

AGU MOVES INTO NEW BUILDING IN WASHINGTON

After moving to temporary quarters for a little less than two years, the American Geophysical Union returned in June to a new building at its old 2000 Florida Avenue address in Washington, DC. The project cost \$9.6 million.

The new AGU headquarters is not a typical cubic office building. One corner has been described as resembling a ship's prow, and the solar system is represented in the sidewalk. A. F. Spilhaus Jr, AGU's executive director, is pleased to see the structure being noticed: "It's exciting to see people gawking at the prow and sitting on the wall by the inner planets plaza." Spilhaus says that one of AGU's objectives is "to become a center for the Earth and space sciences in Washington," and he thinks that this building, already recognized in *The Washington Post's* "Cityscape" column as having "a certain atypical kick, excitement, drama," will help achieve that goal.

The building has five levels above ground and one partially below, with windows. There's an underground parking garage too. AGU occupies about 60% of the 60 000 square feet of usable space. A 5300-square-foot conference center is on the first floor. Part of the first floor, with its 14-foot ceilings, is planned for educational displays. The second floor will be completely leased. AGU's first tenant, the American Astronomical Society, rents about 3500 square feet.

GEOPHYSICAL SOCIETIES AGREE TO COOPERATE

The American Geophysical Union and 31 other geophysics societies from around the world have begun a collaboration aimed at making geophysics more of a global endeavor.

In May representatives from 27 national geophysical societies and 5 international organizations convened at the new AGU headquarters in Washington, DC, to discuss how best to address problems faced by geophysical scientists worldwide. (The news story above describes the new AGU building.)

According to Robin Brett, AGU's international secretary, by the end of the weekend-long meeting, the society representatives had drafted and

passed three resolutions. The first urged educational institutions at all levels to "strengthen the quality of studies in the geophysical sciences, so as to ensure that an adequate supply of the best science students go into the geophysical disciplines."

Prompted by concern that increased emphasis on applied science and technology has lessened the funding of basic science, the second resolution recommended that governments "maintain the vigor of the basic sciences."

The third resolution asked that governments provide visas promptly for those scientists attending conferences or participating in exchange programs.

To make communicating easier, the societies agreed to establish an electronic-mail list server; those societies that do not have access to e-mail will receive information via regular mail. The societies also plan to produce a joint directory of their members. Other projects that were discussed included setting up a clearinghouse for sending equipment and publications to developing countries and establishing an olympiad in Earth and space sciences along the lines of the international competitions for secondary school students now held in physics and mathematics.

The societies plan to meet next at the International Union of Geodesy and Geophysics General Assembly, to be held in Boulder, Colorado, in July 1995.

NEW AAPT SCHOLARSHIP FOR FUTURE TEACHERS

A retired college professor has established a scholarship for students who plan to become high school physics teachers. Barbara Lotze, who taught physics at Allegheny College, in Meadville, Pennsylvania, for 27 years, gave \$10 000 to the American Association of Physics Teachers, which will administer the scholarship.

A native of Hungary, Lotze fled her country in 1956 and was living in a refugee camp when she won a Rockefeller scholarship to attend the Leopold-Franzens-Universität, in Innsbruck, Austria. There she earned a PhD in mathematics with a minor in theoretical physics. "And I also met my future husband," Lotze told PHYSICS TODAY.

The Lotzes moved to the US in 1961. When Barbara's husband, Dieter, became ill with leukemia in the early 1980s, "we received the most

support and strength from our students." Before he died in 1987, they agreed to "do something for students."

The \$2000 scholarship is to be awarded each year to either a college student or a high school senior who is preparing for a career in high school physics teaching; the scholarship may be given to the same individual for each of four years, according to Howard G. Voss of Arizona State University, who is heading the scholarship committee. The first scholarship recipient is Jennifer Ann Blaszak, an undergraduate at De Paul University, in Chicago.

IN BRIEF

Physics Education News, a twice-monthly electronic publication of the American Institute of Physics, summarizes information on government reports, national initiatives, outreach programs, grants, professional development opportunities and publications related to physics and science education. *PEN* is aimed at physics educators at all levels and is offered as a service to the science and education communities without charge. To subscribe, send to listserv@aip.org, leaving the subject line blank. Enter "add pen" in the body of the message.

The Society of Physics Students has elected six new councillors to three-year terms on the SPS Council. Eighteen students will serve one-year terms as associate councillors. Jean P. Krisch, an associate professor of physics at the University of Michigan at Ann Arbor, was elected in June to a two-year term as president of Sigma Pi Sigma, the national physics honor society. As president, Krisch also becomes a member of the executive committee of the SPS Council. She succeeds Reuben James of the State University of New York College at Oneonta.

Optcon, an annual conference dedicated to applied optics, has been canceled by its sponsors, the Optical Society of America, the Laser Institute of America, the Lasers and Electro-Optics Society of IEEE, and the International Society of Optical Engineering (SPIE). The 1994 meeting, which had been scheduled for November in Boston, will not take place. David Hennage and Jim Pearson, the executive directors of OSA and SPIE, respectively, attributed the cancellation to the meeting's lack of technical focus and market value, as well as "particularly difficult management issues." ■

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INTIMATE REFLECTIONS ON A CAREER AND A LIFE

Selected Works of Yakov Borisovich Zel'dovich Vol. II: Particles, Nuclei and the Universe

Edited by J. P. Ostriker,
G. I. Barenblatt
and R. A. Sunyaev
Princeton U. P., Princeton,
N. J., 1993. 644 pp.
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Reviewed by Kip S. Thorne

The sweep of Zel'dovich's career was breathtaking. From the early 1960s until his death in 1987, my colleagues and I knew him as arguably the world's most influential astrophysicist and cosmologist—and also as a creative genius in general relativity and in quantum field theory in curved spacetime. Others revered his contributions to chemical physics, fluid mechanics, the theory of detonations, elementary particle physics, nuclear physics and the design of nuclear weapons. When I introduced him to Stephen Hawking in 1973, Hawking said, "Now I know that you are a real person and not a group of scientists like Bourbaki." Zel'dovich's friend and competitor Andrei Sakharov characterized his breadth of genius as "probably unique." (He shared with Sakharov the invention, in the USSR, of the "Teller-Ulam" idea that underlies the hydrogen bomb, as well as the distinction of being the most medal-bedecked scientist in Soviet history.)

This second volume of Zel'dovich's *Selected Works* gives some sense of his achievements, breadth and power. In 1939 and 1940—right after the discovery of nuclear fission—we find him, with Yuli B. Khariton, developing the theory of nuclear chain reac-

tions and laying theoretical foundations for nuclear reactors (papers 1, 2 and 3). In 1952 and 1953 we see him, in the midst of secret hydrogen-bomb design work, still finding time to propose the laws of conservation of baryon number and lepton number, although he did not use those names (papers 9 and 10). In 1971 we find him arguing that a spinning black hole must spontaneously emit radiation (paper 34), thereby triggering Hawking's subsequent discovery that all black holes must radiate. In the early 1970s we see him, via a clever analysis of nonlinear effects during galaxy formation, correctly predicting that there must be "pancakes," cellular structures and voids in the universe's large-scale distribution of galaxies (papers 55 and 56).

Zel'dovich himself chose in 1983 which of his original research papers should appear in his *Selected Works*, and he appended to each paper a several-paragraph commentary spelling out his own retrospective view of its significance. By writing his commentaries in the passive voice or in the third person (referring to himself simply as "Ya. B.") he saves the reader from wincing at words of self-praise and frank admissions of error. It is these commentaries, as much as the original papers themselves, that make Zel'dovich's *Selected Works* valuable for research scientists and historians alike—and also for graduate students.

The most tragic event in Zel'dovich's career may have been his explosive break with most of the younger members of his astrophysics research group in 1978. (In my view, never before or since has there been any single astrophysics group with so much power as the one thereby destroyed.) Perhaps because of the bitter aftertaste of that explosion, Zel'dovich omitted from the Russian-language edition of his *Selected Works* major papers that he had coauthored with Igor D. Novikov. Happily, the editors of this English-language edition chose—after Zel'dovich's death—

to insert the key Zel'dovich-Novikov papers; for example, the 1966 paper (30b) in which the two proposed the ultimately successful method of searching for black holes (using x rays from the massive dark companion of a normal star) and the 1965 paper (29b) in which, they and Andrei G. Doroshkevich triggered the speculation that "a black hole has no hair" (later proved true). It is sad that these added papers carry no commentary. Perhaps Zel'dovich would have preferred it that way.

In an autobiographical afterword at the end of this volume, Zel'dovich assesses somewhat harshly his own original contributions to astrophysics: "In significant measure my work . . . in astrophysics turned out to be promotional, popularizing and pedagogical. All of this is necessary and useful; however, it is to be judged on a different scale than obtaining original results." Elaborating on this theme in 1985 in his Moscow flat over a bottle of cognac, Zel'dovich produced for me a list of great astrophysical discoveries that he missed by being "too-narrow minded" (for example, that *all* black holes should radiate), a list more impressive than his remarkable actual discoveries. As sad as this self-assessment may have been, it can be seen as an essential corollary of one of the keys to Zel'dovich's achievements: His life was an intense, competitive battle for new ideas—a battle not so much against his colleagues (he took great joy in their discoveries as well as his own) but rather against his own ideal of what he himself *ought* to be achieving.

Science and Anti-Science

Gerald Holton
Harvard U. P., Cambridge,
Mass., 1993. 215 pp. \$24.95 hc
ISBN 0-674-79298-X

The title of this book might suggest that it is exclusively devoted to the battle between science and the forces of darkness, but the author deserves

Zel'dovich is a major figure in Kip Thorne's recent book *Black Holes and Time Warps* (Norton, 1994). From 1968 onward Thorne was a frequent visitor to Zel'dovich's Moscow research group.