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Soggetti	Plasma (Ionized gases) Lasers Photonics Space sciences Atoms Physics Plasma Physics Optics, Lasers, Photonics, Optical Devices Space Sciences (including Extraterrestrial Physics, Space Exploration and Astronautics) Atoms and Molecules in Strong Fields, Laser Matter Interaction
Lingua di pubblicazione	Inglese
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Nota di contenuto	Introduction -- Part I - High conductivity channels for a laser lightning-protection system -- Electric-discharge guiding by a continuous laser-induced spark -- Experimental simulation of a laser lightning-protection system -- Lightning and acology of atmosphere -- Part II – “Impulsar” as a background for high conductivity channels realization -- Interaction of an optical pulsed discharge with a gas -- Mechanism of shock waves merging in a laser jet engine -- Laser jet engine based on the resonance merging of shock waves -- Laser jet engine: the action of shock waves at low laser pulse repetition rate -- Simulation of high conductivity channels in space -- High conductivity channel expansion rate measurements -- "Impulsar": New application for high power high repetition rate pulse-periodic lasers -- Part III. Lasers and

laser components for high conductivity channels implementation -- Laser source for wireless power transmission in space -- High power high repetition rate lasers -- High power lasers and new applications -- High power disk lasers -- High power molecular lasers -- High power HF(DF) lasers -- High power/energy optics -- New materials for high power/energy lasers and new technologies.

Sommario/riassunto

This book discusses the physics of conductive channel development in space, air and vacuums and summarizes the attempts to create super-long conductive channels to study the upper atmosphere and to complete specific tasks related to energy transmission from the space to earth with high-voltage high repetition rate electrical sources. Conductive channels are produced by the laser jet engine vehicle-propulsion under the influence of powerful high repetition rate pulse-periodic laser radiation by CO2-laser, solid state Nd YAG,HF/DF laser systems generated with each pulse of the powerful laser conductive dust plasma. The book also presents the experimental and theoretical results of conductive canal modeling: the laser jet engine vehicle “Impulsar”, which can reach the lower layers of the ionosphere in several hundred seconds. Further, the book explores the development of lightning protection systems. The so-called long laser spark is generated to provide the conditions for connecting a thunderstorm cloud with a grounded metal rod, i.e. a classical lightning rod. Such conductivity channels can be used for energy transmission, overvoltage protection systems, transport of charged particle beams and plasma antennas. It provides the theoretical and experimental basis of high repetition rate P-P mode of operation for high power lasers (COIL, HF/DF, CO2,Nd YAG). It describes high efficiency and excellent beam quality disk lasers used for numerous applications, including surface treatment of dielectric materials in microelectronics, cutting, drilling, welding, polishing and cleaning of the surface and other technological operations. Lastly it investigates how megawatt mono-module disk lasers could be used to solve various problems: small satellites launched by lasers, formation of super-long conducting channels in space and atmosphere, cleaning of the near-earth space from the space debris and related applications.