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Book Review

Title:	***Laser Plasma Physics: Forces and the Nonlinearity Principle***
Author:	Heinrich Hora
Publisher:	SPIE Optical Engineering Press
Year:	2000
Pages:	217
Price:	$50.00
ISBN:	0-8194-6509-0

This is a Landau/Lifschitz-class book. It is a critically important reference work for the whole field of high intensity and/or high plasma density laser-plasma interactions for years to come. It covers everything from single particles to dense fluids, from computational physics to the practical results in fusion, accelerators, you name it. It contains excellent and crystal-clear treatments of the theory of electrodynamics, laser-driven hydrodynamics, the Lorentz force, complex refractive index, and relativistic effects in plasmas. Although "the swamp of plasma physics" is mostly a classical place, Hora clearly indicates where quantum effects must be considered.

I deeply appreciated Hora's elegant organization of the topic. He gives a quick overview of where we're headed, then plows into the complete theory for the easiest case, then the complete theory for the general case never ignoring any term without explaining why and when it may be ignored, then finally rederives the simple results from the complete theory. This is the reverse of the standard treatments of technical subjects, where the simple results are often stated as if God gave them and only later we realize where the laws fail.

It is certainly not just a reassembly of material in his earlier books, especially *Physics of Laser Driven Plasmas*, but rather a much more cohesive and expository treatment of topics which could not be treated in a detailed way in those earlier books. At the moment it is the only work I can think of that includes such a huge, panoramic historical perspective surrounding its very specialized topic. Such a perspective is important to maintain the interest of the reader who may be coming from a slightly different background than the author. It also is very personal in places, and this is not bad in my view. Hora also does not pretend that the very difficult parts are obvious like so many standard science texts do. The reader and the author are both sweating at the end of a chapter!

There are very few negative aspects. In places it is a bit pejorative, and there are a few places where it would have been better to show one convincing example than to show the reader 4 figures and 4 references all proving the same point. The book is mainly written in gaussian units. However, in the early chapters, Hora indicates in several places how the equations look in SI and afterward plows ahead in gaussian without clearly indicating the breakpoint.

Overall, I recommend this book very highly. It is definitely a graduate-level book. At 217 pages, it is just the right size for an upper-level graduate course text in laser-plasma interactions. As a reference work, it is very accessible with a clear and concise table of contents, a good index and a copious bibliography.

Claude Phipps founded Photonic Associates, Santa Fe, NM in 1995, to study and develop systems that employ laser–matter interaction to produce thrust. He is a recognized authority on interaction of lasers with condensed matter. Dr. Phipps is author of 160 publications, including 31 invited presentations and a book chapter on the theory of laser ablation at high intensities, and has been an invited lecturer at the Free University of Berlin, the Industrial Research Institute of Japan (Tokyo), and the University of New South Wales. He organized and chaired the SPIE's High Power Laser Ablation Conferences in 1998, 1999, and 2000. International in scope, these meetings typically draw 150 scientists from 15 countries for discussions of forefront issues in the field in a collegial "Gordon-type" setting. He is known for inventing the "ORION" laser space debris clearing concept, and for the Phipps model for predicting pressure and impulse produced by pulsed laser irradiation of opaque surfaces. From 1972 to 1995 he worked in the laser programs at Lawrence Livermore and Los Alamos National Laboratories. He was co-initiator of the laser effects program at Los Alamos in 1983. Phipps' Ph.D. (Stanford University, 1972) was earned for doing the first measurements of 2-D electron velocity distributions in a nonthermal magnetized plasma via Thomson scattering. He is a member of SPIE, OSA, and AIAA.