



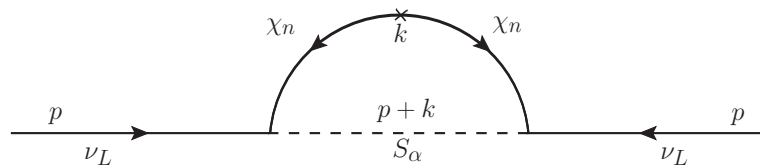
UNIVERSIDAD DE ANTIOQUIA
INSTITUTO DE FÍSICA
FACULTAD DE CIENCIAS EXACTAS Y NATURALES
GRUPO DE XXX

Título del proyecto o tesis

with this subtitle

PHD THESIS

JUAN VALDEZ



Advisor: Albert Einstein

Co-advisor: Richard Feynman

Medellín, 2017



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.....
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Medellín, 2017

Abstract

In this thesis we solve all the existing problems and create new ones.

Keywords

Dark matter, neutrino masses, scotogenic models, galactic center excess of gamma-rays

Short inspired phrase here

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Chapter **1**

Introduction

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Chapter **2**

Main chapter

Main developments and calculations.

Conclusions

We have have solve all the problems and created a new ones.

Appendices

Appendix **A**

General details

It is known that ...

Acknowledgements

I would like to thank all the people that in some way have helped me with the elaboration of this thesis.

First, I would like to thank

Medellín, 2017

Juan Valdez

Bibliography

Abbreviations

BAO	Baryon acoustic oscillation
CDM	Cold dark matter
CMB	Cosmic microwave background
CTA	Cherenkov telescope array
DM	Dark matter
EW	Electroweak
EWPO	Electroweak precision observables
FCNC	Flavor changing neutral currents
GUT	Gran unified theory
GDE	Gamma diffuse emission
GC	Galactic center
GCE	Galactic center excess
ICS	Inverse Compton scattering
ILC	International linear collider
IH	Inverse hierarchy
LHC	Large hadron collider
LUX	Large underground Xenon experiment
LEP	Large Electron-Positron Collider
LFV	Lepton flavor violation
LOP	Lightest odd particle
LAT	Large area telescope
LZ	LUX-Zeplin experiment
MSM	Millisecond pulsar
MSSM	Minimal supersymmetry standard model
NLO	Next to leading-order
NH	Normal hierarchy
NFW	Navarro-Frenk-White
SDFDM	Singlet-doublet fermion dark matter
SSDM	Singlet scalar dark matter
SI	Spin independent
SD	Spin independent
SM	Standard model
WIMP	Weakly interacting massive particle

