

An insider's account of the beginning of the space age

Origins of Magnetospheric Physics

James A. Van Allen

144 pp. Smithsonian Institution P., Washington, DC, 1983. \$19.95

Reviewed by Jai S. Kim

The discovery of Earth's radiation belts led to the development of magnetospheric physics. James A. Van Allen and his students at the University of Iowa made this discovery in early 1958

certain aspects of the solar and geophysical knowledge available in 1946, the year Van Allen designates as the start of the space age. Van Allen then gives a personal account of his participation in space research, from 1946, when he worked on high-altitude observations of cosmic-ray intensity with rocket-borne equipment (a program that established the technical and scientific foundations of space exploration), to the early 1960s, when the basic

the passage of time.

The book contains an extensive and well-selected bibliography. However, an index would have been useful.

Particle Physics: The Quest for the Substance of Substance

L. B. Okun

223 pp. Harwood Academic, New York, 1985.

\$44.00 hardcover; \$18.00 paper

Very few gifted theoretical physicists are also great expositors; rare indeed are those with equal mastery of the intuitive underpinnings of a theory and its formal structure; and scarcest of all are those in whom erudition lives in harmony with imagination. The Soviet theorist L. B. Okun is all of these, as this short but lucid monograph demonstrates. He has produced a handy guidebook for those newly arrived in the arcane land of fundamental particles and fields, whether they be students contemplating immigration or tourists from other subdisciplines. This work could well fill the niche that, some 25 years ago, was occupied by Richard Feynman's *Theory of Fundamental Processes*.

Okun has a remarkable knack for finding the vivid image that can illuminate a murky concept, as when he illustrates the difference between strong and electromagnetic interactions by imagining a gluon beam that, were it not for confinement, could shine in its own light.

Like most good theorists, Okun has deep respect for formal beauty. For him, Nature's most telling facts are symmetries, and her deepest laws are variational principles. The two are linked by the Lagrangian. Yet in this narrative, he usually discards formal arguments in favor of intuitive ones. The topics covered range from simple particle zoology to the airy reaches of supersymmetry. Okun introduces each topic via a historical summary, and is careful to interpret history in the light of its contribution to the modern viewpoint. Flavor SU(3) symmetry, for



James A. Van Allen (middle), Wernher von Braun (right) and William H. Pickering hold aloft a full-scale model of Explorer I at a press conference in the Great Hall at the National Academy of Sciences on 1 February 1958, shortly after the spacecraft completed its first orbit. The photograph appears in *Origins of Magnetospheric Physics*, reviewed here.

using equipment they had designed, built and flown on Explorers I and IV. Van Allen, one of the most distinguished pioneers in high-altitude and space research, has now written this brief history of an important epoch of 20th-century science: the opening up of entirely new windows to space and the universe by rockets and spacecraft.

The book begins with a brief sketch of

framework of magnetospheric physics had become firmly established.

The book is written in an informal and readable style. Its autobiographical approach, including excerpts from Van Allen's private journals, adds a sense of immediacy and excitement. His reminiscences about his experiences with many aspects of the early rocket and satellite programs are very interesting. A research proposal he wrote in 1955 (given in Appendix A) shows a marked contrast with today's proposals, and we cannot help feeling

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