map

28th FCAL Collaboration workshop

JINR

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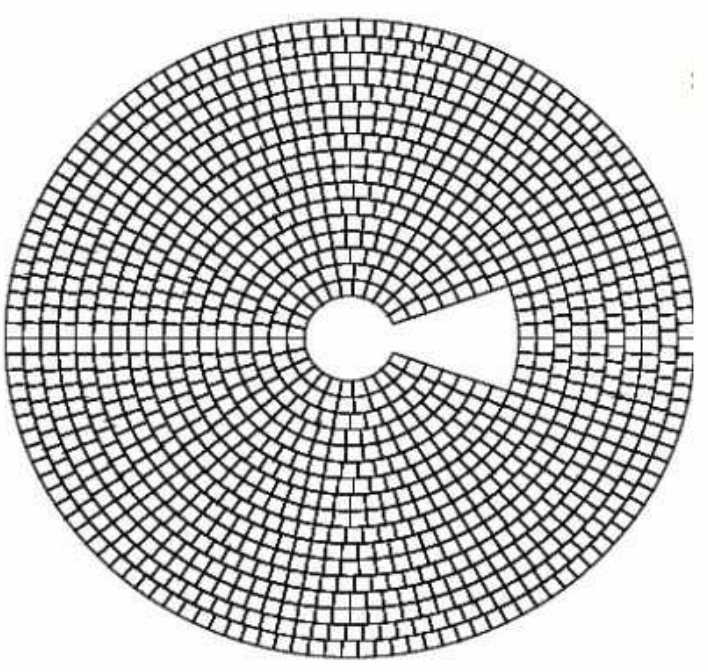
Outline

- BeamCal
- Background simulation
- Current status
- Future plans

BeamCal

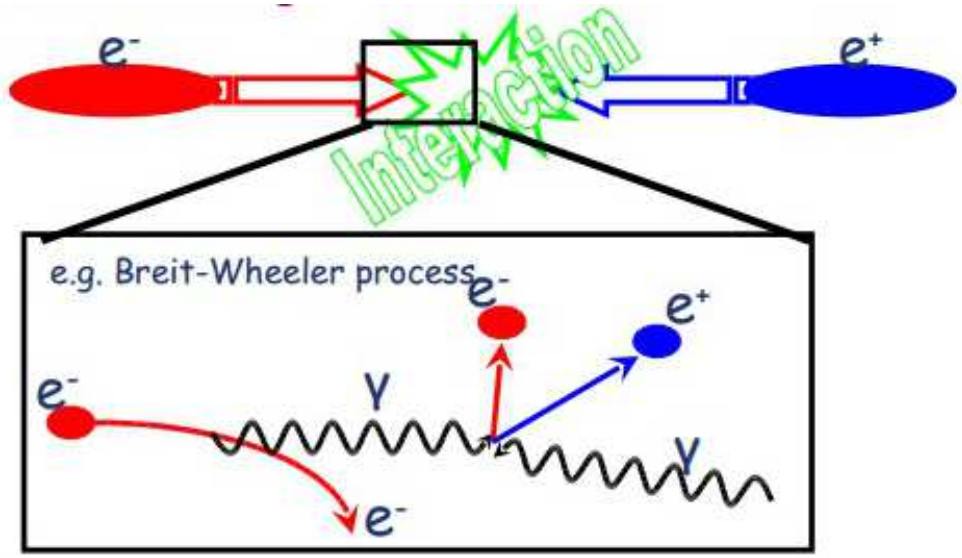
- Diamond
- GaAs
- Silicon
- Tungsten



- 40 layers of 3:5 mm thick tungsten
- 0.3 mm sensor uniformly segmented into 8x8 mm2 pads.
- θ_{inner} = 5.6mrad; θ_{outer} = 41.7mrad.

Beamsstrahlung

Beamsstrahlung – a coherent radiation of photons resulting from beam-beam interaction. Some photons are converted to electron-positron pairs and create a lot of non-uniform background in the BeamCal.



Background simulation methods

- **Pregenerated** - the background is constructed with random samples from bg pool. Simulate 40BX = select 40 samples and add them.
- **Gaussian**- the bg is generated according to gaussian distribution in each pad:

gaus(mean*Nbx, st.dev*√Nbx).

The parameters are obtained from bg pool and are stored in a root file. Good for large Nbx.

- **Average** - very similar to Gaussian, but with mean=0
- **Parametrised**- bg is generated according to with parameters obtained from the pool.

Good for Nbx < 4

$$f(x) = \frac{[1]}{x} \exp\left[-\left(\frac{x-[2]}{[3]}\right)^2\right]$$

Mathods of reconstruction

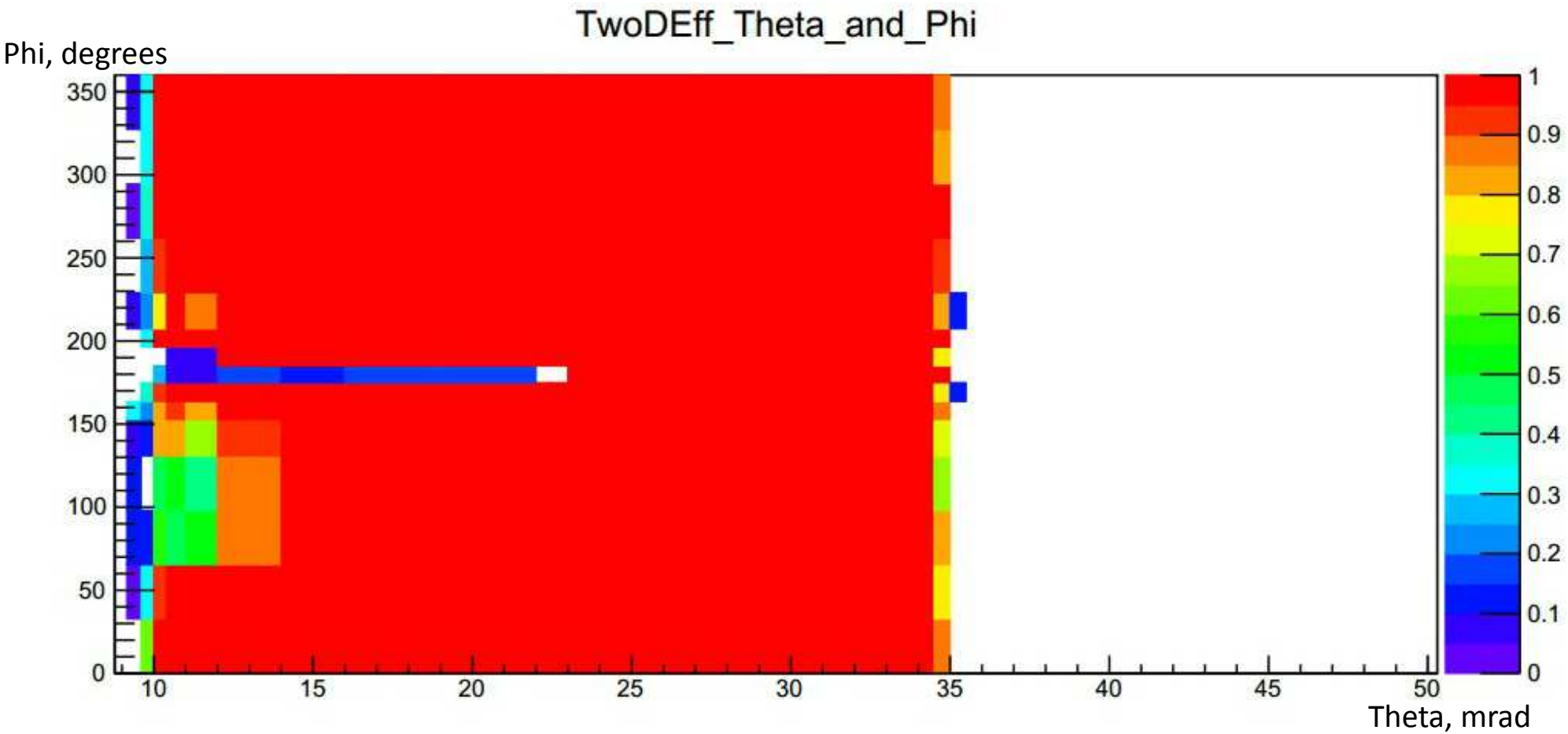
Clustering algorithm and shower position reconstruction.

Clustering - search based on the pads with significant remaining energy.

Shower – fitting the laterally projected energy distribution.

Requires considerable time.

Efficiency map (E=500GeV)



Construction of the efficiency map

- Configure binning;
- Choose the energy;
- Tune the configuration file for Marlin;
- Choose a method for background simulation;
- Call up a program.

Current status

Task : to calculate the efficiency in an arbitrary point.

- Configured the simulation system Marlin;
- Adapted binning;
- Preliminary the two-dimensional interpolation method has been developed;
- An interface has been created.

Summery & Future plans

- ✓ Made a test version of the efficiency map;
- ✓Preliminary the two-dimensional interpolation method has been developed.

- Optimize the system of efficiency calculations at the point;
- Create a comfortable interface for users;
- Add energy dependence;
- Construct an efficiency map for energy CLIC and ILC;
- Further support.