Optimization issues

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The copy of this talk one can find at the http://www.desy.de/˜morgunov

Four stages of optimization

- **Technological (simplified events for sub–detectors) – PFA is not involved**
- **Detector sizes and magnetic field (simplified jets) – PFA is not involved**
- **PFA influence on the detector performance (whole events)**
- **Final detector performance**

Sub–detectors calibration and alignment is also issue of optimization, as well as push–pull.

Each item could be converted into a few concrete tasks after some detailed.

We need a synchronization of efforts.

Comparison of different types of sub–detectors

- **Type of Vertex detector ... :**
  - Number of X–zeros : Occupancy : Accuracy : Sensitivity to background : : ...
- **Type of Main Tracker ... :**
  - Number of X–zeros : Occupancy : Accuracy : Efficiency : Stand-alone resolution for individual particles : ...
- **Type of ECAL to vary of material ... :**
  - Number of X–zeros : Resolution of individual particles : How it is connected with HCAL in terms of compensation? : Granularity : ...
- **Type of HCAL to vary of material and size ... :**
  - Number of interaction length : Resolution of individual particles : Hardware compensation? : Granularity : Leakage : ...
- **Magnet and muon sub–detector ... :**
  - What do we need to know about them ? : ...

Could be done without involving of any Particle Flow Algorithm.

Would be useful to exclude of badly designed sub–detectors, or to correct it.

Detector sizes and Magnetic field variation

- **Tracker as whole: Resolution vs B–field and sizes for individual particles?**
- **Number of loopers and its energy, efficiency of tracker+algorithm to find it?**
- **Number of particles that goes into tube and vertex background (dependence on magnetic field?)**
- **Distances between particles/showers in ECAL and HCAL (gammas and hadrons separately)**
- **Leakage of energy after calorimeters**
- **Calorimeter energy resolution without PFA or software compensation**
- **B–field $\times$ Size cost? (we should have at least a factor of volume cost)**
- **...**

Single/double/triple jet Energy and Mass resolution

after some/many of Particle Flow Algorithms

- **B–field and sizes influence on PFA quality**
- **Tracker accuracy influence on PFA quality**
- **Jet density influence on PFA quality**
- **Different processes, different energies, different physical cases**
- **...**

Final Estimation of Integrated Detector Performance

Comparison of physical properties of reconstructed events with requirements on it

For a few chosen version of the detector only and for most frequent physical processes

as well as for rear processes included into reference list.

Full chain of simulation of accelerator and whole physics include:

- **Luminosity curve**
- **ISR**
- **Background**
- **More or less realistic digitization of sub–detectors**
- **Full chain of reconstruction program including PFAs**
- **b,c,s, tagging quality**
- **Jet finder quality**