

CURTIN UNIVERSITY
PHYS4001 - LITERATURE REVIEW

IONIZATION AMPLITUDES IN ELECTRON-HELIUM COLLISIONS WITHIN THE S-WAVE MODEL

TOM ROSS - 1834 2884
PROFESSOR IGOR BRAY

[ABSTRACT]

Contents

| | | |
|----------|---|----------|
| 1 | Introduction | 2 |
| 2 | Theory | 2 |
| 2.1 | Convergent Close-Coupling Method | 2 |
| 2.1.1 | Electron-Helium Hamiltonian | 2 |
| 2.1.2 | Close-Coupling Equations | 2 |
| 2.2 | Ionization Amplitudes | 2 |
| 2.3 | Ionization from Ansatz of Zatsarinny and Bartschat | 2 |
| 2.4 | Ionization from Exterior Complex Scaling | 2 |
| 3 | Survey of Current Literature | 2 |
| 3.1 | Extant Ionization Calculations with Close Coupling-Method | 2 |
| 3.2 | Ionization Calculations with Ansatz of Zatsarinny and Bartschat | 2 |
| 3.3 | Ionization Calculations with Exterior Complex Scaling | 2 |
| 4 | Questions | 2 |
| 5 | Conclusion | 3 |

List of Figures

List of Tables

1 Introduction

2 Theory

2.1 Convergent Close-Coupling Method

2.1.1 Electron-Helium Hamiltonian

Laguerre basis.

Implications of spin / Pauli exclusion principle.

Target structure.

2.1.2 Close-Coupling Equations

Description of CC equations.

2.2 Ionization Amplitudes

Transition amplitudes - discrete excitation.

Discuss auto-ionization (auto-ionization from excited states)?

Ionization amplitudes.

Limitation of ionization amplitudes to pseudostate energies in (CCC), and resulting method for calculating ionization amplitudes.

Behaviour of ionization amplitudes for Singlet states.

Singly-Differential-Cross-Section for electron-impact Ionization.

2.3 Ionization from Ansatz of Zatsarinny and Bartschat

2.4 Ionization from Exterior Complex Scaling

3 Survey of Current Literature

3.1 Extant Ionization Calculations with Close Coupling-Method

3.2 Ionization Calculations with Ansatz of Zatsarinny and Bartschat

3.3 Ionization Calculations with Exterior Complex Scaling

4 Questions

SDCS?

Re-scaling?

Ionization vs Ionisation?

Frozen-core model?

e-He or e-(He+)?

5 Conclusion

References