1. Record Nr. UNINA9910298324103321

Autore	Chizhik Vladimir I
Titolo	Magnetic Resonance and Its Applications / / by Vladimir I. Chizhik, Yuri S. Chernyshev, Alexey V. Donets, Vyacheslav V. Frolov, Andrei V. Komolkin, Marina G. Shelyapina
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2014
ISBN	3-319-05299-3
Edizione	[1st ed. 2014.]
Descrizione fisica	1 online resource (785 p.)
Disciplina	530.41 538 538.36 541
Soggetti	Medicine Condensed matter Physical chemistry Magnetism Magnetic materials Biomedicine, general Condensed Matter Physics Physical Chemistry Magnetism, Magnetic Materials
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Interaction between nuclei and electrons and their interaction with external electromagnetic fields -- Part I Nuclear magnetic resonance (NMR) -- Basic principles of detection of nuclear magnetic resonance -- Nuclear magnetic relaxation -- Nuclear Magnetic Resonance in Liquids -- Nuclear magnetic resonance in diamagnetic solids -- Nuclear Magnetic Resonance in Liquid Crystals -- Nuclear magnetic resonance in magnetic materials -- Part II Nuclear quadrupole resonance (NQR) -- Nuclear quadrupole resonance -- Experimental methods in NQR -- Part III Electron paramagnetic resonance (EPR) --

Basic interactions of an electron in solids -- Energy levels of paramagnetic center in crystal field -- Covalent-coupled paramagnetic -- Fine structure of EPR spectra in solids -- Electron-nuclear interactions and hyperfine structure of EPR spectra -- Part IV Double resonances and polarization transfer -- Double resonances -- Two-dimensional NMR Fourier spectroscopy -- Part V Quantum radiofrequency electronics (radioelectronics) -- Basic physical ideas of quantum radioelectronics -- Generators with molecular and atomic beams -- Quantum amplifiers based on electron paramagnetic resonance -- The use of optical radiation in quantum radioelectronics devices -- Magnetic resonance quantum magnetometry.

Sommario/riassunto

The book is devoted to the description of the fundamentals of various radiospectroscopic methods in the area of magnetic resonance and their use for the investigation of molecular structure and dynamics and for some technical applications. This book covers two domains: radiospectroscopy and quantum radioelectronics. Radiospectroscopy comprises nuclear magnetic resonance (NMR), electron paramagnetic resonance (EPR), nuclear quadrupolar resonance (NQR), and some other phenomena. The radiospectroscopic methods are widely used for obtaining the information on internal (micro and macro) structure of objects investigated. There are no direct analogues of magnetic relaxation processes among the physical phenomena that define spectra in infrared, visible and higher frequency spectroscopy. Relaxation parameters are directly related to molecular mobility and thus represent an unique source of information on velocity and types of thermal motion. One of the most spectacular developments is the concept of double (multi) resonances (NMR–ESR, NMR–NQR, NMR–NMR and so on). Quantum radioelectronics, which was developed on the basis of radiospectroscopic methods, deals with processes in quantum amplifiers, generators and magnetometers. These devices possess record-breaking characteristics: quantum generators demonstrate the highest frequency stability; quantum amplifiers possess the lowest level of set noise; quantum magnetometers are very fruitful tool for measuring weak magnetic fields (such as the Earth field). The introductory chapter provides the necessary underpinning knowledge for newcomers to the methods. The exposition of theoretical materials goes from initial to final formulas through detailed intermediate expressions.