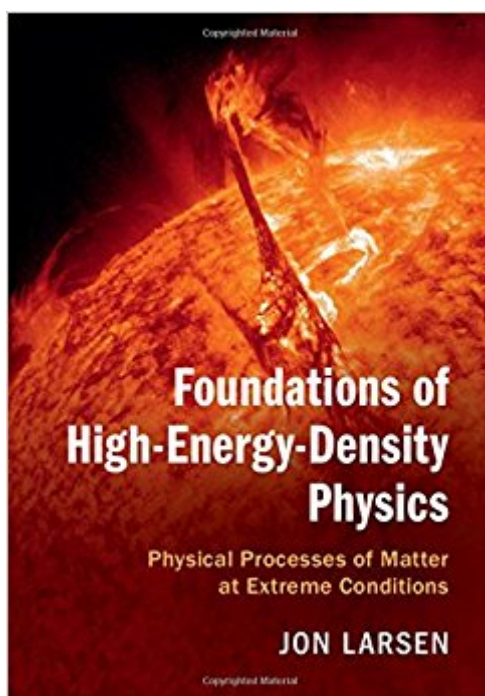


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# Foundations Of High-Energy-Density Physics: Physical Processes Of Matter At Extreme Conditions



## Synopsis

High-energy-density physics explores the dynamics of matter at extreme conditions. This encompasses temperatures and densities far greater than we experience on Earth. It applies to normal stars, exploding stars, active galaxies, and planetary interiors. High-energy-density matter is found on Earth in the explosion of nuclear weapons and in laboratories with high-powered lasers or pulsed-power machines. The physics explored in this book is the basis for large-scale simulation codes needed to interpret experimental results whether from astrophysical observations or laboratory-scale experiments. The key elements of high-energy-density physics covered are gas dynamics, ionization, thermal energy transport, and radiation transfer, intense electromagnetic waves, and their dynamical coupling. Implicit in this is a fundamental understanding of hydrodynamics, plasma physics, atomic physics, quantum mechanics, and electromagnetic theory. Beginning with a summary of the topics and exploring the major ones in depth, this book is a valuable resource for research scientists and graduate students in physics and astrophysics.

## Book Information

Hardcover: 756 pages

Publisher: Cambridge University Press; 1 edition (March 10, 2017)

Language: English

ISBN-10: 1107124115

ISBN-13: 978-1107124110

Product Dimensions: 6.8 x 1.5 x 9.7 inches

Shipping Weight: 3.5 pounds (View shipping rates and policies)

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A valuable and complete resource that brings together many of the branches of physics needed in high-energy-density physics. Targeted at research scientists and graduate students in physics and astrophysics, this book begins with basic concepts and develops a detailed explanation of the physics of hydrodynamics and energy transport in plasma.

Jon Larsen is the founder and President of Cascade Applied Science, Inc., the company that

developed a suite of simulation codes for the high-energy-density physics (HEDP) research community. He is an expert in radiation hydrodynamic simulations and is particularly well known for a code known as HYADES, which is widely used by individuals and by the National Laboratories.

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