



Doctoral Thesis

Dimuon production in e^+e^- collisions with the L3 experiment at LEP2 up to the highest energies

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**Dimuon production in e^+e^- collisions with the L3
experiment at LEP2 up to the highest energies.**

**A dissertation submitted to the
SWISS FEDERAL INSTITUTE OF TECHNOLOGY ZURICH**

**for the degree of
Doctor of Natural Sciences**

**presented by
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Abstract

In this thesis the results and the experimental techniques on the measurements of the interaction $e^+e^- \rightarrow \mu^+\mu^-(\gamma)$ with the L3 detector at LEP are presented, for center-of-mass energies from 189 GeV to ~ 208 GeV. In this range of energy a total integrated luminosity of 608 pb^{-1} has been analyzed and 2868 muon pairs have been selected. The results on the cross section and asymmetry measurements are all in good agreement with the Standard Model expectations. The measurements from 130 GeV upwards have been also used to search for new physics, in the framework of the contact interactions theory. No evidence for new physics have been found and limits on the corresponding parameters have been set.

Presentations of the Central Error Analyzer and the muon barrel calibration techniques, other projects in which the candidate has been directly involved, are also given in the appendices.

Riassunto

In questa tesi sono presentati i risultati e le tecniche sperimentali delle misure dell'interazione $e^+e^- \rightarrow \mu^+\mu^-(\gamma)$ con il rivelatore L3 a LEP, per energie nel centro di massa da 189 GeV a ~ 208 GeV. In questo range di energie sono stati analizzati ~ 608 pb⁻¹ di luminosità integrata e sono stati selezionati 2868 coppie di muoni. I risultati delle misure di sezioni d'urto e asimmetria sono in buon accordo con le previsioni del Modello Standard. I risultati da 130 GeV in poi sono stati utilizzati per ricercare nuova fisica, nell'ambito della teoria delle contact interactions. Nessuna evidenza di nuova fisica è stata trovata e sono stati calcolati limiti sui parametri corrispondenti.

Nelle appendici sono presentati anche il Central Error Analyzer e la calibrazione del barrel delle camere a muoni, altri progetti in cui il candidato è stato direttamente coinvolto.