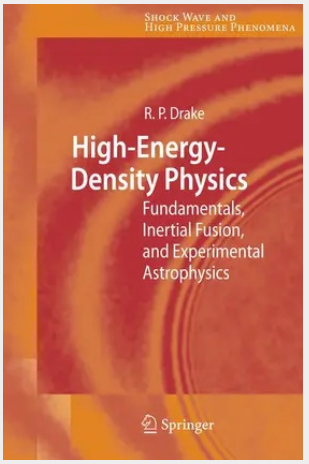
Drake

High-Energy-Density Physics

Fundamentals, Inertial Fusion, and Experimental Astrophysics



The raw numbers of high-energy-density physics are amazing: shock waves at hundreds of km/s (approaching a million km per hour), temperatures of millions of degrees, and pressures that exceed 100 million atmospheres. This book introduces the fundamental tools and discoveries of high-energy-density physics. It surveys the production of high-energy-density conditions, the fundamental plasma and hydrodynamic models that can describe them and the problem of scaling from the laboratory to the cosmos. Connections to astrophysics will be streessed throughout. The book is intended to support coursework in high-energy-density physics, to meet the needs of new researchers in this field, and also to serve as a useful reference on the fundamentals.

This book has two goals. One goal is to provide a means for those new to high-energy-density physics to gain a broad foundation from one text. The second goal is to provide a useful working reference for those in the ?eld. This book has at least four possible applications in an academic c- text. It can be used for training in high-energy-density physics, in support of the growing number of university and laboratory research groups working in this area. It also can be used by schools with an emphasis on ultrafast lasers, to provide some introduction to issues present in all laser–target - perimentswithhigh-powerlasers,andwiththoroughcoverageofthematerial in Chap. 11 on relativistic systems. In addition, it could be used by physics, applied physics, or engineering departments to provide in a single course an introduction to the basics of ?uid mechanics and radiative transfer, with d- matic applications. Finally, it could be used by astrophysics departments for a similar purpose, with the parallel bene?t of training the students in the similarities and di?erences between laboratory and astrophysical systems. The notation in this text is deliberately sparse and when possible a given symbol has only one meaning. A de?nition of the symbols used is given in Appendix A. In various cases, additional subscripts are added to distinguish among cases of the same quantity, as for example in the use of ? and ? 1 2 to distinguish the mass density in two di?erent regions.

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