

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

A Search for Second-generation Leptoquarks in pp Collisions

at $\sqrt{s} = 7$ TeV with the ATLAS Detector

By

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Apparent similarities between the quark and lepton families of the Standard Model (SM) are, at the very least, suggestive of a more fundamental symmetry and interaction between them. In some Beyond the Standard Model theories, such interactions are mediated by leptoquarks (LQ): hypothetical color-triplet bosons with both lepton and baryon number and fractional electric charge.

The results of a search for pair production of second-generation scalar LQs are presented for a final state consisting of one muon, missing transverse energy, and at least two jets. The search is performed on 1.03 fb^{-1} of integrated luminosity of proton-proton collision data produced by the Large Hadron Collider at a center-of mass energy of 7 TeV and recorded by the ATLAS detector. Observed event yields in selected signal regions are found to be consistent with SM background expectations. Therefore, limits are set: LQs with mass $m_{LQ} < 545$ GeV are excluded at 95% confidence level (CL), assuming the branching ratio of a LQ to a muon and a quark $\text{BR}(LQ \rightarrow \mu q) = \beta = 0.5$. When these results are combined with those of a complementary search in the $\mu\mu jj$ final state, LQs with mass $m_{LQ} < 594$ (685) GeV are excluded at 95% CL for $\beta = 0.5$ (1.0). There are currently the world's most stringent limits on second-generation scalar LQ production.

Date: June 20, 2012

Time: 2:00pm

Place: Physics Bldg, D-122

Program: Physics

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