Dedication

This work is dedicated to the Person who gives my life meaning and who I love, my mother.

To the person who supported and helped me, my father.

To my lovely brother and my lovely sisters.

To all my family.

To all my best friends.

And my colleagues.

Acknowledgement

First, I would like to thank Allah who gives me the power to complete this work.

Then ,I would like to thank professor Mubarak Dirar who patiently and kindly supervised this research and who generously gave me many valuable references which were a great help.

Thanks extended also to the Department of Physics , college of science and SUST.

Special thanks to Basheir Abd Al- quome (Sudan University Department of physics) and for all people who work in Sudan University Department of physics for assistance to do this research .

My gratitude is sent to my dear family who patiently and kindly aided me very much throughout this work .

.Also thanks were sent to all who helped me

Abstract

In this work Maxwell equations in vacuum in the presence of polarization are utilized together with Plank and De Broglie hypothesis to find a relativistic expression for the photon mass.

Compton scattering theory together with Maxwell equations are also used to determine the photon mass .The values obtained of the photon mass by these methods are found to be comparable with that obtained by others.

المستخلص

في هذا العمل أستُخدمت معادلات ماكسويل في الفراغ في حضور الاستقطاب مع فرضية بلانك ودو برولي لإيجاد صياغة مناسبة لكتلة الفوتون .وأستُخدمت نظرية تشتت كمبتون مع معادلات ماكسويل أيضا لتحديد كتلة الفوتون .

قيم كتلة الفوتون بالطريقتين تبين أنها إلى - حد ما- متوافقة مع تلك القيم المتحصل عليها من قبل آخرين.

Table of Contents

Content		Page
Dedication		I
Acknowledgment		II
Abstract		III
Abstract in Arabic		IV
Table of content		V
(Chapter One (Introduction		
The Importance of Photon	1.1	1
The problem of Photon Mass	1.2	2
The Aim of Research	1.3	3
presentation of the Thesis	1.4	3
(Chapter Two (Literature Review		
Introduction	2.1	4
Maxwell's Equations	2.2	4
Theory of the Photon with Finite Mass	2.3	7
Chapter Three (Photon Mass from Maxwell's and (Compton Theories		
Introduction	3.1	14
Photon Mass and Maxwell's Equations	3.2	14

Photon Rest Mass 3.3 16

Photon Mass from Compton Theory 3.4 17

Discussion 3.5 18

Conclusion 3.6 18

References 19