Abstract

A study of WW scattering in pp collisions at the Large Hadron Collider, which is due to begin running in 2007, is presented. It is assumed that no new particles, including a light Higgs boson, are discovered prior to the start-up of the Large Hadron Collider. Five signals, chosen to represent a range of potential new physics scenarios, are generated within the framework of the Electroweak Chiral Lagrangian. Simulations of the WW scattering process are performed using the Pythia Monte Carlo Event generator, followed by the ATLFAST fast simulation of the ATLAS detector.

The analysis considers only high WW centre-of-mass energies, $m_{WW} > 600$ GeV, and the semi-leptonic decay channel, $WW \to l\nu qq$. The signal selection relies on good jet identification, and so the performance of the cone and k_T jet reconstruction algorithms are compared. In particular, methods are developed in both algorithms to optimise the mass resolution and background rejection in reconstructing the hadronically decaying W. The resolution on the invariant mass of the W boson is between 6.8 GeV and 7.5 GeV using these techniques. Similar results are obtained from both jet algorithms.

After signal selection, the final signal-to-background ratios are greater than unity in all cases, with significances of 4.5 to 13 after 30 fb^{-1} and 7.5 to 21 after 100 fb^{-1}.