ATLAS

The collaboration has 1850 members from 150 institutions in 34 countries

ATLAS is a general-purpose detector that will exploit the full potential of the LHC p-p collision programme. The basic design concept includes :

¥ An inner detector with semi-conductor pixel and strip detectors for accurate measurements of the charged particle trajectories, followed by a straw-tube detector giving many hits per track and independent electron identification using transition radiation. A thin superconducting solenoid coil provides a 2 T magnetic field for the inner detector.

¥ A calorimeter with an inner cylinder using lead-LAr technology with its high resolution, calibration precision and stability, followed at large radius by an iron-scintillator tile calorimeter providing good jet energy resolution and complete coverage for measuring the missing transverse energy E_T^{miss}.

¥ A high-precision stand-alone muon spectrometer optimised for the requirements and environment at LHC, surrounding the calorimeter. A superconducting air-core toroidal magnet system provides the magnetic field for the muon spectrometer.

All systems have a large solid-angle coverage. In particular, precision measurements will be performed down to η=2.5 and calorimeter measurements down to η= 5.

The initial information flow from the ATLAS detectors is reduced by a dedicated selection system, the trigger, based on hierarchical decision-making. A data-acquisition system merges the information from the different systems and stores it for further processing and analysis.

An object-oriented software system will reconstruct the stored detector signals, so as to access the physical properties of the produced particles. It will also simulate ATLAS in all relevant details.

Calorimeter

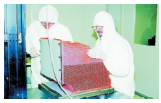
Muon Spectrometer

Inner Detector

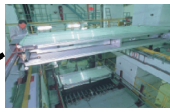
Lead/liquid argon accordion electromagnetic calorimeter

Iron/scintillator tile hadronic barrel calorimeter

Copper/liquid argon hadronic end-cap calorimeter



Copper/tungsten/liquid argon forward calorimeter

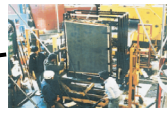


Monitored Drift Tubes

Central Solenoid

Resistive Plate Chamber

Transition Radiation Tracker

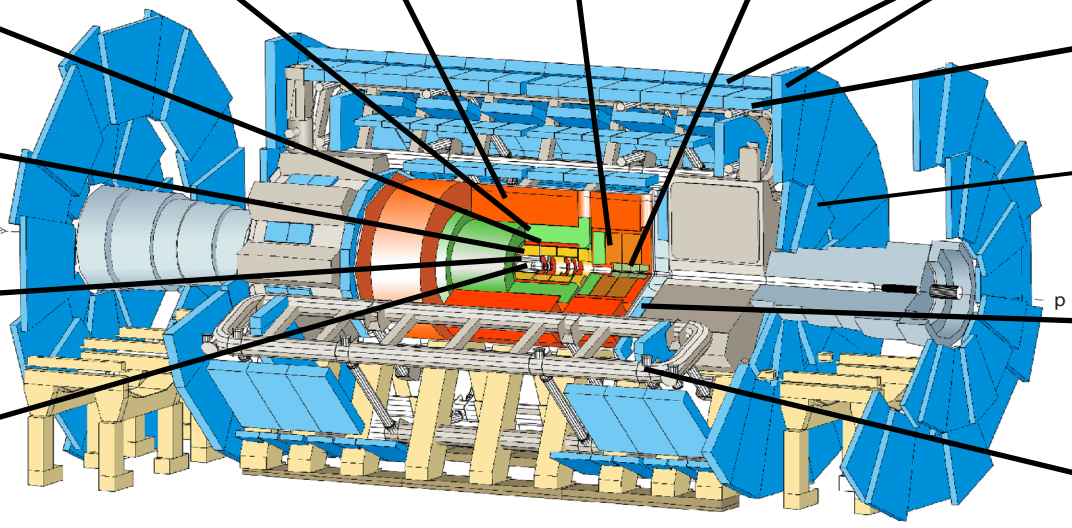


Thin Gap Chambe

Semi-conductor tracker

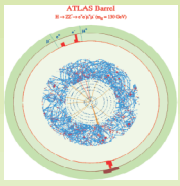
Cathode Strip Chambe

Pixel detector

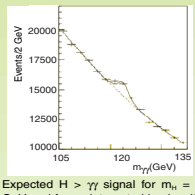


Air-core Toroid

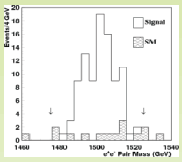
The ATLAS detector is 22 meters high, 44 meters long, and the overall weight is about 7000 tons



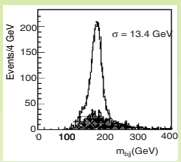
Display in the transverse plane of simulated high p_T H > ZZ* > e⁺e⁻μ⁺μ⁻ decay (m_H = 130 GeV) in the ATLAS barrel Inner Detector and calorimeters at a luminosity of 5 x 10^{33} $cm^{-2}s^{-1}$.



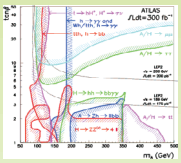
Expected H > γγ signal for m_H = 120 GeV and for an integrated luminosity of 100 fb^{-1}. The signal is shown on top of the irreducible background.



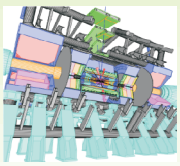
Expected signal from graviton resonant production in ATLAS, with the graviton decaying into electron-positron pairs, above the Standard Model background. These signals are expected in models with extra dimensions.



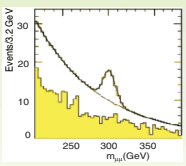
Invariant mass of t > b + 2 jets obtained from full simulation for the sample of 30 000 inclusive single lepton plus jet events. The dashed histogram shows the background from wrong combinations.



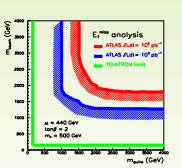
ATLAS sensitivity for the discovery of MSSM Higgs bosons (in the case of minimal mixing). The 5σ discovery contour curves are shown in the (m_A, tanβ) plane for an integrated luminosity of 300 fb^{-1}. Also included are the LEP2 limits.



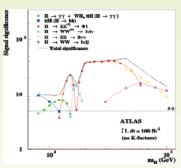
Three dimensional display of the same simulated event H > ZZ* > e⁺e⁻μ⁺μ⁻ shown above.



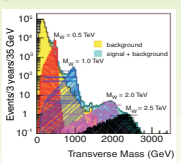
For an integrated luminosity of 30 fb^{-1} and for tanβ = 30,distribution of $m_{\mu\mu}$ shown for the reducible $t\bar{t}$ background (shaded histogram), for the total summed background (dashed curve) and for the sum of H/A > μμ signal with m_A = 300 GeV and of the background (solid histogram).



ATLAS sensitivity to squark and gluino masses for two integrated luminosities. The regions below the curves can be excluded in the absence of a signal.



ATLAS sensitivity for the discovery of a Standard Model Higgs boson. The statistical significances are plotted for individual channels, as well as for the combination of all channels, assuming an integrated luminosity of 100 fb^{-1}.



Transverse mass distribution of the three leptons and the escaping neutrino for the decay of WÖ boson into a WZ pair and for the corresponding background, for an integrated luminosity of 300 fb^{-1}

GRAPHIC DESIGN

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