0.1 Sub-detector performance

- The detector performances of each concepts has been studied based on full simulation programs which takes into account effects such as particle interactions with detector materials and shower developments in calorimetric detectors. Those effects are usually not easy to simulate in fast simulation type programs which are used for physics studies.

- The deapth of the detector descriptions implemented in the full simulation programs is depending on the concepts but usually simplified configurations sufficient to estimate major effects which significantly affect detector performances.

- The reconstruction program are under development and cheated method are used when its not significantly affect the performance estimations.

0.1.1 tracker performance

- The tracking devices are designed to provide excellent momentum resolution and efficient reconstruction over a large range in polar angle, θ. To facilitate these function, LDC, GLD, and 4th concepts use the Time Projection Chamber in the solenoid magnet of 3 to 4 Tesla as a central tracking device.

  They are equiped with an intermediate tracker in side the TPC to help track connection to the vertex detector and improve the reconstruction efficiency of low momentum tracks.

- A tyipical momentum resolution in the case of GLD is shown in Fig.1 In conjunction with the TPC, intermediate tracker and vertex detector, the momentum resolution better than $5 \times 10^{-}5 p_t(\mathrm{GeV/c^2})$ is achieved.

- The track reconstruction of the TPC is relatively stright forward even in an environment of large background hits thanks to the 3 dimensional dense signal hit information. The efficiency to reconstruct track were studied based on the Tesla TPC model, which is shown in In the central

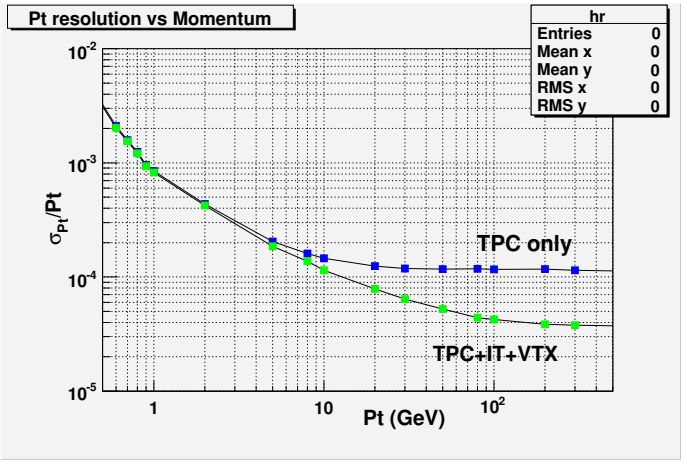

Figure 1: gld Momentum Resolution

region which are covered by the TPC, the track reconstruction efficiency better than XX% are achieved. The reconstruction efficiency in the forward region will be improved by an algorithm based on the forward intermediate tracker hits.

- In the case of SiD concept, the trackers are all silicon. Though the number of layers are limitted, the high momentum resolution are expected thanks to the very good spatial resolution of a silicon strip detector. The momentum resolution of the SiD is shown in Fig.3. In the SiD concept detector the main tracker consists of five layers of microstrip detectors with coarse longitudinal segmentation. While the stand-alone pattern recognition in such a detector is difficult, especially in the case of a high density of background hits, the pattern recognition capability of the vertex detector, with its high precision and high pixellation, is nearly perfect. Therefore, the standard track finding algorithm for the SiD detector is an 'inside-out' track finding algorithm.

  – Put some reconstruction efficiency plot of SiD

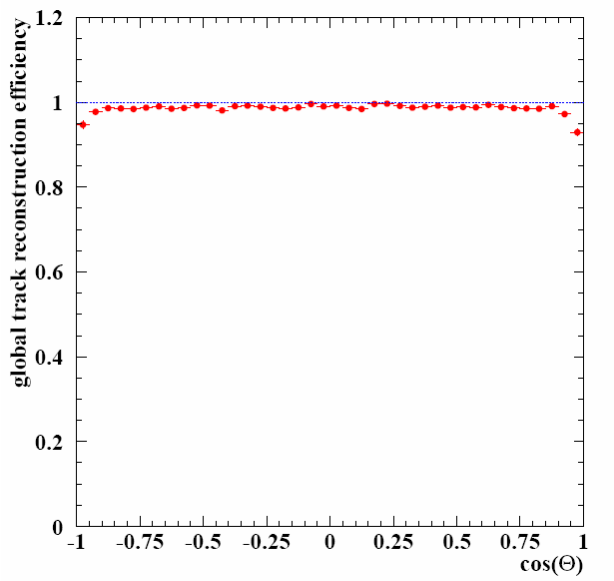

Figure 2: ldc-fig22

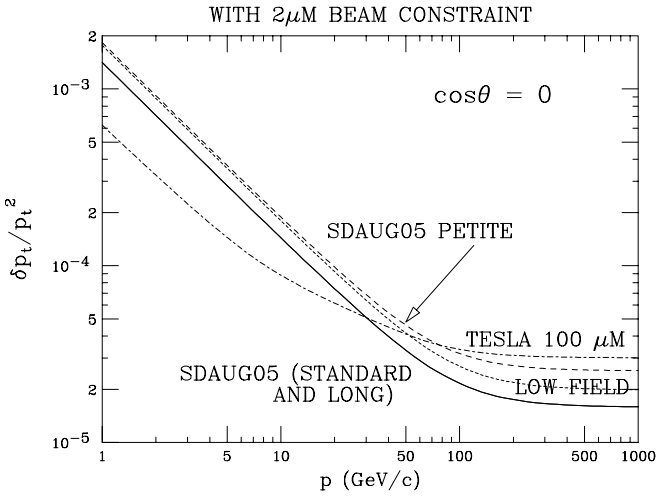

Figure 3: SiD Momentum Resolution

0.1.2 pfa performance

- Calorimeter performance for single particle
  - gamma/electron energy resolution, angular resolution
  - pion/k0L energy resolution, angular resolution
- - What is PFA
  - The tracking devices of the ILC detectors measures only charged particles, while the calorimeter devices measure both neutral and charged particles. The tracking devices can measure the particle momentum better than the calorimeter devices. In order to achieve the good energy measurement of jets in the ILC, it is important to subtract charged particle signals from the calorimeter signals and use the calorimeter only for the measurement of the neutral particles.
- - PFA algorithms
- - A typical PFA performance of $Z \rightarrow q\bar{q}$ events at Z pole. (Figures below are just an example. Expected to be updated later)

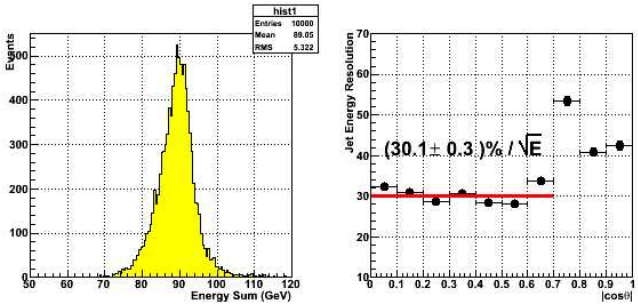

Figure 4: gld Z0 mass resolution as a function of cosTheta

SiD figure ?

- Performance at higher energies.
- Particle Identification - any good reference ?
  - gamma idenntification

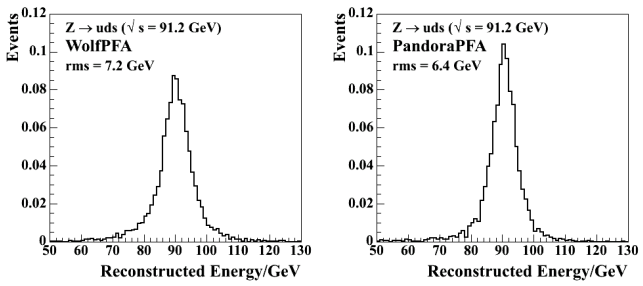

Figure 5: ldc-fig87 Z0 mass resolution by WolfPFA and Pandora PFA

- electron identification
- muon identification

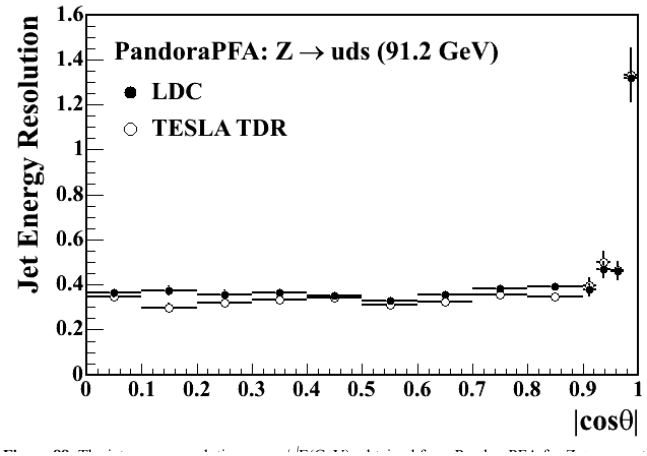

Figure 6: ldc-fig88 Z0 mass resolution as a function of cosTheta

0.1.3 vertexing performance

- - Impact parameter resolution
- - b/c quark tagging efficiency
- - b/c charge tagging