pseudorapidity range $|\eta| < 2.5$.[1] The highest granularity is achieved around the vertex region using the pixel detectors. The Transition Radiation Tracker (TRT), which surrounds the silicon detectors, enables track-following up to $|\eta| = 2.0$. Electron identification information is provided by the detection of transition radiation in the TRT straw tubes.

The calorimeter system covers the pseudorapidity range $|\eta| < 4.9$. It is based on two different detector technologies, with liquid argon (LAr) and scintillator-tiles as active media. The electromagnetic (EM) calorimeter, consisting of lead absorbers and liquid argon as the active material, is divided into one barrel ($|\eta| < 1.475$) and two end-cap components ($1.375 < |\eta| < 3.2$). It uses an accordion geometry to ensure fast and uniform response. It has a fine segmentation in both the lateral and longitudinal directions of the particle showers. At high energy, most of the EM shower energy is collected in the second layer which has a lateral cell granularity of $\Delta\eta \times \Delta\phi = 0.025 \times 0.025$. The first layer is segmented into eight strips per cell in the η direction which extend over four cells in ϕ. A third layer measures the tails of very high energy EM showers and helps in rejecting hadron showers. In the region $|\eta| < 1.8$, a presampler detector consisting of a thin layer of LAr is used to correct for the energy lost by electrons, positrons, and photons upstream of the calorimeter. The hadronic tile calorimeter is placed directly outside the EM calorimeter envelope. This steel/scintillating-tile detector consists of a barrel covering the region $|\eta| < 1.0$, and two extended barrels in the range $0.8 < |\eta| < 1.7$. The copper Hadronic End-cap Calorimeter (HEC), which uses LAr as active material, consists of two independent wheels per end-cap ($1.5 < |\eta| < 3.2$), located directly behind the end-cap electromagnetic calorimeter. The Forward Calorimeter (FCal), which also uses LAr as the active material, consists of three modules in each end-cap: the first, made of copper, is optimised for electromagnetic measurements, while the other two, made of tungsten, measure primarily the energy of hadronic interactions [20].

Muon detection is based on the magnetic deflection of muon tracks in the large superconducting air-core toroid magnets, instrumented with separate trigger and high-precision tracking chambers. A system of three toroids, a barrel and two end-caps, generates the magnetic field for the muon spectrometer in the pseudorapidity range $|\eta| < 2.7$. Over most of the η-range, a precision measurement of the track coordinates in the principal bending direction of the magnetic field is provided by Monitored Drift Tubes (MDTs). At large pseudorapidities, Cathode Strip Chambers (CSCs) with higher granularity are used in the innermost plane (station) over $2.0 < |\eta| < 2.7$, to withstand the demanding rate and background conditions expected with the LHC operation at the nominal luminosity. The muon trigger system, which covers the pseudorapidity range $|\eta| < 2.4$, consists of Resistive Plate Chambers (RPCs) in the barrel ($|\eta| < 1.05$) and Thin Gap Chambers (TGCs) in the end-cap regions ($1.05 < |\eta| < 2.4$), with a small overlap in the $|\eta| = 1.05$ region.

The first-level (L1) trigger system uses a subset of the total detector information to make a decision on whether or not to record each event, reducing the data rate to a design value of approximately 75 kHz. Details about the L1 calorimeter and muon trigger systems used in the W and Z analyses are provided in Section 3. The subsequent two levels, collectively known as the high-level trigger, are the Level-2 (L2) trigger and the event filter. They provide the reduction to a final data-taking rate designed to be approximately 200 Hz.

3 Data and Monte-Carlo samples

The data were collected over a four-month period, from March to July 2010. Application of basic beam, detector, and data-quality requirements resulted in total integrated luminosities of 315 nb^{-1} for

[1] The nominal interaction point is defined as the origin of the coordinate system, while the anti-clockwise beam direction defines the z-axis and the $x-y$ plane is transverse to the beam direction. The positive x-axis is defined as pointing from the interaction point to the centre of the LHC ring and the positive y-axis is defined as pointing upwards. The azimuthal angle ϕ is measured around the beam axis and the polar angle θ is the angle from the beam axis. The pseudorapidity is defined as $\eta = -\ln\tan(\theta/2)$. The distance ΔR in the $\eta-\phi$ space is defined as $\Delta R = \sqrt{(\Delta\eta)^2 + (\Delta\phi)^2}$.