

國 立 清 華 大 學

碩士論文

尋找與衰變成一對底夸克對的希格斯粒子相伴產生的
 Z' -2HDM 模型的暗物質

Search for Dark Matter of Z' -2HDM Model Produced in
Association with MonoH Higgs Decaying to $b\bar{b}$



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可再加更多人... 博 士 (Prof. More member...)

英 文 逗 號 示 範 博 士 (Prof. ZUO, GONG-DE)

中 華 民 國 一〇七 年 六 月

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尋找與衰變成一對底夸克對的希格斯粒子相伴產生的
 Z' -2HDM 模型的暗物質

摘要

在此寫上你的中文摘要。

關鍵字：暗物質, 希格斯玻色子, 大型強子對撞機, ATLAS



摘要



Search for Dark Matter of Z' -2HDM Model Produced in
Association with MonoH Higgs Decaying to $b\bar{b}$

Abstract

Write your English abstract here.

Keywords: Dark Matter, Higgs Boson, LHC, ATLAS



ABSTRACT



Acknowledgement

Thanks NCU, and sppmg's L^AT_EX template[1].



ACKNOWLEDGEMENT



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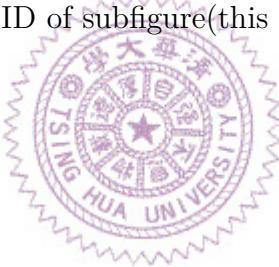
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LIST OF TABLES



Glossary

Use table for symbol list. You can also use package “nomencl” (simple) or “glossaries” (powerful). see packages document or my tutorial (but it’s Chinese).

Glossary

- VIM : The best guy’s editor
- Emacs : The God’s editor
- CTAN : Comprehensive TeX Archive Network, ctan.org



GLOSSARY



Chapter 1

Introduction

(You can copy “chapter_template.tex” or “chapter_template_demo.tex” to create new sub-file(chapter).)

Write your Introduction here. eg,

I don't want my chaste thesis impinge by M\$. But L^AT_EX is little hard.





Chapter 2

The ATLAS Detector

The ATLAS (A Toroidal LHC ApparatuS) is a multifunctional detector with a nominally forward-backward symmetric cylindrical geometry with respect to the interaction point. It comprises four detector components which are the inner detector tracking system, the electromagnetic (EM) calorimeter, the hadronic calorimeter and the muon spectrometer. The overview of the ATLAS is shown in Figure 2.1.

The inner detector is composed of three sub-detectors, the silicon pixel layers, the silicon microstrip (SCT) layers and the transition radiation tracker (TRT), shown in Figure 2.2. The silicon pixels and the SCT are placed in the range of $|\eta| < 2.5$, providing the information of pattern recognition, outstanding momentum resolution and both primary and secondary vertex measurements. The TRT comprises many layers of gaseous straw-tube tracking detectors in the range of $|\eta| < 2.0$, taking charge of continuous charged-particle tracks to improve the pattern recognition and enhance the momentum resolution and also giving the electron identification.

The calorimeters measure electron, photon, jet and τ lepton energies, covering the range of $|\eta| < 4.9$, shown in Figure 2.3. The EM calorimeters are liquid argon (LAr) detectors which are accommodated in three cryostats, two end-caps and one barrel, covering the range of $|\eta| < 3.2$. The LAr is used because of its inherent behavior, stability of response over time and intrinsic radiation-hardness.

Outside the EM calorimeter envelope, the hadronic calorimeter can be divided into the LAr hadronic end-cap calorimeters, the LAr forward calorimeters and the tile calorimeters for the range of $1.5 < |\eta| < 4.9$. The LAr hadronic end-cap calorimeters cover the range of $1.5 < |\eta| < 3.2$, sharing the cryostats with the EM end-cap calorimeters and the forward

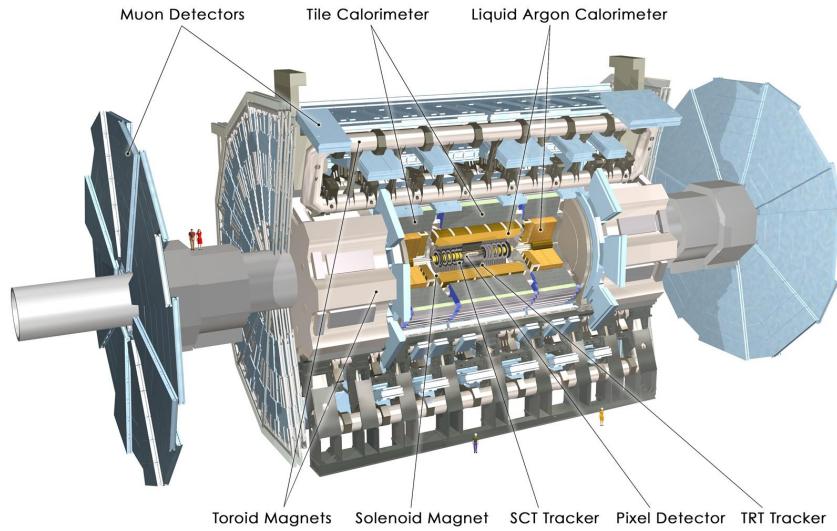


Figure 2.1: The overview of the ATLAS.

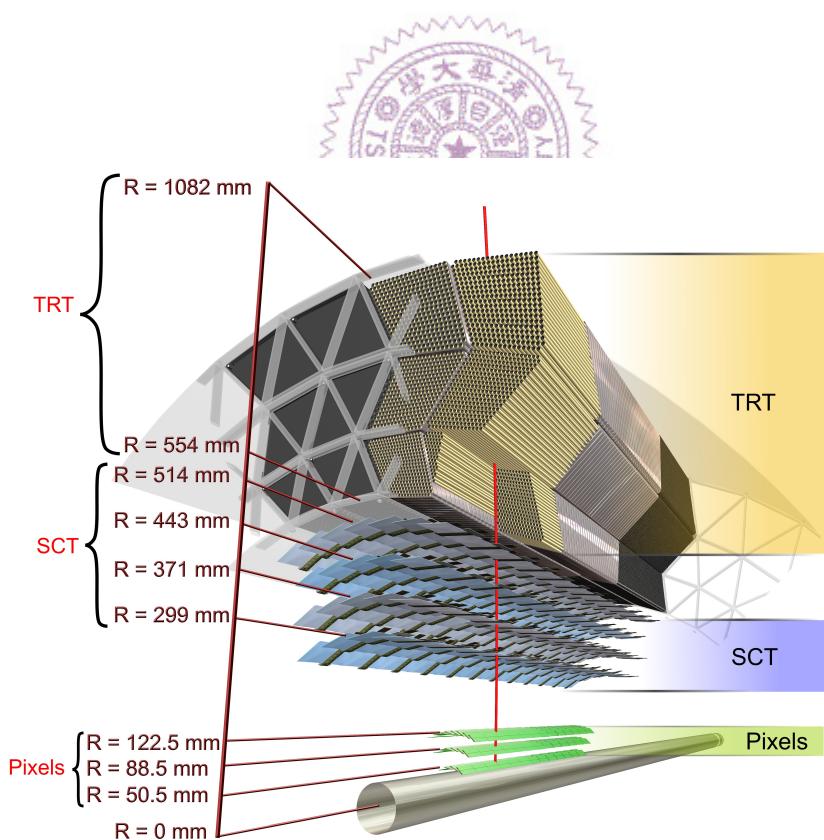


Figure 2.2: The schematic diagram of the ATLAS inner detector, which comprises three sub-components, pixels, SCT and TRT.

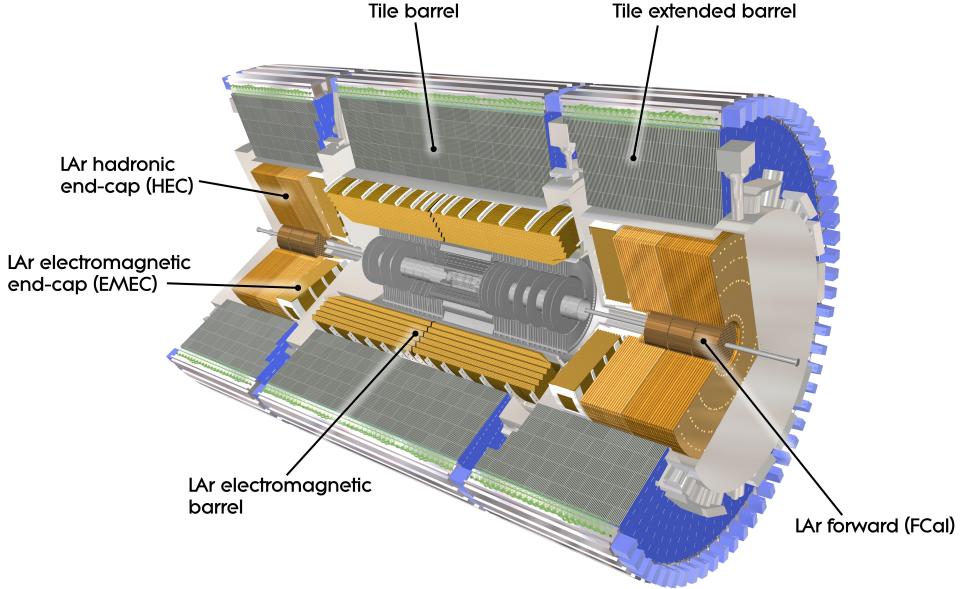


Figure 2.3: The schematic diagram of the calorimeters, composed of the EM calorimeter and the hadronic calorimeter.

calorimeters. The LAr forward calorimeters are placed in the range of $3.1 < |\eta| < 4.9$. As mentioned previously, the LAr is chosen for its inherent excellent property. The tile calorimeters consist of one central barrel calorimeter and two extended barrel calorimeters, made of steel as the absorber and scintillating tiles as the active material, laying over the range of $|\eta| < 1.7$.

The outmost component is the muon spectrometer. Over the range of $|\eta| < 2.7$, the high-precision tracking chambers measure muon tracks in the large superconducting air-core toroid magnets. There are also the trigger chambers covering the range of $|\eta| < 2.4$ for providing bunch-crossing identification, providing well-defined p_T thresholds, and measuring the muon coordinate in the direction orthogonal to that determined by the precision-tracking system.

Apart from the detectors, there are also the trigger system carrying out the event selection. There are up to one billion proton-proton collisions per second in the ATLAS and the trigger system only selects 100 events worth retaining per second. There are three levels for the selection process. The Level-1 trigger searches for high p_T muons, electrons, photons, jets, τ leptons and large missing and total transverse energy.

Magnetic system



Chapter 3

Result

I had a nice thesis.





Chapter 4

Conclusion

I am free, I am not own by M\$.





Chapter 5

Chapter name(demo)

Content of chapter

Content Content Content.

5.1 Section name

Content of section

Content Content Content



5.1.1 Subsection name

Content of subsection

Content Content Content

5.1.1.1 Subsubsection name

Content of subsubsection

Content Content Content

5.1.1.1.1 Paragraph name Content of paragraph

Content Content Content

Subparagraph name Content of subparagraph

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Chapter 6

Test demo

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Chapter 7

figure

7.1 Insert single figure(by sppmg's tool)

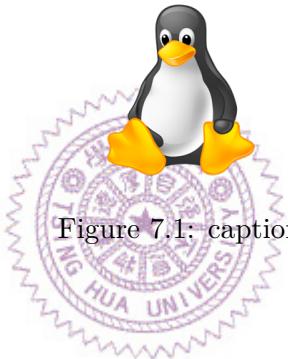


Figure 7.1: caption

7.2 Insert figures

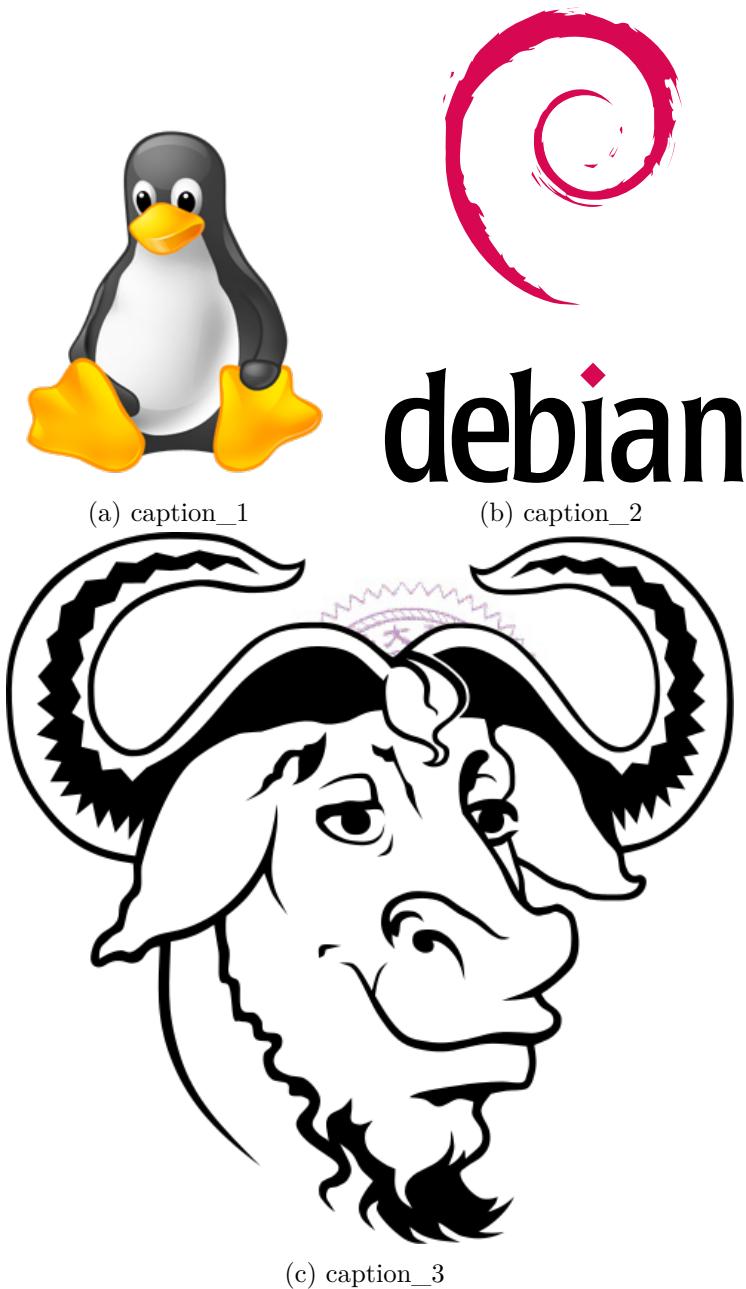


Figure 7.2: caption, use “(b)” get ID of subfigure(this ID is Debian) in caption

Chapter 8

Table

8.1 Simple table

Table 8.1: Solution

Component	Concentration(mM)
CaCl ₂	118.0

8.2 Auto break line table

short	short short
long	long



Bibliography

- [1] (). Sppmg/TW_thesis_template, GitHub, [Online]. Available: https://github.com/sppmg/TW_Thesis_Template (visited on 10/23/2016).



BIBLIOGRAPHY



Appendix A

List of device

Table A.1: List of device

device	Model	Description
Linux	Debian 9	Best of best of best OS
Windows	10	Best of Best tool to prevent the aging of brain.



APPENDIX A. LIST OF DEVICE



Appendix B

Solutions

B.1 The solution

Table B.1: The solution

Component	Concentration(mM)
NaCl	1.0
CaCl ₂	2.0
NaCl	1.0
CaCl ₂	2.0

APPENDIX B. SOLUTIONS



Appendix C

Code

C.1 C

Code C.1: hello_world_c.c

```
1 #include <stdio.h>
2 main()
3 {
4     printf("hello, world\n");
5 }
```

C.2 Matlab

Code C.2: hello_world_matlab.m

```
1 fprintf('hello, world\n');
```

C.3 IDL

Code C.3: hello_world_idl.pro

```
1 print,"hello, world"
2
3 end
```