

# Measurement of Vector Boson Scattering in semileptonic final states with the ATLAS detector using LHC Run-2 data

FUJIMOTO Minori

The discovery of the Higgs boson in 2012 confirmed the existence of all particles in the Standard Model (SM).

Although the SM can predict precisely various phenomena up to around the electroweak scale, it is still an incomplete theoretical model.

It is necessary to explore the possibilities of physics beyond the SM through measurements of the SM processes and searches for new particles.

Vector Boson Scattering (VBS) is an important process to probe the electroweak symmetry breaking in the SM, and its cross section can be easily modified by the anomalous gauge couplings at high transverse momenta of the vector bosons.

Therefore the measurement of the VBS is one of the most essential topics in the physics program at the LHC experiment.

This thesis reports the measurement of the electroweak production of a pair of weak vector bosons in association with two forward jets (EW  $VV+jj$ ), including the VBS, with the semileptonic final states.

The analysis has been done with data collected by the ATLAS detector during the whole Run 2 of the LHC, corresponding integrated luminosity of  $139 \text{ fb}^{-1}$ .

The signal strength and the significance of the EW  $VV+jj$  process are reported.

The measured results with all three decay channels are interpreted in terms of the anomalous quartic gauge coupling appearing in the dimension-8 effective field theory.