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Disciplina	523.1
Soggetti	Cosmology Gravitation Classical and Quantum Gravitation, Relativity Theory
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Includes index.
Nota di contenuto	Preface -- Notation -- Cosmology -- The expanding universe and its content -- Cosmological observations -- Redshift -- Open problems in cosmology -- The universe in expansion -- Newtonian cosmology -- Relativistic cosmology -- Friedmann equations -- Solutions of the Friedmann equations -- Distances in cosmology -- Thermal history -- Thermal equilibrium and Boltzmann equation -- Short summary of thermal history -- The distribution function -- The entropy density -- Photons -- Neutrinos -- Boltzmann equation -- Boltzmann equation with a collisional term -- Big-Bang Nucleosynthesis -- Recombination and decoupling -- Cosmological perturbations -- From the perturbations of the FLRW metric to the linearised Einstein tensor -- Perturbation of the energy-momentum tensor -- The problem of the gauge and gauge transformations -- Normal mode decomposition -- Einstein equations for scalar perturbations -- Einstein equations for tensor perturbations -- Einstein equations for vector perturbations -- Perturbed Boltzmann equations -- General form of the perturbed Boltzmann equation -- Force term -- The perturbed Boltzmann equation for CDM -- The perturbed Boltzmann equation for massless neutrinos -- The perturbed Boltzmann equation for photons -- Boltzmann equation for baryons -- Initial conditions -- Initial conditions -- Evolution equations in the Λ CDM model -- The flatness problem -- The horizon problem -- Single scalar field slow-roll

inflation -- Production of gravitational waves during inflation --
Production of scalar perturbations during inflation -- Spectral indices
-- Observational results -- Examples of models of inflation --
Evolution of perturbations -- Evolution on super-horizon scales -- The
matter-dominated epoch -- The radiation-dominated epoch -- Deep
inside the horizon -- Matching and CDM transfer function -- The
transfer function for tensor perturbations -- Anisotropies in the
Cosmic Microwave Background -- Free-streaming -- Anisotropies on
large scales -- Tight-coupling and acoustic oscillations -- Diffusion
damping -- Line-of-sight integration -- Finite thickness effect and
reionization -- Cosmological parameters determination -- Tensor
contribution to the CMB TT correlation -- Polarisation -- Miscellanea
-- Bayesian analysis using type Ia supernovae data -- Doing statistics
in the sky -- Appendices -- Thermal distributions -- Derivation of the
Poisson distribution -- Helmholtz theorem -- Conservation of R on
large scales and for adiabatic perturbations -- Spherical harmonics --
Method of Green's functions -- Polarisation -- Thomson scattering --
Bibliography -- Subject Index.

Sommario/riassunto

Cosmology has become a very active research field in the last decades thanks to the impressive improvement of our observational techniques which have led to landmark discoveries such as the accelerated expansion of the universe, and have put physicists in front of new mysteries to unveil, such as the quest after the nature of dark matter and dark energy. These notes offer an approach to cosmology, covering fundamental topics in the field: the expansion of the universe, the thermal history, the evolution of small cosmological perturbations and the anisotropies in the cosmic microwave background radiation. Some extra topics are presented in the penultimate chapter and some standard results of physics and mathematics are available in the last chapter in order to provide a self-contained treatment. These notes offer an in-depth account of the above-mentioned topics and are aimed to graduate students who want to build an expertise in cosmology.
