Abstract

This thesis presents the measurement of the cross-sections and asymmetries of tau and muon pairs in e^+e^- collisions at centre-of-mass energies between 192 and 209 GeV. The analysis is based on data of about 433 pb^{-1} collected during the years 1999-2000, by the OPAL detector at LEP (CERN). Cross-sections and asymmetry measurements of the full energy events (non-radiative) are presented separately from the inclusive sample as these are potentially more interesting for new physics searches. The systematic uncertainties for the cross-sections and asymmetries are assessed. No significant deviations from the Standard Model theoretical predictions were found in either channel.

In addition, a separate study is presented concerning the feasibility of a possible forward jet trigger for the ATLAS detector at the LHC which is potentially interesting for the analysis of Higgs production via weak boson fusion. Different versions of the algorithm have been tested with simulated data and the preferred solution is presented.