CLASSICAL ELECTRODYNAMICS

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SSD FIS 03	COURSE 9 CREDIT	Year (I, II)	1	Semester (I , II)	I

CONTENTS

The contents of Classical Electrodynamics are divided essentially in two parts. The first corresponds to the microscopic Maxwell-Lorentz theory, is developed along the lines corresponding, for instance, to the first eight chapters of Kurt Lechner's book "Elettrodinamica Classica", Elements of Special Relativity, Maxwell-Lorentz equations in covariant form, Variational method in Classical Field Theory and in Classical Electrodynamics, Noether's theorem, Electromagnetic waves and the Kirchhoff formula for the Cauchy problem with the descent method for Poisson and D'Alembert formulae, Generation of electromagnetic fields, The fields of Lienard –Wiechert, Radiation of electromagnetic waves. Also, many sections were useful of the first nine chapters of Landau-Lifshitz "The Classical Theory of Fields", and some sections of Jackson's book, as well as of P. G. Bergmann's old book "Theory of Relativity". The second part of the course is mainly devoted to the electrodynamics of continuous media. Following mainly the book of Landau-Lifshitz on this subject, Stroffolini's "Lezioni di Elettrodinamica" and again some sections of Jackson's book, the macroscopic Maxwell-Lorentz equations are introduced and the Cauchy problem is solved for homogeneous dispersive media. Geometrical optics is studied by discussing wave packet propagation and refraction between different homogeneous dielectrics or reflection by a metallic conductor. Kramers-Kroenig relations and Brillouin's energetic considerations for dispersive media are discussed. Finally, wave guides and resonant cavities are studied.

BIBLIOGRAPHY

Indicazioni bibliografiche o file pdf di singole sezioni di libri di difficile reperibilità, con particolare riferimento ai seguenti testi: Kurt Lechner "Elettrodinamica Classica" SPRINGER ITALIA (2014); J. D. Jackson "Elettrodinamica Classica" ZANICHELLI; Landau-Lifshitz "The Classical Theory of Fields" ed "Electrodynamics of Continuous Media" (anche in trad. Italiana ED. RIUNITI) P. G. Bergmann "Theory of Relativity" DOVER; R. Stroffolini "Lezioni di Elettrodinamica" BIBLIOPOLIS.