

**Stony Brook University  
The Graduate School**

Doctoral Defense Announcement

**Abstract**

Measurement of WW Production Cross Section in Proton-Proton  
Collisions at  $\sqrt{s} = 8$  TeV with the ATLAS Detector and  
Limits on Anomalous Triple-Gauge-Boson Couplings

By

**Karen Chen**

A precision measurement of WW production is an important test of the electroweak sector of the Standard Model. Deviations in the measured production cross section or differential kinematic distributions from the Standard Model prediction can arise from anomalous triple-gauge-boson couplings or the production of new physics particles that decay into electroweak bosons. In this analysis, the  $W^+W^-$  production cross section is measured in the fully leptonic decay channels. The experimental signature consists of two oppositely charged leptons (electrons or muons) and the transverse momentum imbalance due to neutrinos. Fiducial and total WW cross sections are reported and compared to the Standard Model expectation, which is updated to include the NNLO WW theoretical cross section calculation. Unfolded differential distributions are also provided, where observed results are “unfolded” such that detector resolution and acceptance effects are removed. This allows for direct comparison between experimental results and theoretical predictions. Differential measurements are also used to constrain anomalous coupling parameters that appear in a generalized Lagrangian or Effective Field Theory Model. In general, anomalous couplings will lead to excesses in the high invariant mass or high momentum regions. For WW production, the leading lepton transverse momentum distribution is sensitive to anomalous couplings, so the high momentum region is used to constrain the anomalous coupling parameters. Since the data shows that the coupling parameters are consistent with those for the Standard Model, limits on the anomalous coupling parameters are reported.

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**Time:** 11:00 am

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**Program:** Physics

**Dissertation Advisor:** John D. Hobbs