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Course 5. Cosmic microwave background anisotropies up to second order1. Preamble; 2. Introduction; 3. Perturbing gravity; 4. The collisionless Boltzmann equation for photons; 5. Collision term; 6. The Brightness equation; 7. The Boltzmann equation for baryons and cold dark matter; 8. Linear solution of the Boltzmann equations; 9. Conclusions; Appendix A. Einstein's equations; Appendix B. First-order solutions of Einstein's equations in various eras; References; Course 6. Physics beyond the standard model and dark matter; 1. Introduction; 2. Why beyond the standard model

3. Examples of physics beyond the standard model4. Evidence for dark matter; 5. What dark matter is not; 6. WIMP dark matter; 7. Dark horse candidates; 8. Cosmic coincidence; 9. Conclusions; Appendix A. Gravitational lensing; References; Part 2. Short Topical Lectures; Course 7. Effective field theories and gravitational radiation; 1. Lecture I; 2. Lecture II; 3. Conclusions; Appendix A. Redundant operators; References; Course 8. Holographic cosmology; 1. Introduction; 2. Framework; 3. Anti-de Sitter cosmologies; 4. Dual field theory evolution; 5. Discussion; References

Course 9. Neutrino physics and cosmology1. Introduction; 2. The cosmic neutrino background; 3. Neutrinos and Primordial Nucleosynthesis; 4. Extra radiation and the effective number of neutrinos; 5. Massive neutrinos; 6. Effects of neutrino masses on cosmology; 7. Current bounds on neutrino masses; 8. Future sensitivities on neutrino masses from cosmology; 9. Conclusions; References; Course 10. Cosmic microwave background: observational status; 1. Introduction; 2. CMB temperature anisotropies: the "early" days; 3. WMAP first release

4. Polarization of the CMB - discovery and first measurements

Sommario/riassunto

This book is a collection of lectures given in August 2006 at the Les Houches Summer School on "Particle Physics and Cosmology: the Fabric of Spacetime?". It provides a pedagogical introduction to the various aspects of both particle physics beyond the Standard Model and Cosmology of the Early Universe, covering each topic from the basics to the most recent developments.· Provides a pedagogical introduction to topics at the interface of particle physics and cosmology· Addresses each topic from the basis to the most recent developments· Provides necessary tools to build new theor