Heavy Flavour Benchmarks of ILD

Abstract

An overview of the performance of the ILD detector in its version Large and Small as relevant for the IDR is given

Contents

1. Introduction

Description of relevance of heavy flavour finals states for detector benchmarking

- Stringent test of (secondary) vertexing
- Exploitation of particle ID

2. Methods and tools

We use the following methods

- 'Core tools'
  - Jet algorithms at various steps of the analysis
  - Isolated Lepton Finding in case of $ee \to tt$ semi-leptonic
- Using TPC dE/dx to identify Kaons issue of the B-Meson decays (Processors????)
- Tools specific/developed for the study
  - Analysis of tracks associated to the secondary vertex (LCFIPlus v.xxxx and navigations through reconstructd particle list using LCRelations)
    - Purpose: Identify and add tracks that have not been associated in Standard Reco (VertexRecoveryProcessort)

2.1. Monte Carlo samples and Event processing

- specify samples that are used for the analysis
- Give list of processors that have been used, official reconstruction and private processors (Maybe summarised in a table). Document where to find them. Remark: this is maybe double work since on may give the processors already above.

3. Efficiencies and Control plots

- Common
  - it might be good to produce a plot of the b-momentum in the lab frame to point out the differences between the two final states.
  - Plots before and after vertex recovery (at least initially b and t analysis, large detector is enough unless striking difference).
  - Increase of purity by vtx recovery (b and t analysis, large detector is enough unless striking difference)
  - Detector acceptance (here maybe large and small) Slide 11 by Adrian
  - dE/dx including 'Jenny's' Plot, it's maybe sufficient to use the plots produced by Adrian.
- Information specific to tt-analysis
  - Energy and polar angle spectrum of selected isolated lepton
  - Table with selection efficiencies
  - For the record we may add the observation by Amjad on the b/c tagging.
- Information specific to bb analysis
  - Table with selection efficiencies
  - Is there anything specific to the bb analysis given that bb is a subsystem of tt?

3.1. Limits of $ee \to bb$ at 500 GeV

- Here I wanted to point out why the bb at 500 GeV is more involved than at 250 GeV but given the results shown today by Adrian this is maybe less of an issue.

4. Results

- Polar angle spectrum $ee \to bb$ (Large and small)
- $ee \to tt$ including underlying b polar angle spectrum (Large and small)

5. Summary

The process $ee \to tt$ has been successfully ported from the 'DBD world' to the 'IDR World'. No major differences between short and large detectors.

FURTHER SUGGESTIONS ARE WELCOME.

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References