

TABLE OF CONTENTS

Dedication / الإهداء	i
Acknowledgement	ii
Table of Contents	iv
List of Figures.....	vi
List of Tables	viii
ملخص	ix
Abstract	x
1. Introduction.....	1
2. Wave Function of the Deuteron.....	14
2.1 Spin, Isospin and Angular Momentum of the Deuteron	16
2.2 Nucleon-Nucleon Interaction	20
2.3 Spatial Part of the Deuteron Wave Function	29
3. Wave Function of the Deuteron-Nucleon System	38
3.1 Construction of the Deuteron-Nucleon Wave Function	39

3.2 Spin Factors	42
3.3 Normalization of the Deuteron-Nucleon Wave Function	44
4. Energy of the Deuteron-Nucleon System.....	52
4.1 Hamiltonian of the Deuteron-Nucleon System	52
4.2 Energy Expectation Value for the Deuteron-Nucleon System.....	56
4.3 Using Gaussian Functions in Evaluation of the Integrals J_{2t} and J_{3t}	64
4.4 Binding Energy Formula for a Deuteron Immersed in a Nucleon Vapor .	69
5. Mott Transition and the CM Momenta of Deuterons and Nucleons	73
5.1 Evaluation of $\langle e^{i\vec{Q}\cdot\vec{r}} \rangle$ at High Temperature	74
5.2 Chemical Potentials for the Deuteron-Nucleon System.....	83
5.3 Evaluation of $\langle e^{i\vec{Q}\cdot\vec{r}} \rangle$ at Absolute Zero Temperature	89
6. Results and Conclusion	93
6.1 Density Dependence of the Deuteron Binding Energy.....	93
6.2 Comparison of the Present Work Results With Other Theoretical Results	101
References.....	105
Appendix A.....	109