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Zagazig University
Benha Branch
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17/10/2004

MESONS SPECTROSCOPY INTERMS OF QUARK MODEL

م. م. / م. م.
✓

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BY
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✓

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

سُبْحَانَكَ اللَّهُمَّ وَبِحَمْدِكَ
وَعِزَّتِكَ اللَّهُمَّ وَجَلَالِكَ

اللَّهُمَّ صَلِّ عَلَى مُحَمَّدٍ وَعَلَى
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CONTENTS

CONTENTS

SUBJECT

PAGE

Acknowledgement

i

Abstract

ii

CHAPTER I

INTRODUCTION

1-1	The quark model	1
1-2	Quark spin and color	2
1-3	Charge screening in both Quantum Electrodynamics (QED) and Quantum Chromodynamics (QCD).	4
1-4	Classifications of particles	6
1-4.1	Leptons	6
1-4.2	Baryons	7
1-4.3	Mesons	9
1-5	Experimental evidence	11
1-5.1	Discovery of ψ particle ($c\bar{c}$ -meson)	11
1-5.1.2	Upsilon states γ ($b\bar{b}$ -meson)	13
1-5.1.3	Toponium ($t\bar{t}$ -meson)	15

1-5.1.3 Toponium ($t\bar{t}$ -meson)	15
1-5.2 Leptonic decay of vector mesons	15
1-6 Quarkonium system	17
1-7 Previous work	18
1-8 The Aim of the work	29

CHAPTER II

HEAVY MESONS SPECTROSCOPY

2-1 Introduction	30
2-2 The used model	31
2-3 Leptonic decay widths	34

CHAPTER III

RESULTS AND DISCUSSIONS

3-1 Results and discussions	37
3-2 Conclusion	43

APPENDICES

APPENDIX A: Determination of the eigen values and eigen vectors	54
APPENDIX B: Fortran program	57

REFERENCE	69
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ABSTRACT

ABSTRACT

This thesis deals with the study of the nature of the interacting potential between the quark and the antiquark inside the quarkonium systems.

In this work a new simple phenomenological potential form is suggested to describe the interactions inside these meson systems. Also some previous potential models such as; Lichtenberge, Power law and Screening potential forms are modified by taking the spin-dependence terms under consideration. These potential forms are used to calculate the resonance masses and the leptonic decay widths of different quarkonium systems. The meson systems which are considered in this study are $c\bar{c}$, $b\bar{b}$, $c\bar{s}$, $b\bar{s}$, $b\bar{u}$, $c\bar{b}$.

The experimental data are used to adjust the potential parameters and quark masses through the χ^2 -test. A comparison between the theoretical calculations of the considered potential forms and the available experimental results are given.

From this study, one can conclude that, the results of our potential form give a satisfied agreement with the experimental data in all considered meson systems.

This thesis consists of three chapters; in chapter one an introduction about the quark model and an review of some previous works are given, in chapter two the nonrelativistic wave equation using our proposed potential form is solved to calculate the resonance masses and the leptonic decay widths of these systems. Finally, discussions of the obtained results are given in chapter three.

CHAPTER I

INTRODUCTION