The DØ Experiment

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The DØ and CDF detectors are large multi purpose detectors at the $p\bar{p}$-Collider TeVatron. The TeVatron operates at a center-of-mass energy of 1.96 TeV and is located at Fermilab near Chicago. After major upgrades at the Fermilab accelerator complex, TeVatron restarted operation in spring 2001. The aim is to collect in a first phase called Run 2a an integrated luminosity of $2fb^{-1}$ per experiment and in a second phase $15fb^{-1}$ before the start of the Large Hadron Collider at CERN. These numbers have to be compared with the luminosity of a bit more than $100pb^{-1}$ collected in Run 1. The DØ detector was extensively upgraded. The central tracking system was completely redesigned and now consists of a silicon microvertex detector and a fiber tracker contained inside a 2 Tesla superconducting solenoid, which is surrounded by preshower detectors. The readout electronics of the LAr-calorimeter were replaced in order to cope with the increased bunch crossing rate. Also the muon system was upgraded: In the forward region new detectors based on mini-drift-tubes and scintillating tiles were installed. In addition the trigger system was redesigned and now consists of three levels. Two hardware trigger levels reduce the input rate subsequently to 10 kHz and 1 kHz, which is passed to the Level 3 trigger which reads out the entire data stream and reconstructs the events on a Linux PC farm. The data is permanently stored with an output rate of up to 50 Hz.

Among the physics aims of the TeVatron are studies of properties of the top quark including an improved mass determination, an improved measurement of the W boson mass and the study of triple gauge couplings. Important topics are also the search for the Higgs boson and for new phenomena beyond the standard model.

The DØ Collaboration devoted most of 2001 to the commissioning and calibration of the detector.

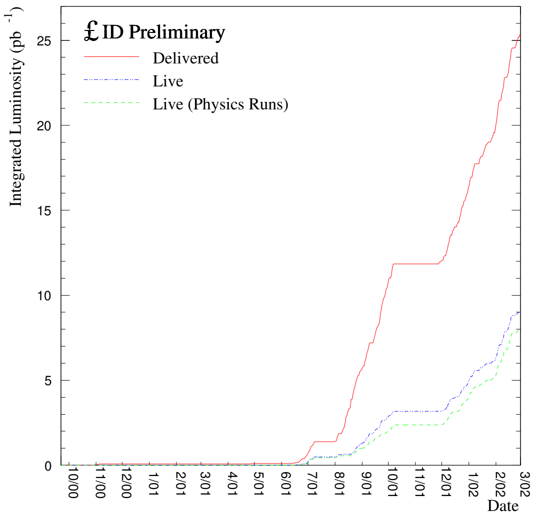

Fig. 1: Luminosity in the year 2001

Fig. 1 shows the delivered and recorded luminosity in the year 2001. About 25% of the luminosity were taken in special runs with dedicated triggers in order to commission the different detector components.

As an example of the detector performance figure 2 shows the invariant mass of muon pairs measured only with the muon detector. The resolution of the J/ψ peak will be greatly improved if the muons are matched to central tracks.

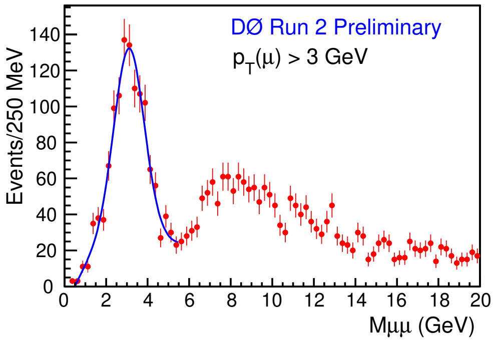

Fig. 2: Invariant dimuon mass

Fig. 3 shows the Z^0 peak measured with the energy deposit of reconstructed electrons in the electromagnetic calorimeter.

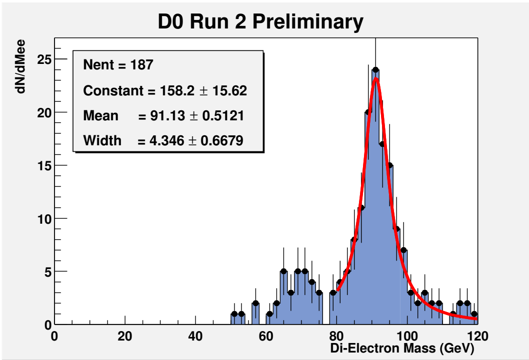

Fig. 3: Z^0 peek from e^+e^- pairs

The main activities of our group are the Level-2 Forward-Muon Trigger [1] and work on the segment and track finding in the muon system. We are also working on the preparation for the physics analysis [2]. Here we are concentrating on Higgs and SUSY searches in channels with leptons especially muons in the final state.

References

[1] T. Christiansen *et al.*, this report, p.44

[2] M.Bussmann, this report, p.41