The Final Oral Examination
for the Degree of

DOCTOR OF PHILOSOPHY
Physics and Astronomy

Frank Berghaus
2006 UBC M.Sc.
2003 Saint Mary’s University Hons. B.Sc.

“Search for Quark Compositeness in 7 TeV Proton-Proton Collisions with the ATLAS Detector at the Large Hadron Collider”

February 14, 2013,
10:00 am
Graduate Student Centre, Board Room

Supervisory Committee:
Dr. Michel Lefebvre Department of Physics and Astronomy, UVic (Supervisor)
Dr. Randy Sobie Department of Physics and Astronomy, UVic and IPP (Academic Unit Member)
Dr. Rob McPherson Department of Physics and Astronomy, UVic and IPP (Academic Unit Member)
Dr. Stan Dosso School of Earth and Ocean Sciences, UVic (Outside Member)

External Examiner:
Dr. Sampa Bhadra Department of Physics and Astronomy, York University

Chair of Oral Examination:
Dr. Andrew Rowe, Department of Mechanical Engineering, UVic
Abstract

Quarks and leptons are assumed to be fundamental particles in the Standard Model of particle physics. The Large Hadron Collider provided 7 TeV proton-proton collisions in 2010 for a total data sample of 36 pb⁻¹ recorded by the ATLAS detector. These collisions permit the search for quark substructure at a smaller length scale than was previously possible. This study of the angular distribution of hadronic jets in high dijet mass events excludes quark substructure at \( \Lambda < 5.29 \) TeV, corresponding to a length scale of \( 3.73 \times 10^{-5} \) fm, at 95% confidence level.

Awards, Scholarships, Fellowships

2010 Eric Foster Graduate Scholarship in Physics

Selected Presentations


### Selected Publications


