Search for Higgs Decay to Dark Matter and Trigger Studies

João Carlos Arnauth Pela
of Imperial College London

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for the degree of Doctor of Philosophy

Abstract

Here the abstract of the thesis

Declaration

This dissertation is the result of my own work, except where explicit reference is made to the work of others, and has not been submitted for another qualification to this or any other university. This dissertation does not exceed the word limit for the respective Degree Committee.

João Pela

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I would like to thank FCT for their support of my PhD work through their grant SFRH/BD/77979/2011.

TODO: Include FCT symbols

Preface

Thesis structure and so on...

"To my grand mother"

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Chapter 1

Theory

TODO: Something

1.1 Standard Model of Particle Physics

TODO: Very brief summary of the Standard Model.

1.2 Higgs Mechanism

Summary of the Higgs Mechanism. Should include

- Motivations
- Explanation of the mechanism itself
- Consequences
- Possible decays

1.3 Higgs Invisible decays

TODO: Explain what are SM Higgs invisible decays. Go over the possibility of BSM invisible decays.

Chapter 2

Experimental Apparatus

2.1 The Large Hadron Collider

TODO:

- CERN basics location etc
- Basics of machine and operation
- New to include Instantaneous luminosity equation

The Large Hadron Collider [**?**] is a 27 km synchrotron machine located in Geneva Switzerland.

Luminosity Equation

$$L = \frac{N_b^2 n_b f_{\text{rev}} \gamma}{4\pi \epsilon_n \beta^*} F, \tag{2.1}$$

2.2 The Compact Muon Solenoid Experiment

Detector description

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2.2.2 Electromagnetic Calorimeter

2.2.3 Hadronic Calorimeter

2.2.4 Solenoid Magnet

2.2.5 Muon System

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2.2.7 Trigger System

The upgrade tdr [**?**].

2.2.8 Computing

2.2.9 Run II Updgrades

Chapter 3

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3.1.2 Muon

3.1.3 Tau

3.1.4 Jets

3.1.5 Missing Transverse Energy

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Technical work

4.1 Level 1 Trigger Data Quality Monitoring System

Hello

Chapter 5

Physics Analysis

5.1 Prompt/Parked trigger studies

5.2 Prompt Analysis

5.3 Parked Analysis

5.4 Run II trigger studies

5.5 Run II Analysis

Chapter 6

Conclusions

Summary of relevant results and their impact on Particle Physics