particle motion. DeShalit and Feshbach's first volume successfully fills a need for coverage with insight and understanding, from the basic concepts to the more erudite applications, of most of the most important aspects of nuclear-structure theoretical physics. May the second volume, which is to be about nuclear forces and reactions, be as successful.

DeShalit did not live to see the volume completed. His death represents a deep loss to the many friends who found pleasure and inspiration in his bouyant spirit. Some of his keen insight survives in the book. That Feshbach has been able to carry on without him on so extensive and demanding an enterprise is a triumph of devotion.

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Astrophysics of Bizarre Objects

Physics of Dense Matter. Proceedings of a symposium, Boulder, Colo., Aug. 1972. CARL J. HANSEN and LORRAINE H. VOLSKY, Eds. Reidel, Boston, 1974. x, 328 pp., illus. $36.50. International Astronomical Union Symposium No. 53.

Most conference proceedings in physics reflect a "clash between two cultures"—usually between experimentalists and theorists. In this case all the contributors are theorists; the contest is between physicists providing basic information and astrophysicists applying it to bizarre objects. And even this contest is one-sided: the topics treated are such new additions to astronomy that even the astrophysical applications are mainly in the hands of theoretical physicists.

The "bizarre objects" under consideration are neutron stars, white dwarf stars, and the early universe, with neutron stars taking up most of the book. Another recent International Astronomical Union (IAU) symposium had dealt exclusively with white dwarfs, but the three papers on white dwarfs in the present book (Van Horn, Lamb and Sutherland, O'Connell) complement rather than compete with those presented there: Only aspects relevant to neutron stars are treated—in particular, the polarized radiation emitted from white dwarf atmospheres with very strong magnetic fields (though not as strong as in pulsars) and massive white dwarfs with strong differential rotation (encroaching on the unstable region between white dwarfs and neutron stars). Two short and intriguing papers on the birth of the universe (and repeated afterbirths) by Omnès and Ne'eman (and the obvious enthusiasm for the subject Cameron shows in his concluding remarks) only whet the reader's appetite for speculation on the early universe. Nevertheless, the preoccupation with neutron stars gives the book a unity of purpose (though not of style) that is rare in conference collections.

The neutron star story itself starts with a detailed and clear exposition of "orthodoxy": the nuclear composition and equation of state for cold matter at densities up to a few times nuclear density (Bethe, Negele). One even gets some feeling of how such calculations are carried out nowadays (Pandharipande). Minor controversies (Buchler) concerning these densities only reinforce the feeling that the most basic properties of medium-mass neutron stars are reasonably uncontroversial. Neutron star cooling (Tsuruta) and other questions involving superfluidity (Greenstein) are in a worse state, but there is still something resembling consensus—even the complex effects of super-strong magnetic fields are explained simply and reassuringly (Ruderman). When the discussion gets around to ultra-super-high densities, however, it appears that consensus on even qualitative answers is out of reach, no matter whether one asks about the presence or absence of pion condensations (Sawyer), about the crystalline or fluid structure (Canuto and Chitre, Kalman and Lai), or simply about the equation of state (Wheeler, Leung and Wang, Cohen and Börner and others).

The connection between observations and the deep interior of neutron stars is given only cursory treatment in the book. This is due in part to the absence of observational astronomers at the symposium, but largely to the fact that these subjects are still in a state of flux. Colgate sets the tone with a short and honest admission of how little we know about supernova implosions. Pines, Ruderman, and Shaham tell a beautiful story of the information the "glitches" in pulsar timing data provide concerning neutron star interiors, but it will take some time before this story is fully confirmed.

Considering that about two years have elapsed since this symposium on a fast-moving subject, it is surprising and gratifying that the proceedings volume is not out of date; some topics that are not included (such as neutron stars in binary x-ray sources) have become fashionable since the symposium, but very few of the chapters in the book have been made obsolete by more recent papers. Nevertheless, it is a pity that IAU symposium proceedings take such a long time to come out and are so expensive when they do. Paperback proceedings, produced sloppily but quickly and cheaply, are a much better idea. The beautiful printing on glossy paper without misprints is not worth doubling the price and the delay when the science itself changes so quickly.

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A Memoir in Physics

The World of Walther Nernst. The Rise and Fall of German Science 1864–1941. K. MENDELSSOHN. University of Pittsburgh Press, Pittsburgh, 1973. viii, 192 pp. + plates. $11.95.

Despite its title this is a very personal book. It had its origins in Kurt Mendelssohn's visit to his native city of Berlin in 1964 to help celebrate the centenary of Walther Nernst's birth. Mendelssohn, a distinguished low-temperature physicist at Oxford, had worked in Nernst's laboratory some 35 years earlier, when Berlin was one of the great centers of physics, made so by the presence of Einstein, Planck, von Laue, Schroedinger, and Nernst himself. This exciting scientific community, built up during the Wilhelmian era before World War I and continuing to flourish during the brief period of the Weimar republic, had been quickly destroyed and its members dispersed when Hitler took power in 1933. Mendelssohn's book is the result of his reflections on the rise and fall of German science. Since Nernst held a central position in German scientific life over a period extending from Bismarck to Hitler, from Helmholtz to Heisenberg, it was a happy idea of Mendelssohn's to make Nernst's career the guiding thread of his story.

Nernst was a remarkable scientist. Einstein, his colleague for 20 years, was impressed by Nernst's "creative productivity," his "rare mastery" of experimental methods and "sovereign knowledge" of experimental facts, but what really drew Einstein's admiration

was Nernst's "infallible sense for the essential and genuine passion for knowledge of the deep interrelations of nature." All these qualities are evident in Nernst's greatest scientific achievement —the formulation, theoretical clarification, and experimental justification of the third law of thermodynamics, a law that Nernst himself usually and legitimately referred to as "my heat theorem." Nernst arrived at this theorem as a result of his efforts to determine thermodynamically the equilibrium state of chemical reactions in gases at high temperatures. The theorem then led him into the rich and unexplored field of low-temperature physics, a field whose fundamental importance was actually established by Nernst's theorem. These studies in turn made it possible for Nernst to become the first successful advocate for the quantum theory and the architect of the Solvay Conference of 1911.

Mendelssohn shows how the success story of Nernst's career was closely coupled to the rapidly growing wealth and power of the new Prussian-dominated imperial Germany. He describes the important role played by Friedrich Althoff, Permanent Secretary of the Prussian Ministry of Education, in strengthening the scientific faculties of the Prussian universities. It was Althoff who saw to the creation of a chair of physical chemistry and a new electrochemical laboratory for Nernst at the University of Goettingen to keep him in Prussia. During his Goettingen years Nernst established close contacts with industry, as did many of his scientific colleagues. He showed his multifaceted genius here, too, by inventing a lamp that used the light emitted by a solid electrolyte carrying a current, and by selling the patent for it outright to the Allgemeine Elektrizitaets Gesellschaft for a million marks. When Nernst was called to a chair in Berlin in 1905 he moved his family in the style he considered appropriate to a rich 20th-century professor—by automobile. (Nernst had been driving since 1898; his first assignment when he volunteered for duty after war broke out in 1914 was to drive with military documents from the General Staff to the German armies deep within France.)

Nernst felt at home in Berlin. His circle there was by no means limited to academic colleagues, but embraced prominent figures from the artistic, financial, industrial, military, and governmental elite of the imperial capital, including Kaiser Wilhelm the Second, whom Nernst often advised on a variety of matters. After the personal and national tragedies of the war Nernst became a firm supporter of the new republic, serving it well in several capacities. When Hitler came to power Nernst soon found that life in Berlin was impossible for a man with anti-Nazi views, Jewish friends, and two Jewish sons-in-law. He retired to his country estate, where he died early in 1941.

I must point out that Mendelssohn's work is not the sound, scholarly history one should expect in a book written by an internationally respected scientist and published by a university press. The writing is completely undocumented; there are no references, no bibliography, no notes whatsoever. What Mendelssohn says about the history of science is inaccurate and sometimes seriously misleading. The Nernst he presents is the Nernst he knew and admired, the Nernst known by other people. But there is no letter, no quotation from Nernst himself, that would take us behind the persona which, as Mendelssohn himself remarks, Nernst used to conceal himself from the world. Mendelssohn's book is lively and interesting reading, but it must be taken for what it is—a personal memoir presented in the form of a biography and social history.

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