Inclusive Pion Production on Heavi Nuclei in the MINERvA Detector

by

Aaron Bercellie

Submitted to the Department of Physics and Astronomy
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Physics

at the

UNIVERSITY OF ROCHESTER

June 2018

Author .....
Department of Physics and Astronomy
May 18, 2018

Certified by .....
Kevin McFarland
Professor of Physics
Thesis Supervisor

Accepted by .....
Dan Watson
Chairman, Department Committee on Graduate Theses

Inclusive Pion Production on Heavi Nuclei in the MINERvA Detector

by

Aaron Bercellie

Submitted to the Department of Physics and Astronomy
on May 18, 2018, in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy in Physics

Abstract

Measured pion production off of nuclear targets

Thesis Supervisor: Kevin McFarland
Title: Professor of Physics

Acknowledgments

This is the acknowledgements section. You should replace this with your own acknowledgements.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

1.1 Neutrino oscillations

They happen... in space and time

1.1.1 PMNS matrix

Describes the mixing between eigenstates [1]

I will include this[**lamport94**]

[1] A description of things

Bibliography

[1] Leslie Lamport, *LaTeX: a document preparation system*, Addison Wesley, Massachusetts, 2nd edition, 1994.