



ATLAS NOTE

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A Search for the Higgs boson in the $H \rightarrow WW^{(*)} \rightarrow \ell \nu \ell \nu$ decay mode using Boosted Decision Tree Technique and 4.7 fb^{-1} of data collected with the ATLAS detector at $\sqrt{s} = 7 \text{ TeV}$

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Abstract

A searches for the Standard Model Higgs boson using the $H \rightarrow WW^{(*)} \rightarrow \ell \nu \ell \nu$ ($\ell = e, \mu$) decay mode is performed with an integrated luminosity of 4.7 fb^{-1} of pp collisions at $\sqrt{s} = 7 \text{ TeV}$ collected with the ATLAS detector at the Large Hadron Collider. A Boosted Decision Tree is used to maximize the sensitivity of the analyses with 0 and 1 jet in the final state, while a fit to a transverse mass variable is used in the 2-jet final state. No evidence for a SM-like Higgs boson is found. Instead, the SM Higgs boson is excluded at 95% CL. in the mass range of between 130 GeV and 281 GeV, with an expected exclusion in the range $127 \text{ GeV} \leq m_H \leq 254 \text{ GeV}$. This result is an improvement over the corresponding cut-based analysis using a transverse mass shape fit in all jet multiplicities, which excludes the SM Higgs boson in the range $133 \text{ GeV} \leq m_H \leq 258 \text{ GeV}$ with an expected exclusion of $127 \text{ GeV} \leq m_H \leq 233 \text{ GeV}$.