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Sean Gasiorowski

$HH \rightarrow b\bar{b}b\bar{b}$ or How I Learned to Stop Worrying and Love the QCD Background

Sean Gasiorowski

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Reading Committee:

Anna Goussiou, Chair

Jason Detwiler

Shih-Chieh Hsu

David Kaplan

Henry Lubatti

Thomas Quinn

Gordon Watts

Program Authorized to Offer Degree:
Physics

University of Washington

Abstract

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Sean Gasiorowski

Chair of the Supervisory Committee:
Professor Anna Goussiou
Physics

Insert abstract here

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GLOSSARY

ARGUMENT: replacement text which customizes a \LaTeX macro for each particular usage.

ACKNOWLEDGMENTS

As anyone who has written a Ph.D. thesis will probably tell you, it's been a journey. We laughed, we cried, we bled occasionally (though nothing too serious). A pandemic happened, I learned how to make sourdough (see the appendix for more details). I learned how to ski, discovered a love for hiking, and ate large amounts of cheese. The list of people who I have met and shared deep and memorable experiences with is long – I fear to list you all here in case I miss someone! – but please do know that I treasure you. This is the beauty and tragedy of doing a Ph.D. half in Seattle, half at CERN: it allows you to build strong friendships with a large group of people, and then scatters you all across the globe. So to the Seattle friends, to the CERN friends, to the friends from undergrad, and high school, and even earlier, and to everyone in between, thank you for being a part of my life, and I hope to see you soon.

Of course, a thank you to my family for their continuing support, vacationing adventures, and for trying their best to learn physics along with me (my dad re: ATLAS – “This is pretty complicated isn't it?”).

And finally a huge thank you to my group: Anna, for your guidance and support, and for always caring about me as a person in addition to me as a physicist. And Jana, for guidance and support, of course, but also for looking at/giving comments on almost literally every single one of my talks (even if you didn't always get my jokes).

DEDICATION

To life!

Chapter 1

INTRODUCTION: THE STANDARD MODEL OF PARTICLE PHYSICS

Chapter 2

BEYOND THE STANDARD MODEL

Chapter 3

EXPERIMENTAL APPARATUS

Chapter 4

SIMULATION

Chapter 5

RECONSTRUCTION

Chapter 6

THE ANATOMY OF AN LHC SEARCH

Chapter 7

**SEARCH FOR NON-RESONANT PAIR PRODUCTION OF
HIGGS BOSONS IN THE $b\bar{b}b\bar{b}$ FINAL STATE**

Chapter 8

**SEARCH FOR RESONANT PAIR PRODUCTION OF HIGGS
BOSONS IN THE $b\bar{b}b\bar{b}$ FINAL STATE**