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## Laser Physics At Relativistic Intensities

For the first time in a book, this monograph describes relativistic and charge-displacement self-channelling, which is the major finding in the physics of superintense laser beams. It also presents general nonlinear models of lasers - plasma interactions specifically in the case of extremely high intensities. Read more  
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## Laser Physics at Relativistic Intensities (Springer Series

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The book provides a comprehensive introduction to laser physics at relativistic intensities that will be valuable to both researchers and graduate students. Keywords Laser Plasma electrodynamics electromagnetic wave laser physics scattering self-channeling ultrasort pulses

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The analysis makes use of fully nonlinear models, analytical techniques and extensive simulations, whereby both qualitative and quantitative interpretations are included. The book provides a comprehensive introduction to laser physics at relativistic intensities that will be valuable to both researchers and graduate students.

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## **Laser Physics at Relativistic Intensities (eBook, 2003 ...**

For the first time in a book, this monograph describes relativistic and charge-displacement self-channelling, which is the major finding in the physics of superintense laser beams. It also presents general nonlinear models of lasers - plasma interactions specifically in the case of extremely high intensities.

## **Laser physics at relativistic intensities (Book, 2003 ...**

Relatively little is currently known about how a strong quasi-static magnetic field affects the physics of laser-plasma interactions at relativistic intensities. Until recently, limited capabilities for producing relevant experimental conditions have been one of the major stumbling blocks in this research.

## **Effects of a strong applied magnetic field on relativistic**

...

Laser-matter interactions at relativistic intensities have

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exhibited many interesting physical processes. These include the acceleration of electrons [1-4], protons, and heavy ions [5-7], the creation of electron-positron jets [8-10], and attosecond pulse generation [11,12].

## **Microengineering Laser Plasma Interactions at Relativistic ...**

The characteristic feature is that both the relative frustrated tunneling rate and the hard rescattering rate decrease with increasing the laser intensity and the wavelength. This study sheds a light on those processes that are closely related with electron rescattering in circularly polarized laser fields, e.g., high-order harmonic generation ...

## **Phys. Rev. A 89, 013422 (2014) - Rescattering and ...**

Derivation Relativistic longitudinal Doppler effect. Relativistic Doppler shift for the longitudinal case, with source and receiver moving directly towards or away from each other, is often derived as if it were the classical phenomenon, but modified by the addition of a time dilation term. This is the approach employed in first-year physics or mechanics textbooks such as those by Feynman or ...

## **Relativistic Doppler effect - Wikipedia**

The generation of harmonics by interaction of an ultrashort laser pulse with a step boundary of a plane overdense plasma layer is studied at intensities  $I\lambda^2 = 10^{17} - 10^{19} \text{ W cm}^{-2} \mu\text{m}^2$  for normal and oblique incidence and different polarizations.

## **Short-pulse laser harmonics from oscillating plasma ...**

Here we report on an optical parametric synthesizer designed for nonlinear attosecond optics and relativistic laser-plasma physics. This synthesizer uniquely combines ultra-relativistic focused...

## **Next Generation Driver for Attosecond and Laser-plasma Physics**

The typical time scale of ICF is on the order of nanosecond, while the time scale of laser-solid interactions at relativistic intensities is on the order of picosecond or even femtosecond. Therefore the local thermal equilibrium assumption needs to be seriously

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retreated.

## **Particle-in-cell simulations of laser-plasma interactions ...**

The time scale of laser-solid interactions at relativistic intensities is much shorter than those processes in inertial confinement fusion (ICF) studies, such as ablation, shock wave tuning, and hydrodynamic instabilities.

## **Particle-in-cell simulations of laser-plasma interactions ...**

As the laser intensity becomes relativistic, significantly more hot electrons are measured by the electron spectrometer. The number of electrons per keV at around 100 keV is  $4 \times 10^5$ ,  $9 \times 10^5$  and  $2 \times 10^6$  for the three laser intensities, respectively. This increase is consistent with the enhanced laser absorption at higher laser intensities<sup>35</sup>.

## **Short Pulse Laser Absorption and Energy Partition at ...**

In light fields of relativistic intensity ( $I > 10^{18}$  W/cm<sup>2</sup>) electrons oscillate with velocities close to the speed of light. The corresponding kinetic energy reaches values from MeV to GeV (at  $I > \dots$ )

## **Amplification of relativistic electron pulses by direct ...**

Efficient coupling of intense laser pulses to solid-density matter is critical to many applications including ion acceleration for cancer therapy. At relativistic intensities, the focus has been mainly on investigating various laser beams irradiating initially overdense flat interfaces with little or no control over the interaction.

## **Towards manipulating relativistic laser pulses with micro ...**

... suited to study the laser ion acceleration to relativistic ion energies, which will be heavily influenced by QED-plasma effects. These facilities will operate in the single particle relativistic electrodynamics, high-intensity particle physics, relativistic plasma physics, and QED-plasma parameter space. 5. Stage 3 (ultimate SF QED facility)

## **Relativistic plasma physics in supercritical fields**

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The assumed laser peak intensity is  $I \approx 1.38 \times 10^{22} \text{ W/cm}^2$  ( $a_0 = 100$ ), wavelength  $\lambda = 1 \mu\text{m}$ , the pulse duration amounts to 5 laser periods, focal radius  $5 \mu\text{m}$ , and ellipticity 0.05. The electron...

## **Generation of polarized particle beams at relativistic ...**

High harmonics generated due to the scattering of relativistic electrons from high intensity laser light is studied. The experiments are carried out with an Nd:Glass laser system with a peak intensity of  $2 \times 10^{18} \text{ Wcm}^{-2}$  in underdense plasma.

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