

<<原子和分子光谱学>>

图书基本信息

书名：<<原子和分子光谱学>>

13位ISBN编号：9787030313386

10位ISBN编号：7030313380

出版时间：2011-6

出版时间：科学出版社

作者：斯万贝里

页数：588

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

<<原子和分子光谱学>>

内容概要

A wide-ranging review of modern spectroscopic techniques such as X-ray, photoelectron, optical and laser spectroscopy, and radiofrequency and microwave techniques. On the fundamental side the book focuses on physical principles and the impact of spectroscopy on our understanding of the building blocks of matter, while in the area of applications particular attention is given to those in chemical analysis, photochemistry, surface characterisation, environmental and medical diagnostics, remote sensing and astrophysics. The Fourth Edition also provides the reader with an update on laser cooling and trapping, Bose-Einstein condensation, ultra-fast spectroscopy, highpower laser/matter interaction, satellitebased astronomy and spectroscopic aspects of laser medicine.

<<原子和分子光谱学>>

作者简介

作者：（美国）斯万贝里（S.Svanberg）

<<原子和分子光谱学>>

书籍目录

1. introduction
2. atomic structure
 - 2.1 one-electron systems
 - 2.2 alkali atoms
 - 2.3 magnetic effects
 - 2.3.1 precessional motion
 - 2.3.2 spin-orbit interaction
 - 2.4 general many-electron systems
 - 2.5 the influence of external fields
 - 2.5.1 magnetic fields
 - 2.5.2 electric fields
 - 2.6 hyperfine structure
 - 2.6.1 magnetic hyperfine structure
 - 2.6.2 electric hyperfine structure
 - 2.7 the influence of external fields (hfs)
 - 2.8 isotopic shifts
3. molecular structure
 - 3.1 electronic levels
 - 3.2 rotational energy
 - 3.3 vibrational energy
 - 3.4 polyatomic molecules
 - 3.5 clusters
 - 3.6 other molecular structures
4. radiation and scattering processes
 - 4.1 resonance radiation
 - 4.2 spectra generated by dipole transitions
 - 4.2.1 atoms
 - 4.2.2 molecules
 - 4.3 rayleigh and raman scattering
 - 4.4 raman spectra
 - 4.4.1 vibrational raman spectra
 - 4.4.2 rotational raman spectra
 - 4.4.3 vibrational-rotational raman spectra
 - 4.5 mie scattering
 - 4.6 atmospheric scattering phenomena
 - 4.7 comparison between different radiation and scattering processes
 - 4.8 collision-induced processes
5. spectroscopy of inner electrons
 - 5.1 x-ray spectroscopy
 - 5.1.1 x-ray emission spectroscopy
 - 5.1.2 x-ray absorption spectroscopy
 - 5.1.3 x-ray imaging applications
 - 5.2 photoelectron spectroscopy
 - 5.2.1 xps techniques and results

<<原子和分子光谱学>>

- 5.2.2 chemical shifts
- 5.3 auger electron spectroscopy
- 6. optical spectroscopy
 - 6.1 light sources
 - 6.1.1 line light sources
 - 6.1.2 continuum light sources
 - 6.1.3 synchrotron radiation
 - 6.1.4 natural radiation sources
 - 6.2 spectral resolution instruments
 - 6.2.1 prism spectrometers
 - 6.2.2 grating spectrometers
 - 6.2.3 the fabry-p~rot interferometer
 - 6.2.4 the fourier transform spectrometer
 - 6.3 detectors
 - 6.4 optical components and materials
 - 6.4.1 interference filters and mirrors
 - 6.4.2 absorption filters
 - 6.4.3 polarizers
 - 6.4.4 optical materials
 - 6.4.5 influence of the transmission medium
 - 6.5 optical methods of chemical analysis
 - 6.5.1 the beer-lambert law
 - 6.5.2 atomic absorption/emission spectrophotometry
 - 6.5.3 burners, flames, sample preparation and measurements
 - 6.5.4 modified methods of atomization
 - 6.5.5 multi-element analysis
 - 6.5.6 molecular spectrophotometry
 - 6.5.7 raman spectroscopy
 - 6.6 optical remote sensing
 - 6.6.1 atmospheric monitoring with passive techniques
 - 6.6.2 land and water measurements with passive techniques
 - 6.7 astrophysical spectroscopy
- 7. radio-frequency spectroscopy
 - 7.1 resonance methods
 - 7.1.1 magnetic resonance
 - 7.1.2 atomic-beam magnetic resonance
 - 7.1.3 optical pumping
 - 7.1.4 optical double resonance
 - 7.1.5 level-crossing spectroscopy
 - 7.1.6 resonance methods for liquids and solids
 - 7.2 microwave radiometry
 - 7.3 radio astronomy
- 8. lasers
 - 8.1 basic principles
 - 8.2 coherence
 - 8.3 resonators and mode structure
 - 8.4 fixed-frequency lasers

<<原子和分子光谱学>>

- 8.4.1 the ruby laser
- 8.4.2 four-level lasers
- 8.4.3 pulsed gas lasers
- 8.4.4 the he-ne laser
- 8.4.5 gaseous ion lasers
- 8.5 tunable lasers
 - 8.5.1 dye lasers
 - 8.5.2 colour-centre lasers
 - 8.5.3 tunable solid-state lasers
 - 8.5.4 tunable co2 lasers
 - 8.5.5 semiconductor lasers
- 8.6 nonlinear optical phenomena
- 8.7 ultra-short and ultra-high-power laser pulse generation
 - 8.7.1 short-pulse generation by mode-locking
 - 8.7.2 generation of ultra-high power pulses
- 9. laser spectroscopy
 - 9.1 basic principles
 - 9.1.1 comparison between conventional light sources and lasers
 - 9.1.2 saturation
 - 9.1.3 excitation methods
 - 9.1.4 detection methods
 - 9.1.5 laser wavelength setting
 - 9.2 doppler-limited techniques
 - 9.2.1 absorption measurements
 - 9.2.2 intracavity absorption measurements
 - 9.2.3 absorption measurements on excited states
 - 9.2.4 level labelling
 - 9.2.5 two-photon absorption measurements
 - 9.2.6 opto-galvanic spectroscopy
 - 9.2.7 single-atom and single-molecule detection
 - 9.2.8 opto-acoustic spectroscopy
 - 9.3 optical double-resonance and level-crossing experiments with laser excitation
 - 9.4 time-resolved atomic and molecular spectroscopy
 - 9.4.1 generation of short optical pulses
 - 9.4.2 measurement techniques for optical transients
 - 9.4.3 background to lifetime measurements
 - 9.4.4 survey of methods of measurement for radiative properties
 - 9.4.5 quantum-beat spectroscopy
 - 9.5 ultrafast spectroscopy
 - 9.5.1 ultrafast measurement techniques
 - 9.5.2 molecular reaction dynamics (femtochemistry)
 - 9.5.3 coherent control
 - 9.6 high-power laser experiments
 - 9.6.1 above threshold ionization (ati)

<<原子和分子光谱学>>

- 9.6.2 high harmonic generation
- 9.6.3 x-ray laser pumping
- 9.6.4 broadband x-ray generation
- 9.6.5 relativistic effects and laser accelerators
- 9.6.6 laser-nuclear interactions and laser-driven fusion
- 9.7 high-resolution laser spectroscopy
 - 9.7.1 spectroscopy on collimated atomic and ionic beams
 - 9.7.2 saturation spectroscopy and related techniques
 - 9.7.3 doppler-free two-photon absorption
- 9.8 cooling and trapping of ions and atoms
 - 9.8.1 introduction
 - 9.8.2 ion traps
 - 9.8.3 basic laser cooling in traps
 - 9.8.4 trapped ion spectroscopy
 - 9.8.5 atom cooling and trapping
 - 9.8.6 sub-recoil cooling
 - 9.8.7 atom optics
 - 9.8.8 bose-einstein condensation and "atom lasers"
 - 9.8.9 ultracold fermionic gases
- 10. laser-spectroscopic applications
 - 10.1 diagnostics of combustion processes
 - 10.1.1 background
 - 10.1.2 laser-induced fluorescence and related techniques
 - 10.1.3 raman spectroscopy
 - 10.1.4 coherent anti-stokes raman scattering
 - 10.1.5 velocity measurements
 - 10.2 laser remote sensing of the atmosphere
 - 10.2.1 optical heterodyne detection
 - 10.2.2 long-path absorption techniques
 - 10.2.3 lidar techniques
 - 10.3 laser-induced fluorescence and raman spectroscopy in liquids and solids
 - 10.3.1 hydrospheric remote sensing
 - 10.3.2 vegetation monitoring
 - 10.3.3 monitoring of surface layers
 - 10.4 laser-induced chemical processes
 - 10.4.1 laser-induced chemistry
 - 10.4.2 laser isotope separation
 - 10.5 spectroscopic aspects of lasers in medicine
 - 10.5.1 thermal interaction of laser light with tissue
 - 10.5.2 photodynamic tumour therapy
 - 10.5.3 tissue diagnostics with laser-induced fluorescence
 - 10.5.4 scattering spectroscopy and tissue transillumination
- questions and exercises
- references
- index

章节摘录

版权页：插图：9.1.3 Excitation Methods Several different excitation schemes can be used in laser spectroscopy. This is illustrated in Fig. 9.1 for the case of alkali atoms.

Single-Step Excitation. Atoms are transferred directly from the ground state to the excited state using an allowed electric dipole transition. This means an S-P transition for an alkali atom.

Multi-Step Excitation. Since tunable lasers have high output powers enabling the saturation of optical transitions, stepwise excitation via short-lived intermediate states is possible. A two-step process has been indicated in the figure. For an alkali atom this may mean S-P-D transitions. Stepwise excitations give access to states that cannot normally be reached.

Multi-Photon Absorption. At high laser powers higher-order optical absorption processes become non-negligible. Thus, it becomes possible for an atom to simultaneously absorb two photons, thus bridging energy differences between two states without utilizing real intermediate states. The theory of two-photon absorption processes was presented by M. Goeppert-Mayer as early as 1931, but only in 1961, could such transitions be observed with lasers.

<<原子和分子光谱学>>

编辑推荐

《原子和分子光谱学:基础及实际应用(第4版)(影印版)》是国外物理名著系列27之一。

<<原子和分子光谱学>>

版权说明

本站所提供下载的PDF图书仅提供预览和简介, 请支持正版图书。

更多资源请访问:<http://www.tushu007.com>