

The Main Title of the Dissertation: The Subtitle of the Dissertation

by

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requirements for the degree of
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DISSERTATION ABSTRACT

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To so-and-so...

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CHAPTER II

OVERVIEW AND MOTIVATION

2.1 Background Motivation

2.2 Supersymmetry

2.2.1 Coannihilation Stau.

2.2.2 GMSB Stau.

CHAPTER III

EXPERIMENTAL SETUP

This section will describe the experimental setup used to collect the data necessary for the long lived particle searches presented in sections VI and VII. All the work done on these thesis was done with results from the ATLAS detector located at the Large Hadron Collider (LHC) at CERN.

3.1 The Large Hadron Collider

The Large Hadron Collider (LHC) is currently the world's largest and highest energy particle accelerator, with a total circumference of 27 kilometers. The LHC is situated 100 meters underground, straddling the border between Switzerland and France near Geneva. The LHC accelerates protons to nearly the speed of light using radiofrequency cavities and superconduction magnets. The LHC collides the proton bunches at four interactions points evenly spaced around the accelerator rings. At each interaction point sit one of the four main detectors, ATLAS, CMS, LHCb, and ALICE. The energy of the proton-proton collisions at the interaction points are 13 TeV for run 2 and 13.6 TeV for run 3.

The protons start as hydrogen gas and are accelerated via multiple different accelerators. As hydrogen is a diatomic molecule the first step of accelerating protons is to actually add electrons to create H^- ions. Then a strong electric field strips away an electron from each ion to create the protons aka H^+ ions. The protons are then accelerated with RF cavities and focused with quadrupole magnets in what is called the LINAC4. By the end of the LINAC4 the Protons reach an energy of 160 MeV. Next step on the journey to collision is the Proton Synchrotron Booster (PSB) which further accelerates the protons to an energy of 1.4 GeV. The Protons are then ??

Finally the bunches are injected into the LHC where the counter-circulating beams collide.

3.2 The ATLAS Detector

CHAPTER IV

EXPERIMENTAL UPGRADES

4.1 Phase 2 upgrades

4.1.1 ATLAS ITk.

CHAPTER V

OBJECT RECONSTRUCTION

CHAPTER VI
DISAPPEARING TRACKS

CHAPTER VII

DISAPPEARING TRACKS WITH HIGH IONIZATION LOSS

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THE FIRST APPENDIX

A.1 Appendix One Section One

A.1.1 Chapter four section one sub-section one.

APPENDIX B

THE SECOND APPENDIX

B.1 Appendix Two Section One

B.1.1 Chapter two section one sub-section one. This is a sample
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