CONTENTS

Foreword	vii
Foreword to English Edition	X
CHAPTER I. FORMULATION OF THE VARIATIONAL PRIN-	
CIPLE	
1. Statement of the problems of the collision of electrons with atoms	
and calculations performed before the development of variational	
methods	1
2. Variational principles for problems of the discrete spectrum	6
3. Variational principles for problems of the theory of collisions.	
A short survey	7
4. Hulthén's variational principle for the one-dimensional equation	9
5. A variational principle for a potential having Coulomb character	Part Tark
at infinity	14
6. The general problem of elastic scattering of particles and Kohn's	10
variational principle	16
7. The elastic scattering of electrons by complex atoms, taking	22
exchange into account	29
	29
CHAPTER II. THE CONNECTION BETWEEN VARIOUS	
FORMULATIONS OF VARIATIONAL PRINCIPLES AND	
THEIR APPLICATION IN THE THEORY OF COLLISIONS	
9. The connection between Hulthén's and Kohn's variational	25
principles	35
10. Variational principles and perturbation theory	38
11. Variational principles based on an integral equation for the wave function	46
12. Direct methods for the calculation of phases, based on variational	
principles	53
13. A variational principle and the method of the self-consistent field	64
14. The variational principle and the classification of approximate	
methods for the calculation of inelastic collisions	70
15. Variational calculations for elastic collisions of electrons with	
hydrogen atoms	74
CHAPTER III. THE SYMMETRY OF THE FUNCTIONALS,	
THE PRINCIPLE OF DETAILED BALANCE, AND THE	
UNITARITY OF THE SCATTERING OPERATOR	
16. The symmetry of the functionals in the methods of Hulthén and	
Kohn	81
17. The passage of particles through a potential barrier and the	00
symmetry of the variational functional	83

18. An identity for the scattering amplitude for particles in a central	10000000
field	87
19. The general problem of scattering by a potential field, and the	-00
symmetry of the functional	89
20. The symmetry of the interaction operator and of the scattering	
amplitude. The scattering matrix. A variational principle related	00
to the unitarity condition	93
21. The scattering of electrons by an atom, and the symmetry condition	95
22. Invariance of the unitary condition under phase transformations	00
of atomic functions	98
23. The unitarity condition and the relation between elastic and	100
inelastic partial scattering cross sections	100
24. Reversal principle in quantum mechanics	102
25. The symmetry of the functional and a variational principle for	106
non-stationary problems	100
26. Generalization of a variational principle for a non-stationary	112
problem and perturbation theory	112
CHAPTER IV. VARIATION OF SCALE AND THE VIRIAL	
THEOREM FOR SCATTERING PROBLEMS	
	119
27. The virial theorem in classical mechanics	121
28. The virial theorem in quantum mechanics. Bound states	121
29. The virial theorem for the scattering of particles by a central field.	123
Partial waves	126
30. The simplest example	120
	127
principle 32. Some identities connected with the virial theorem. The relation	12.
between the discrete and the continuous spectrum	129
33. The case of a field having Coulomb character at infinity	134
34. Variation of scale in the three-dimensional case for scattering	
problems	136
35. The relationship between the one-dimensional and the three-	
dimensional cases	137
36. Variational methods and the scattering of electrons by the	
Thomas-Fermi atom	139
37. Virial theorem and Born's method	142
38. The virial theorem for the problem of the collision of elec-	
trons with atoms. The possibility of applying the theorem	
in numerical calculations	144
39. Virial theorem for a classical scattering problem	146
	150
Conclusion	152
References Index	155
THANK	

