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Titolo	The Physics of Laser Plasmas and Applications - Volume 1 [[electronic resource]] : Physics of Laser Matter Interaction // by Hideaki Takabe
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Descrizione fisica	1 online resource (395 pages)
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Disciplina	530.44
Soggetti	Plasma (Ionized gases) Lasers Photonics Physics Astrophysics Nuclear fusion Plasma Physics Optics, Lasers, Photonics, Optical Devices Mathematical Methods in Physics Astrophysics and Astroparticles Nuclear Fusion
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Nota di contenuto	Chapter 1. Introduction -- Part I: Non-relativistic Lasers -- Chapter 2. Laser absorption by Coulomb collision -- Chapter 3. Ultra-short pulse and collisionless absorption -- Chapter 4. Nonlinear physics of laser plasma interaction -- Part II: Relativistic Lasers -- Chapter 5. Relativistic laser electron interactions -- Chapter 6. Relativistic laser plasma interactions -- Chapter 7. Relativistic laser and solid target interactions -- Chapter 8. Relativistic laser heating in plasmas -- Chapter 9. Theory of Stochasticity and Chaos of Electrons in Relativistic Lasers -- Appendices.
Sommario/riassunto	The series of books discusses the physics of laser and matter interaction, fluid dynamics of high-temperature and high-density

compressible plasma, and kinetic phenomena and particle dynamics in laser-produced plasma. The book (Vol.1) gives the physics of intense-laser absorption in matter and/or plasma in non-relativistic and relativistic laser-intensity regime. In many cases, it is explained with clear images of physics so that an intuitive understanding of individual physics is possible for non-specialists. For intense-laser of  $10^{13}$ - $10^{16}$  W/cm<sup>2</sup>, the laser energy is mainly absorbed via collisional process, where the oscillation energy is converted to thermal energy by non-adiabatic Coulomb collision with the ions. Collisionless interactions with the collective modes in plasma are also described. The main topics are the interaction of ultra-intense laser and plasma for the intensity near and over  $10^{18}$  W/cm<sup>2</sup>. In such regime, relativistic dynamics become essential. A new physics appears due to the relativistic effects, such as mass correction, relativistic nonlinear force, chaos physics of particle motions, and so on. The book provides clearly the theoretical base for challenging the laser-plasma interaction physics in the wide range of power lasers. It is suitable as a textbook for upper-undergraduate and graduate students as well as for readers who want to understand the whole physics structure about what happen when an intense-laser irradiates any materials including solids, gas etc. Explaining the physics intuitively without complicated mathematics, it is also a valuable resource for engineering students and researchers as well as for self-study.

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