

# بسم الله الرحمن الرحيم





# شبكة المعلومات الجامعية التوثيق الالكتروني والميكرو فيلم





# جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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# بعض الوثائق الأصلية تالفة







بالرسالة صفحات  
لم ترد بالأصل



B1V1V2

**PRODUCTION OF SCALAR ELECTRONS  
AND  $Z^0$ -BOSON USING THE MSSM.**

BY

**MOHAMMED HASAN MOHAMMED  
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(B. Sc. in Physics)

**THESIS**

Submitted to Faculty of Science, Cairo University,  
In a partial fulfillment of the requirements for the degree of  
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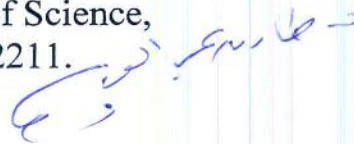
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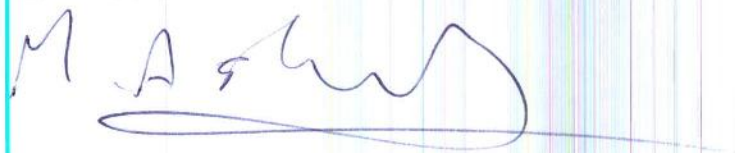
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# ABSTRACT



## ABSTRACT

The main goals of this thesis are;

- a] Solving the parameter space of the minimal supersymmetric extension of the standard model (MSSM) up to s-lepton sector.
- b] Calculation of the interaction cross-section as a function of the center of mass energy (CME) for the process;

$$e^+e^- \rightarrow \tilde{e}_j^+ \tilde{e}_j^- Z^0$$

Where  $j=1$  is the ordering-number of physical s-leptons.

The parameter space has been investigated at tree level in the frame of few physical assumptions as well as some proven arguments. The solution of the parameter-space is progressed according to a scheme that is suggested in this work. Mass spectrum of physical states SUSY partners as well as the transformation matrices are obtained up to slepton sector for two numerical instances, one instance at low value of  $\tan \beta$ , and the other at high value of  $\tan \beta$ . Specifically at  $\tan \beta = 3$ , and  $\tan \beta = 20$ .

The interaction cross-section is calculated over several interaction channels for the above process. The most probable channel is found to be that contains neutralinos  $\chi_j^0$ ,  $j=1,2,3,4$  and/or charged sleptons  $L_k$ ,  $k=1,\dots,6$ . The interaction cross section is found to be about 274.3588 pbarn at the center of mass energy about 395.87 GeV for  $\tan \beta = 3.0$ , and 117.719 pbarn at the center of mass energy about 381.64 GeV for  $\tan \beta = 20.0$ . The neutralino masses are restricted by the model itself to be in the range from 43.5 GeV up to 206.9 GeV.



## The Key words:

- (1) Supersymmetry (SUSY)
- (2) Minimal Supersymmetry  
Standard Model (MSSM)
- (3) Parameter-space
- (4) Higgs-Sector
- (5) Chargino-Sector
- (6) Neutralino-Sector
- (7) Scalar-Leptons (sleptons)-  
Sector
- (8) Physical mass
- (9) Mass-Spectrum
- (10) Interaction Channels
- (11) Mass of the Least  
Supersymmetric Particle  
( $M_{LSP}$ )
- (12) Partial Cross-section
- (13) Feynman diagram-  
Multiplicity

# Contents

## Part 1

Introduction	1
1-Theoretical Framework	1
2- This Work	9

## Chapter I-

Experimental Thought	14
1-1 Science and High energy physics:	14
1-2 Ideas in high energy physics and experiments:	15
(1) <i>Ideas which have been tested or will soon be tested</i>	16
(2) <i>Theoretical ideas whose time hasn't yet come</i>	16
(3) <i>The set of ideas for which non-accelerator and passive experiments have been mounted</i>	17
1-3 Search for Supersymmetric theories and their phenomenology:	18
1-4 $R$ -parity and the Supersymmetry detection:	21
1-5 Chiral classification of elementary particles and $CP$ -violation:	23
1-6 $CP$ -violation in Kaon system and SUSY models (problems and heuristic solutions):	26
1-7 Assumptions about $CP$ -eigenstates in two Higgs-doublet MSSM:	30
1-8 Baryons, Hadrons, and rare decays of hadrons as a way to expect the existence of new physics:	32
1-9 Neutral and Charged interaction currents and $\rho$ -parameter:	41



## Chapter II-

Concepts and Terms	47
2-1 The universal constant $\Lambda$ :	47
2-2 Critical energy density $\rho_c$ and $\Omega_0$ parameter:	50
2-3 Dark (invisible) matter DM:	51
2-5 Integrals of the field equations:	54
2-6 Gauge Symmetry:	64
2-7 Breaking of the symmetry transformations:	73
2-8 Gauge fixing:	80

## Part II

### Chapter III-

#### The Physical Model

Minimal Supersymmetric Standard Model (MSSM):	85
3-1 The Lagrangian structure of the model:	85
3-2 The field content, The superpotential, And soft SUSY breaking terms:	88
3-3 The initial fields (i.e. before SU(2) breaking) Lagrangian and The gauge fixing terms:	92
3-4 Physical spectrum of the model after SU(2) $\times$ U(1) Symmetry breaking and the parameter space:	99
3-5 Assumptions about the parameter-space:	115
3-6 Constraints from Supergravity Model (SUGRA) at unification scale:	117
3-6-1 <i>Brief description of the mechanism of mass induction due to gravitino.</i>	117
3-6-2 <i>The relations of free parameters in soft SUSY breaking terms to those induced due to gravitino at <math>m_w</math> scale.</i>	121
3-6-3 <i>The description of the evolution of initial field masses and couplings from <math>M_{\text{planck}}</math> scale down to <math>m_w</math> breaking scale.</i>	122
3-6-4 <i>The upper limit constraint on <math>\tan\beta</math> parameter due to RGE's at negligible 1<sup>st</sup> two generations Yukawa constants.</i>	132

3-7 Suggested scheme for estimating $m_L$ and $m_R$ matrices at tree level:	133
3-8 Conclusions:	135

## Part III

### Results and Discussion

#### Chapter IV-

NUMERICAL SOLUTIONS OF THE PARAMETER-SPACE:	140
4-1 Choosing low and high $\tan\beta$ values:	140
4-2 Estimation of the $h$ -parameter for each of low and high $\tan\beta$ values:	143
4-3 Higgs sector:	147
4-4 gaugino sector:	149
4-5 Scalar-Leptons sector:	152
4-6 Conclusions:	156

#### Chapter V-

SELECTRON WITH $Z^0$ -BOSON PRODUCTION CROSS-SECTION:	177
5-1 Feynman diagrams:	179
5-2 Partial Cross-sections as functions of CME for the process $e^+e^- \rightarrow \tilde{L}_1^+ \tilde{L}_1^- Z^0$ :	182
5-2-1. Diagrams a1 and a2;	182
5-2-2. Diagrams C2 and C3;	183
5-2-3. Diagrams e1, e2 and e3;	183



5-2-4. Diagrams d1, d3, d5 and d8;	184
5-2-5. The comparison of well behaved partial cross-sections:	185
5-3 Conclusions:	186
<b>FINAL CONCLUSIONS</b>	
Final Conclusions	199
<b>Appendices</b>	
<b>APPENDIX A: PARAMETER SPACE (ASSERTIONS AND PROVES)</b>	
	202
<b>APPENDIX B: SPINORS, PROPAGATORS, AND VERTICES</b>	
	224
<b>APPENDIX C: THREE BODIES KINEMATICS</b>	
	244
<b>APPENDIX D: FEYNMAN DIAGRAMS</b>	
	254
<b>References</b>	
REFERENCES:	269
<b>Arabic Abstract</b>	