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Nota di contenuto	Front cover; Title page; Copyright; Front matter; Preface; Table of contents; 1 Introduction; Absorption; Light absorption in a bulk medium; Absorption of complex samples; Electronic, vibrational and

rotational levels; Wavelength, frequency and energy; Emission; Black body emission; Two level system (Einstein's coefficients); Fluorescence and phosphorescence; Light amplification; Optical spectroscopy; 2 Optics and Optical Devices; Waves; Wave equation; Harmonic waves; Plane waves; Interference; Michelson interferometer; Fabry-Perot interferometer; Interference filters and mirrors; Diffraction
Fresnel formulationFraunhofer diffraction (far field approximation); Diffraction grating; Monochromator; Calculations of optical system (matrix formulation); Geometrical optics approximation; Beam transfer matrix; Imaging and magnification; 3 Lasers for Spectroscopy Applications; Laser active medium; Laser resonators; Resonator with active medium; Resonator bandwidth; Longitudinal modes; Transverse modes; Stable and unstable resonators; Continuous wave lasers; Pulsed lasers; Q-Switched lasers; Mode-locked lasers; Laser amplifiers; Main types of lasers; Nd:YAG lasers; Ion lasers
Excimer lasersDye lasers; Ti:sapphire lasers; Semiconductor lasers; Other lasers used in spectroscopy applications; Non-linear optic effect in laser applications; Second harmonic; Third harmonic; Wave mixing; Parametric amplification and generation of the light; 4 Optical measurements; Noise statistics and accuracy of measurements; Systematic error and random noise; Noise statistics; Statistical approach to measurements; Noise sources; Inaccuracy of indirect measurements; Photosensitive devices; Photodetector performance parameters; Photomultiplier tubes; Semiconductor photo-detectors
Other photo-detectorsMeasurements of the light power; Measurements of the pulse energy; Measurements of the pulse duration; Direct methods; Autocorrelators (indirect methods); 5 Steady State Absorption Spectroscopy; Measurements of the light absorption spectrum; Spectrophotometer schemes; Single channel scheme; Two channel scheme; Spectrophotometers with array detectors; Main characteristics of spectrophotometers; Spectrum range; Spectrum resolution; Sensitivity and absorption range; Instruments, accessories and applications; Spectrophotometer specifications
Cuvettes for absorption spectroscopyApplication notes and examples; 6 Steady State Emission Spectroscopy; Measurement of the Emission Spectrum; Fluorimeter; Optical Scheme; Use of Array Detectors; Evaluation of the Measured Signal; Spectrum Correction; Quantum yield determination by comparison method; Excitation spectrum; Sensitivity; Wavelength resolution; Samples for emission measurements; Excitation-monitoring schemes; Cuvettes; Effect of the sample absorption; Fluorimeter specifications; Water Raman scattering line as sensitivity test; Commercial Fluorimeters
Emission of molecular monolayer: An example

Sommario/riassunto

Optical Spectroscopy bridges a gap by providing a background on optics while focusing on spectroscopic methodologies, tools and instrumentations. The book introduces the most widely used steady-state and time-resolved spectroscopic techniques, makes comparisons between them, and provides the methodology for estimating the most important characteristics of the techniques such as sensitivity and time resolution. Recent developments in lasers, optics and electronics has had a significant impact on modern optical spectroscopic methods and instrumentations. Combining the newest l