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| Soggetti | Spectroscopy<br>Lasers<br>Photonics<br>Biophysics<br>Biological physics<br>Spectroscopy/Spectrometry<br>Optics, Lasers, Photonics, Optical Devices<br>Biological and Medical Physics, Biophysics |
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| Nota di contenuto | Modern TCSPC electronics - Principles and Acquisition Modes -- Single-photon counting detectors for the visible range between 300 nm and 1000 nm -- Single-photon detectors for infrared wavelengths in the range 1 to 1.7 m -- Modern pulsed diode laser sources for time-correlated photon counting -- Advanced FCS: an Introduction to Fluorescence Lifetime Correlation Spectroscopy and Dual Focus FCS -- Lifetime-weighted FCS and 2D FLCS: Advanced application of time-tagged TCSPC -- MFD-PIE and PIE-FI: Ways to extract more information with TCSPC -- Photon Antibunching in Single Molecule Fluorescence Spectroscopy -- FLIM Strategies for Intracellular Sensing: Fluorescence Lifetime Imaging as a Tool to Quantify Analytes of Interest -- Multiple- |

Pulse Pumping with Time-Gated Detection for Enhanced Fluorescence Imaging in Cells and Tissue -- Pattern based linear un-mixing for efficient and reliable analysis of multi-component TCSPC-data -- Metal-Induced Energy Transfer -- The importance of photon arrival times in STED microscopy -- Single color centers in diamond as single photon sources and quantum sensors -- Photon counting and timing in quantum optics experiments -- Photon counting in diffuse optical imaging.

Sommario/riassunto

This volume focuses on Time-Correlated Single Photon Counting (TCSPC), a powerful tool allowing luminescence lifetime measurements to be made with high temporal resolution, even on single molecules. Combining spectrum and lifetime provides a “fingerprint” for identifying such molecules in the presence of a background. Used together with confocal detection, this permits single-molecule spectroscopy and microscopy in addition to ensemble measurements, opening up an enormous range of hot life science applications such as fluorescence lifetime imaging (FLIM) and measurement of Förster Resonant Energy Transfer (FRET) for the investigation of protein folding and interaction. Several technology-related chapters present both the basics and current state-of-the-art, in particular of TCSPC electronics, photon detectors and lasers. The remaining chapters cover a broad range of applications and methodologies for experiments and data analysis, including the life sciences, defect centers in diamonds, super-resolution microscopy, and optical tomography. The chapters detailing new options arising from the combination of classic TCSPC and fluorescence lifetime with methods based on intensity fluctuation represent a particularly unique highlight.