

Book reviews

S. Eliezer and R. A. Ricci, Eds., *High Pressure Equations of State: Theory and Applications*, Course 113 of the International School of Physics "Enrico Fermi," North Holland, Amsterdam, 1991, 563 pages, \$166.75.

It is an incommensurable merit that this book presents a worldwide synopsis of the advanced results on the research of the equations of state for extremely high pressures and temperatures. This covers the physics of nuclear explosions with pressures of several Gbar and the recent compilation of results from the Supernova 1987. It includes the most exciting developments of the equation of state in nuclear matter, as well as high-temperature and high-pressure laboratory plasmas produced by laser compression of solid pellets where pressures of 6 Gbar have been detected and densities of 1,000 times the solid state of polyethylene (especially highlighting the Yamanaka compression on p. 490) have been produced. The field includes plasma with degenerate electrons and cases close to the borderline of these transitions. Just this field was highly developed by the laser-produced plasma studies, including the most sophisticated nuclear and other detection techniques as well as the classic application of shock waves, where the deviations from the classic cases are most important. The laser-plasma interaction studies were the first to arrive at the detailed research of the large-amplitude dilatation shocks and the breaking processes in solids (metals) as pioneered by one of the course directors, Shalom Eliezer, whose pioneering work on the equation of state in nuclear matter was further developed as seen in the presentation of R. M. Weiner, discussing nuclear, hadronic, and quark matter, in which problems of phase transition and symmetry breaking are one of the main goals of high-energy physics. The overview to all this was given by J. A. Maruhn, where the initial theoretical work for shock waves at collisions of heavy nuclei was pioneered by W. Scheid and W. Greiner with further coauthors was elaborated on and shown in the resulting experiments.

The contribution of G. Senatore and G. Pastore about crystallization for quantum liquids came just at the right time because it was only a few months later that R. G. Clark *et al.* first realized the Wigner crystal experimentally. The presentation by Fortov *et al.*, compiling results from nuclear explosions, was regrettably much less explicit than the lectures with detailed descriptions of the experiments. Fortov's summary indeed showed his sovereign position in this field, similar to the presentations of his counterparts at Livermore (F. J. Rogers), Los Alamos (R. G. McQueen), and Oxford (N. H. March), all united in this unique conference, which was especially enlightened by the other co-Director, Renato Ricchi, President of the European Physical Society among other important positions. For the shock wave mechanisms, M. Ross (Livermore) was most experienced to present the review interlinked with many other contributions. Last but not least, Eliezer, by himself, reviewed the laser-produced plasmas. The complexity of the differing models was illustrated in a short contribution by S. Pfalzner *et al.* J.-P. Hansen (Lyon) *et al.* presented methods of statistical mechanics and freezing of classic fluids, J.-M. Besson (Paris) explained X-ray techniques for the advanced measurements of the equation of state, and the astrophysical problems were presented in a most attractive way by E. Schatzman (Meudon) and W. Hillebrandt (Munich) while general plasma physics and some geophysics topics were included.

This presentation of fascinating new physics forms a rare combination of the most experienced researchers in the field that is unique, contrary to many other Enrico Fermi Schools, where this general coverage of the best representatives cannot always be confirmed due to the biased selection of speakers in these cases. The book is a milestone on the equations of state and is essential to the physics of the high-density plasmas, which the readers of *Laser and Particle Beams* specifically need to know.

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M. Month and S. Turner, Eds., *Frontiers of Particle Beams; Observation, Diagnosis, and Correction, Lecture Notes in Physics*, by W. Beigbock *et al.*, vol. 343, Springer, Heidelberg, 1990, 509 pages + ix, DM102, \$69.00.

These are the proceedings of the US-CERN School of Particle Accelerators, Capri 1988, and concern the classic accelerator physics and technology as used for research in high-energy physics. Because