

■ Electronic Cross-Sections and Macroscopic Coefficients. Volume 1: Hydrogen and Rare Gases

1. General Introduction

- Purpose and scope of the book
- Definitions: cross-sections and macroscopic coefficients
- Methods of measurement and calculation

2. Theoretical Foundations

- Electron–atom interactions
- Conservation laws and scattering models
- Concepts of total and differential cross-sections
- Quantum and semi-classical approaches

3. Hydrogen (H)

- Atomic and spectroscopic properties
- Ionization cross-section
- Electronic excitation and de-excitation
- Elastic and inelastic scattering
- Macroscopic coefficients for gaseous hydrogen
- Comparison with experimental data

4. Rare Gases (He, Ne, Ar, Kr, Xe)

- Overview and general properties
- Experimental cross-section data
- Ionization and excitation processes
- Effects of electronic polarization
- Energy dependence of scattering behavior
- Applications to plasma and discharge physics

5. Experimental Methods and Instrumentation

- Electron sources and measurement setups
- Energy and angular spectrometry techniques
- Calibration and experimental uncertainties

6. Practical Applications

- Modeling of cold plasmas and fusion systems
- Calculation of transport and absorption coefficients
- Role of cross-sections in rare gas simulations
- Comparative studies: theory vs. experiment

7. Appendices

- Cross-section data tables (H, He, Ne, Ar, Kr, Xe)
- Empirical parameters and recommended interpolations
- Bibliographic references and data sources

8. Index of Topics and Symbols