

1. Record Nr.	UNINA9910830703103321
Autore	Safonov Vladimir L
Titolo	Nonequilibrium magnons [[electronic resource] ] : theory, experiment, and applications // Vladimir L. Safonov
Pubbl/distr/stampa	Weinheim, : Wiley-VCH, 2013
ISBN	3-527-67053-X 1-299-15720-3 3-527-67056-4 3-527-67055-6
Descrizione fisica	1 online resource (206 p.)
Disciplina	530.1595 530.411
Soggetti	Magnons
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 and index.
Nota di contenuto	Nonequilibrium Magnons: Theory, Experiment, and Applications; Contents; Preface; 1 Harmonic Oscillators and the Universal Language of Science; 1.1 Harmonic Oscillator; 1.1.1 Complex Canonical Variables; 1.2 Classical Rotation; 1.2.1 Classical Spin and Magnetic Resonance; 1.3 Collective Variables and Harmonic Oscillators in k-space; 1.3.1 Chain of Masses and Springs; 1.3.2 Chain of Magnetic Particles; 1.4 Discussion; 2 Magnons in Ferromagnets and Antiferromagnets; 2.1 Phenomenological Description; 2.1.1 Magnons in a Ferromagnet; 2.1.1.1 Holstein-Primakoff Transformation; 2.1.1.2 The Spectrum of Magnons; 2.2 Microscopic Modeling; 2.2.1 Magnons in a Two-Sublattice Antiferromagnet; 2.2.1.1 Hamiltonian; 2.2.1.2 Spectrum of Magnons; 2.2.2 Magnon-Magnon Interactions; 2.3 Nuclear Magnons; 2.4 Magnetoelastic Waves, Quasi Phonons; 2.5 Discussion; 3 Relaxation of Magnons; 3.1 Master Equation; 3.2 Relaxation of Bose Quasi Particles; 3.2.1 Relaxation Process of Harmonic Oscillators; 3.2.2 Magnon-Electron Scattering; 3.3 Relaxation via an Intermediate Damped Dynamic System; 3.4 Ferromagnetic Resonance Linewidth; 3.5 Magnons and Macroscopic Dynamic Equation; 3.5.1 Linearized Landau-Lifshitz Equation; 3.6 Relaxation of Coupled

Oscillations; 3.6.1 Example 1: Nuclear Magnons; 3.6.2 Example 2: Magnetoelastic Oscillations; 3.7 Discussion; 4 Microwave Pumping of Magnons; 4.1 Linear Theory; 4.1.1 Ferromagnetic Resonance; 4.1.2 Threshold of Parametric Resonance; 4.2 Parametric Resonance in a Resonator Cavity; 4.3 Nonlinear SR Theory; 4.4 Experimental Techniques; 4.5 Experimental Results; 4.5.1 Equivalent Circuit; 4.5.2 SR Theory and Experiment; 4.5.2.1 Modulation Response; 4.6 Discussion; 5 Thermodynamic Description of Strongly Excited Magnon System 6.2 Quasi Equilibrium Magnons 6.2.1 Ideal Gas of Quasi Equilibrium Magnons; 6.2.2 Example: Isotropic Spectrum; 6.2.3 Kinetic Equations; 6.2.3.1 The Case of  $T_{\text{eff}} = T$ ; 6.2.4 Magnon System with Bose Condensate; 6.2.5 Magnetodipole Emission of Condensate; 6.3 Frohlich Coherence; 6.4 Discussion; 7 Magnons in an Ultrathin Film; 7.1 Model; 7.1.1 Magnetic Energy; 7.2 Magnons; 7.2.1 Magnon Interactions; 7.2.2 Effective Four-Magnon Interactions; 7.3 Example; 7.4 Discussion; 8 Collective Magnetic Dynamics in Nanoparticles; 8.1 Long-Lived States in a Cluster of Coupled Nuclear Spins; 8.2 Electronic Spins 8.3 Spin-Echo Logic Operations

---

Sommario/riassunto

This much-needed book addresses the concepts, models, experiments and applications of magnons and spin wave in magnetic devices. It fills the gap in the current literature by providing the theoretical and technological framework needed to develop innovative magnetic devices, such as recording devices and sensors. Starting with a historical review of developments in the magnon concept, and including original experimental results, the author presents methods of magnon excitation, and several basic models to describe magnon gas. He includes experiments on Bose-Einstein condensation of

---