Coupling measurements of the Higgs boson in the $WW^{(*)} \rightarrow l\nu l\nu$ decay channel with the ATLAS detector

T. Kubota

ARC Centre of Excellence for Particle Physics at the Terascale,
School of Physics, The University of Melbourne, Victoria 3010, Australia

kubotat@unimelb.edu.au

In the summer of 2012, the ATLAS and CMS experiments at the Large Hadron Collider, Geneva, discovered a Higgs boson with a mass of approximately 126 GeV [1, 2]. The current experimental focus is to solidify the identity of the Higgs boson by measuring its properties, such as couplings. Particularly, the coupling to $W$ boson pairs is one of the crucial properties.

The ATLAS experiment has accumulated proton-proton collision events at $\sqrt{s} = 7$ and 8 TeV throughout the years of 2011 and 2012. Three independent analyses for search and/or measurement of the Higgs boson to $W$ boson coupling have been performed in the $WW^{(*)} \rightarrow l\nu l\nu$ decay channel focusing on different production modes, namely gluon-gluon fusion (ggF), vector boson fusion (VBF) and Higgs-strahlung. The sizes of the datasets are 25 fb$^{-1}$ in the ggF and VBF analyses and 5 fb$^{-1}$ in the Higgs-strahlung analysis.

The best-fit signal strength is defined as a scale factor for the number of signal events expected from the Higgs boson hypothesis in the Standard Model (SM) of particle physics; in the ggF analysis it has been measured to be $0.82 \pm 0.36$, while in the VBF analysis it has been measured to be $1.66 \pm 0.79$ [3]. Both measurements assume that the mass of the Higgs boson is 125 GeV. These results are consistent with the expectations of the SM. In the Higgs-strahlung analysis, no signal strength value has been measured. Instead, the 95% CL cross-section limit is set at 6.7 times the prediction of the SM [4].