techniques. The pace of advance, building on old as well as new technologies, shows little sign of abating. New types of silicon detectors with high-spatial-resolution strip or pixel readout geometries have been brought into use, permitting measurements of heavy-quark lifetimes in the subpicosecond range. Drift chambers, already the foremost particle-tracking technique, have continued to bloom: A dazzling ensemble for the experimental program at CERN's LEP collider is nearing completion. Even the rather murky business of measuring hadronic energy by total-absorption calorimetry has recently advanced significantly due to an improved understanding of energy compensation by neutron–proton recoil. Many other examples could be cited. The advent of the Superconducting Super Collider will continue to stimulate substantial new efforts within the field to meet the formidable experimental challenges ahead.

It is a bit puzzling that fewer than a handful of book-length treatises have tried to chronicle so great an enterprise. Thomas Ferbel has made a valuable contribution to filling this gap with the publication of this reprint volume. The author's goal—"to provide graduate students and practicing experimenters with a compact source on some of the ingenious ideas and techniques developed for modern experiments in particle physics"—is by and large well met. Ferbel, a distinguished experimenter who for several years has organized a school for young physicists in St. Croix on techniques and concepts of high-energy physics, has assembled 12 articles spanning much of the current activity. Inevitably, there are omissions, redundancies and unevenness. Although some articles are beginning to show signs of age (three are more than ten years old), the choices all have good pedagogical value. The general categories of particle tracking, calorimetry and particle identification are well represented.

The book begins with a general introduction to particle detectors by Konrad Kleinknecht. A set of classic lectures by Fabio Sauli on principles of multiwire proportional and drift chambers is next, providing a thorough exploration of electron and ion behavior in these basic devices; this is surely essential reading for all graduate students in experimental particle physics. A more recent treatment of high-resolution particle detectors by Georges Charpak and Sauli, covering both gas-filled and solid-state detectors, follows. Four chapters are devoted to aspects of calorimetry. A landmark paper by William J. Willis and Velko Radeka on liquid-argon ionization chambers and a general introduction by Chris Fabjan, taken from his St. Croix lectures, are complemented by more specialized papers by Ugo Amaldi on shower development and fluctuations and by T. Doke on the fundamental properties of liquid argon, krypton and xenon as radiation-detector media.

Charged-particle identification by dE/dx, Čerenkov radiation and transition radiation is treated in a compact chapter by Wade W. M. Allison and P. R. S. Wright, which packs in both formalism and practical experience. A detailed presentation by Jacques Seguinot and Tom Ypsilantis, among others, of the development of a two-dimensional single-photoelectron drift detector provides a good look at the heroic efforts to use photoionization in a uv-sensitive gas to measure the angle of Čerenkov radiation. The next article, by David Anderson, expands on this topic, covering various applications of photosensitive gases and liquids as means to detect Čerenkov and scintillation light. A very instructive paper by Radeka on signal–noise resolution and its implications for electronic design forms the penultimate chapter. The last article, by Fred James, is on the theory and practice of Monte Carlo methods and is an excellent and down-to-Earth introduction to the art and pitfalls of simulation. It seems a bit out of place here, and might well have served to seed a companion volume on analysis techniques in high-energy physics.

This book shares with other reprint volumes a tendency to cover an active field in retrospect. Nevertheless, for graduate students entering the field and for practicing physicists desiring a good broad-brush source book, this compendium is a worthwhile investment. It could also serve well as basic material for a course or seminar on the subject. While not every particle physicist might need a copy, this book deserves space on the library shelves of all experimental high-energy physics groups.

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The New Alliance: America's R&D Consortia

Dan Dimancescu and James Botkin
Ballinger, Cambridge, Mass., 1986. 209 pp. $29.95 hc
ISBN 0-88730-046-4

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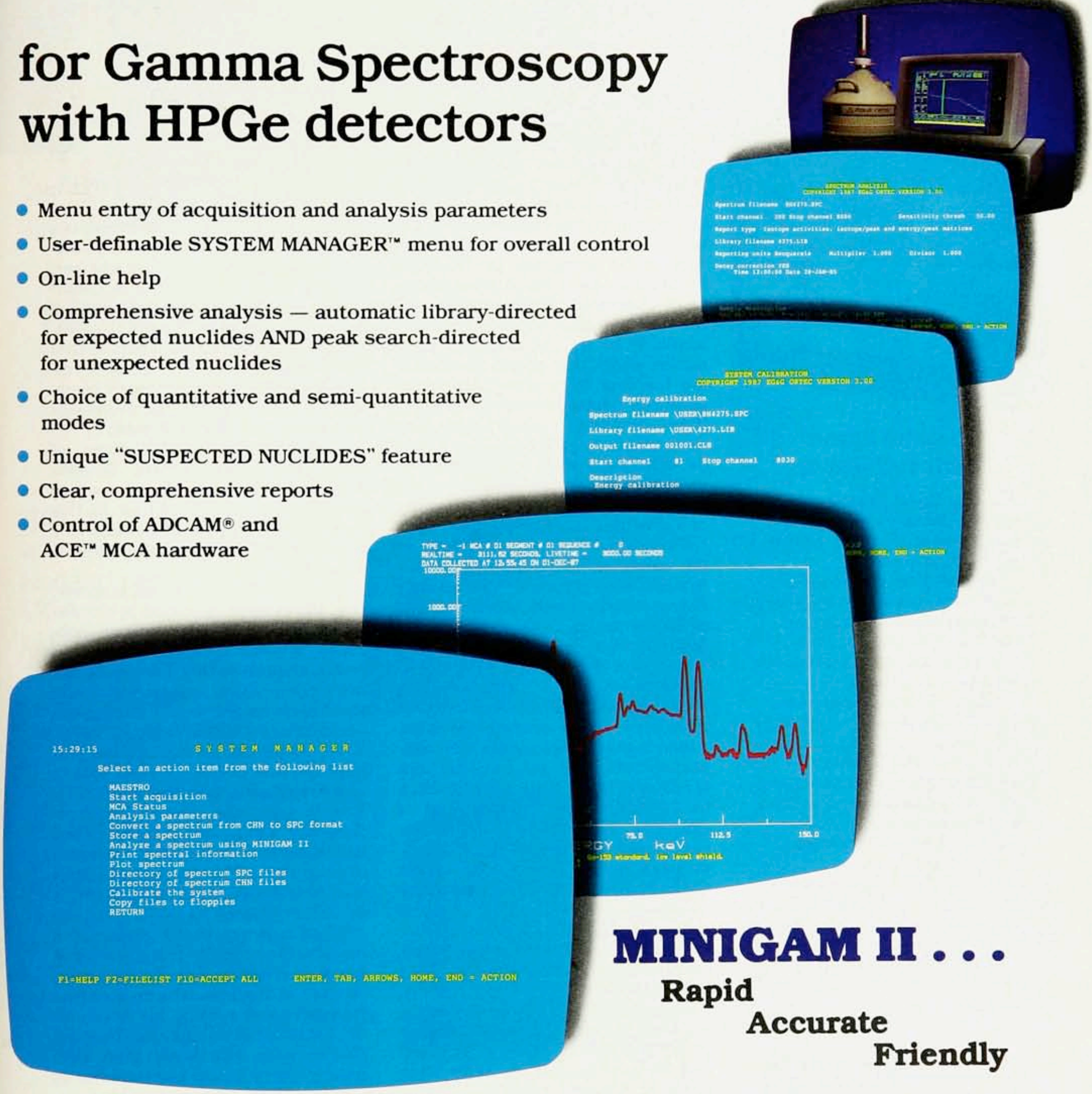

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the organizational phenomenon of universities, industrial firms and the US government collaborating to meet international competition in products and research, both basic and applied. Their highly readable book, *The New Alliance: America's R&D Consortia*, concisely describes selected consortia and poses questions that should be considered.

Increased global competition and the relaxation of US antitrust laws concerning collaboration in research by American firms have sparked the creation of more than 50 research and development consortia in areas ranging from power pumps to semiconductors. Almost half of these consortia do research related to electronics. In the typical consortium, industrial competitors pool financial and intellectual resources to focus on costly, long-term basic research in fields of potential commercial importance. The research results are made available to the participating companies, which then decide whether to use the data to produce proprietary products. These new consortia differ from previous ones in that they concentrate on such issues as product development and manufacturing processes and, in most cases, are not officially affiliated with a university or a governmental agency.

The organizational structures of the consortia vary. The Microelectronics and Computer Technology Corporation in Austin, Texas, consists of 22 companies, each of which paid $150 000 to $1 million to join. MCC has its own building and 405 employees, of whom 295 are scientific staff; in 1986 it had $65 million in funding for research on advanced computer chips. Padco, a pump consortium with four participants, does not have its own facilities or staff. It spends $3 million to $4 million on research that is spread among its member companies. Other consortia, such as the Semiconductor Research Corporation, collect funds from their members to finance university research. The authors clearly point out that these entities are themselves experiments of a sort, so forecasting how successful they will be is difficult.

I wonder if such a fast-changing phenomenon would not be more appropriately reviewed in a technical and business journal, so as to bring news of changes more quickly to concerned leaders. The organizations resulting from these efforts may find themselves in competition with the founding institutions as they struggle for an existence different from an industrial, university or government research laboratory.

The authors have nonetheless performed a significant service in framing questions with which to examine the data regarding the impact of foreign researchers and manufacturers on what used to be a US-dominated domestic market.

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Reminiscences About I. E. Tamm

Edited by E. L. Feinberg
Nauka, Moscow (US dist. Imported, Chicago), 1987. 324 pp. 1.90 rubles ($10.95) pb
ISBN 0-8285-3557-4

Reminiscences About I. E. Tamm is a collection of approximately three dozen short articles by writers who personally knew Igor E. Tamm (1895–1971), one of the best theoretical physicists in the Soviet Union. Tamm was—with his student Andrei Sakharov—one of the major developers of the Soviet hydrogen bomb, and he lived to see Sakharov emerge as a prominent Soviet dissident.

Tamm created the department of theoretical physics at the Lebedev Physics Institute in Moscow, where Sakharov is a senior fellow to this day. But we will not find Sakharov's name among the contributors to this volume.

One should bear in mind, however, that the current collection is a translation from a Russian edition published in 1981. Publication of these reminiscences during Leonid Brezhnev's conservative regime was a substantial accomplishment. Among the contributors we find Tamm's "heir," Vitaly Ginzburg (in my opinion perhaps the best Soviet physicist today), Ilya Frank, solid-state theorist Rudolf Peierls, geneticist Nikolai Timofeev-Resovsky, Daniil Danin (a renowned Soviet science writer), Boris Kuznetsov and Victor Frenkel (Soviet historians of science), a musicologist and a mountain climber.

What emerges is the sketch of a remarkable portrait. It is the story of a baptized German Jew (Tamm means "naive" in Hebrew) who as a radical youngster was sent by his family in 1913 to study in Edinburgh. They did this to keep him away from both revolutionary Russia and tumultuous London. With the outbreak of the First World War, Tamm transferred after a year in Edinburgh to the School of Physics and Mathematics at Moscow University; he graduated in 1918. During the years of war and revolution Tamm was at times an active participant, volunteering for service