

had received from the Soviets. He said the coincidence of the two incorrect values was impossible unless the Soviets had somehow earlier gotten the primer themselves—an early case of nuclear information proliferation!

In exile, Fang continued his human-rights struggle through his writings and his leadership. For example, he chaired the APS Committee on International Freedom of Scientists in 1994. His efforts earned him numerous awards, including the 1996 APS Nicholson Medal for Humanitarian Service.

Since 1961 Fang published at least 360 physics papers, mostly on the frontiers of astrophysics and cosmology, and another 40 on the history or philosophy of science. He wrote many influential essays and authored or edited more than two dozen books. One of his most widely read introductory texts, written with Li, was *Creation of the Universe* (World Scientific, 1993).

We will miss his powerful presence among us.

Remo Ruffini

*Sapienza University of Rome
Rome, Italy*

Ke Chiang Hsieh

*University of Arizona
Tucson*

Edward Gerjuoy

*University of Pittsburgh
Pittsburgh, Pennsylvania*

Harold Zirin

Solar physicist Harold Zirin, emeritus professor of astrophysics at Caltech and founder and former director of Big Bear Solar Observatory (BBSO), died of chronic obstructive pulmonary disease in Pasadena, California, on 3 January 2012.

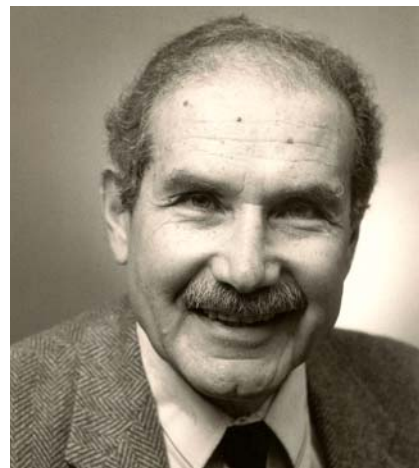
Hal was born in Boston on 7 October 1929 to immigrant parents from Russia and Galicia. Although not from a well-to-do family, he was able to attend Harvard University by winning merit-based scholarships. He earned his BS in applied physics in 1950 and a PhD in astronomy in 1953. Under Philip Morse at MIT, Hal completed his thesis, entitled “Radiative opacity of stellar matter,” in 1952. Upon graduation, he worked briefly at the Rand Corp, but his father’s past association with the Communist Party made it impossible for Hal to obtain security clearances. He returned to Harvard as a postdoc under Donald Menzel in 1953 and 1954 and developed his lifelong passion for solar physics.

Although trained in the theory of atomic transitions in solar and stellar atmospheres, Hal developed a broad and early interest in observations of solar

flares and prominences. He initially pursued that interest from 1954 to 1964 at the High Altitude and Climax Observatories in Colorado. He joined the faculty at Caltech in 1964 as a tenured professor. Together with Caltech’s Robert Leighton and the Mount Wilson Observatory’s Robert Howard, he immediately began to search for a site for a new solar optical observatory. As he made careful site surveys, Hal was the first to recognize the value of observing the Sun over a body of water in order to stabilize the daytime atmosphere to improve the seeing conditions. That technique has since been widely adopted by solar observatories around the world. The search for a Southern California site culminated in 1970 with the establishment of BBSO on Big Bear Lake in the San Bernardino Mountains east of Los Angeles. The observatory continues to be one of the best sites for solar astronomy.

Hal was a dominant figure in solar physics in the 1970s and 1980s. He pioneered not only observational studies of solar flares and prominences using multiwavelength, high-resolution filter-gram movies but also the development and use of sensitive, filter-based videomagnetographs to dynamically measure the patterns and evolution of the Sun’s weak network and intranetwork magnetic fields. His insistence on high-cadence observations of the Sun all day, every day (except, perhaps, Christmas) resulted in Big Bear data being as widely used for context during the *Skylab* and *Solar Maximum Mission* eras as data from the *Solar Dynamics Observatory* are used today. Hal’s tenure as BBSO director bridged the transition from film-based to electronics-based acquisition of solar optical data.

Despite the success of Big Bear, Hal’s drive was directed at learning about the Sun, rather than observing it in any particular wavelength regime. That broad perspective and his nose for productive future directions in solar physics led him to found the program of solar microwave interferometry at Caltech’s Owens Valley Radio Observatory (OVRO); to propose, with Gordon Garmire in the 1970s, the imaging of solar hard x rays with rotating modulation collimators; and to advocate for measuring the total solar irradiance for long-term climate change and other effects at Earth. He also used his knowledge of spectral-line generation in solar flares to study H-alpha, H-beta, and He-10830 emission in hundreds of other stars observed with the Palomar Observatory’s 200-inch Hale telescope. Since his retirement as director in 1997, BBSO and the solar radio program at OVRO



CALTECH

Harold Zirin

have continued under the auspices of the New Jersey Institute of Technology.

Hal wrote two classic textbooks on solar physics: *The Solar Atmosphere* (Blaisdell) in 1966 and a highly expanded and updated version titled *Astrophysics of the Sun* (Cambridge University Press) in 1988. In 1979 he helped initiate the now long-running Summer Undergraduate Research Fellowship program at Caltech, which has provided hundreds of undergraduate students with their first opportunity to do independent research under faculty mentors. He also established the Zirin Studentship awards, which support graduate students in attending the annual meetings of the American Astronomical Society’s solar physics division.

During the 1970s and 1980s, a notable fraction of the solar community was mentored at BBSO as students or postdocs. Hal was a prolific source of ideas and potential projects and was a significant source of inspiration—and frustration—to those who worked around him. The postdocs who worked for him benefited from the exceptional freedom and encouragement he provided that allowed them to develop and follow their own scientific compasses. During his long career, Hal strongly influenced two generations of solar astrophysicists and had a profound influence on the field of solar physics.

Dale E. Gary

*New Jersey Institute of Technology
Newark*

Gordon J. Hurford

University of California, Berkeley ■

Recently posted notices at

<http://www.physicstoday.org/obituaries>:

Akira Tonomura

25 April 1942 – 2 May 2012

Nasser Maleki

25 January 1953 – 6 January 2012