

SEOUL NATIONAL UNIVERSITY

DOCTORAL THESIS

Search for $H^+ \rightarrow WA$

Author:
Jin CHOI

Supervisor:
Unki YANG

*A thesis submitted in fulfillment of the requirements
for the degree of Doctor of Particle Physics
in the*

SNUCMS
Department of Physics and Astronomy

November 2, 2022

Declaration of Authorship

I, Jin CHOI, declare that this thesis titled, “Search for $H^+ \rightarrow WA$ ” and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed:

Date:

“Thanks to my solid academic training, today I can write hundreds of words on virtually any topic without possessing a shred of information, which is how I got a good job in journalism.”

Dave Barry

SEOUL NATIONAL UNIVERSITY

Abstract

Faculty Name
Department of Physics and Astronomy

Doctor of Particle Physics

Search for $H^+ \rightarrow WA$

by Jin CHOI

The Thesis Abstract is written here (and usually kept to just this page). The page is kept centered vertically so can expand into the blank space above the title too...

Acknowledgements

The acknowledgments and the people to thank go here, don't forget to include your project advisor...

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List of Abbreviations

LAH List Abbreviations **Here**
WSF What (it) Stands **For**

Physical Constants

Speed of Light $c_0 = 2.997\,924\,58 \times 10^8 \text{ m s}^{-1}$ (exact)

List of Symbols

a	distance	m
P	power	W (J s ⁻¹)
ω	angular frequency	rad

For/Dedicated to/To my...

Chapter 1

Introduction

1.1 Main Section 1

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Chapter 2

Theoretical Backgrounds

2.1 The ElectroWeak theory of the Standard Model

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2.2 2HDM Extension of the Higgs sector

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Chapter 3

The Large Hadron Collider and the CMS Detector

3.1 The Large Hadron Collider

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3.1.1 Subsection 1

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3.1.2 Subsection 2

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3.2 The CMS Detector

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Chapter 4

The Overview of the Analysis

4.1 Data and MC samples

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4.2 Signal Extraction Strategy

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4.3 Background Estimation

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Chapter 5

Future Plans

5.1 Main Section 1

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5.1.1 Subsection 1

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5.1.2 Subsection 2

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5.2 Main Section 2

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Appendix A

Frequently Asked Questions

A.1 How do I change the colors of links?

The color of links can be changed to your liking using:

```
\hypersetup{urlcolor=red}, or  
\hypersetup{citecolor=green}, or  
\hypersetup{allcolor=blue}.
```

If you want to completely hide the links, you can use:

```
\hypersetup{allcolors=.}, or even better:  
\hypersetup{hidelinks}.
```

If you want to have obvious links in the PDF but not the printed text, use:

```
\hypersetup{colorlinks=false}.
```