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Titolo	Introduction to Laser-Plasma Interactions / / Pierre Michel
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2023] ©2023
ISBN	9783031234248 9783031234231
Edizione	[1st ed. 2023.]
Descrizione fisica	1 online resource (423 pages)
Collana	Graduate Texts in Physics Series
Disciplina	530.44
Soggetti	Laser-plasma interactions
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Chapter 1-Fundamentals of optics and plasma physics -- Chapter 2-Single particle dynamics in light waves and plasma waves -- Chapter 3-Linear propagation of light waves in plasmas -- Chapter 4-Absorption of light waves (and EPWs) in plasmas -- Chapter 5-Nonlinear self-action effects in light propagation in plasmas -- Chapter 6-Introduction to three-wave instabilities. Chapter 7-Wave coupling instabilities via ion acoustic waves -- Chapter 8-Wave coupling instabilities via electron plasma waves -- Chapter 9-Optical smoothing of high-power lasers and implications for laser-plasma instabilities -- Chapter 10-Saturation of laser-plasma instabilities and other nonlinear effects.
Sommario/riassunto	This textbook provides a comprehensive introduction to the physics of laser-plasma interactions (LPI), based on a graduate course taught by the author. The emphasis is on high-energy-density physics (HEDP) and inertial confinement fusion (ICF), with a comprehensive description of the propagation, absorption, nonlinear effects and parametric instabilities of high energy lasers in plasmas. The recent demonstration of a burning plasma on the verge of nuclear fusion ignition at the National Ignition Facility in Livermore, California, has marked the beginning of a new era of ICF and fusion research. These new developments make LPI more relevant than ever, and the resulting influx of new scientists necessitates new pedagogical material on the

	subject. In contrast to the classical textbooks on LPI, this book provides a complete description of all wave-coupling instabilities in unmagnetized plasmas in the kinetic as well as fluid pictures, and includes a comprehensive description of the optical smoothing techniques used on high-power lasers and their impact on laser-plasma instabilities. It summarizes all the key developments from the 1970s to the present day in view of the current state of LPI and ICF research; it provides a derivation of the key LPI metrics and formulas from first principles, and connects the theory to experimental observables. With exercises and plenty of illustrations, this book is ideal as a textbook for a course on laser-plasma interactions or as a supplementary text for graduate introductory plasma physics course. Students and researchers will also find it to be an invaluable reference and self-study resource.

2.

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