Thesis

Report number	CERN-THESIS-2007-027 ; LAPP-T-2006-05
Title	**Etude des performances du calorimètre électromagnétique tonneau d'ATLAS. Mesure de l'asymétrie avant-arrière dans les événements $q\bar{q}$ ⊠ $Z/$ ⊠ ⊠ e^+e^-**
Translation of title	Performance Study of the ATLAS Electromagnetic Barrel Calorimeter. Measurement of the Forward-Backward Asymmetry in the $q\bar{q}$ ⊠ $Z/$ ⊠ ⊠ e^+e^- Events
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Publication	Annecy-le-Vieux : Lab. Annecy Phys. Part., 2006. - 173 p.
Thesis note	PhD : Annecy, LAPP : 2006
Note	Presented on 11 Dec 2006
Subject category	Particle Physics - Experiment
Accelerator/Facility, Experiment	CERN LHC ; ATLAS
Abstract	The start up of the ATLAS experiment at the CERN LHC is planned for the year 2007. The physics program of the experiment covers a wide field, going from tests of Standard Model (Higgs boson discovery) to new theories beyond the SM (Supersymmetry, extra dimensions ... etc). The work presented in this thesis returns within the framework of preparation to the starting of this experiment. After having presented the 2004 combined run, its installation, pedestal

data and calibration data analysis, we develop a method for calibrating the energy measurement based on Geant4 Monte Carlo simulation of the combined run. These simulations are done in the general framework developed for the analysis of the ATLAS data. We present then the performance studies of the electromagnetic calorimeter as well as the results obtained: a sampling term of the energy resolution of $10.6\%GeV^{0.5}$ and local constant term of 0.43%, a non-uniformity of response of 0.44% giving a total constant term of 0.6% and a linearity better than 0.2% for electrons energies between 20 and 250 GeV. Concerning the "physics" side of this thesis, we show a first study on the determination of the effective weak mixing angle, $\sin^2 \theta_{eff}^{lept}$ with one precision better than the current results, ☒ 10^{-4}. To reach such a precision it will be necessary to identify the electrons in the forward regions of the detector. This point is the subject of the last part of this manuscrit, it shows that one can reach an electron-jet rejection of 100 with an efficiency of the electrons reconstruction of 50%, by using a discriminating analysis based on the methods of Fisher, the likelihood and the neural networks.

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