

FAST SIMULATION PARAMETRIZATION

The scope of this project is to provide a fast simulation of existing detectors or detector projects in DELPHES or any other parametrized simulations. This fast simulation will be used to evaluate the performance of different detector designs for some benchmark physics channels relevant for FCC-ee program.

The fast simulation will be developed in the FCC software framework.

Specific tasks

1) collect the relevant performance plots of each chosen detector, e.g.

- Impact parameters resolution as a function of momentum and theta angle
- Charged tracks momentum resolution as a function of momentum and theta angle
- Muons electrons and hadron efficiencies as a function of momentum and theta angle
- ECAL resolution and ECAL granularity as a function of the theta angle
- HCAL resolution and HCAL granularity as a function of the theta angle
- ECAL and HCAL efficiency as a function of energy and theta angle
- Electron and muon id efficiency as a function of momentum and theta angle

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2) Implement the relevant control cards in the present version of DELPHES, using DELPHES as a stand alone program, in order to reproduce the performance plots of the specific detector. Produce for each detector the relevant performance plots obtained running DELPHES with particle gun and cooled them in a document for reference.

3) Reproduce the same plots when running DELPHES in the FCC software framework.

4) The present version of DELPHES may have limitations in providing a realistic particle list in output (e.g. how to treat lepton id efficiency and lepton fake rate ?, material effects ?). Also in collaboration with the DELPHES team propose and implement new features in DELPHES in order to overcome these limitations.

The final goal of this project is provide a realistic improved detector configuration optimizing the choice of realistic performance plots based on the studies of the benchmark physics channels.