

for the field of surface science.

John had a good life, not only because he had much success as a scientist and enjoyed life, but also because he was a good man. Many scientists do not suffer fools gladly, but John did. He was unfailingly polite and generously took the time to sit down with others and help them with their work. His kindness, enthusiasm and intellectual honesty were an example to all of us. He is missed, and will continue to be.

DOUGLAS HENDERSON

*Brigham Young University
Provo, Utah*

MICHAEL KLEIN

*University of Pennsylvania
Philadelphia, Pennsylvania*

Richard Nelson Thomas

Richard Nelson Thomas, who had a pervasive, beneficent and enduring influence on stellar-atmosphere theory, died in Boulder, Colorado, on 8 April 1996 at the age of 75.

Dick Thomas, born in Omaha, Nebraska, received his bachelor's degree in astronomy from Harvard University in 1942. During World War II, he served as a ballisticsian at the US Army's Aberdeen Proving Ground. He returned to Harvard after the war for his doctoral degree in astronomy, which he received in 1948. He then became an associate professor of astronomy at the University of Utah, leaving there in 1953 to join the Harvard faculty as a visiting lecturer.

Thomas moved to Boulder in 1957 and for five years served as a consultant in astrophysics to the laboratory director of the National Bureau of Standards. He had long advocated far more comprehensive and accurate measurements of collisional and radiative atomic cross sections, which were needed to understand stellar spectra. In that cause, he joined forces with Lewis Branscomb, then head of the atomic physics division at NBS in Gaithersburg, Maryland, and together they helped found, in 1962, the Joint Institute for Laboratory Astrophysics in Boulder. Among the many legacies Thomas left to JILA was his fierce defense of the visiting fellowship program when it was threatened with termination in the early years.

Thomas resigned from JILA in 1973 and moved to Paris to join his long-time colleague, Jean-Claude Pecker, at both the Collège de France and the University of Paris. There he turned his attention to emission-line B stars, whose extended atmospheres offered a challenge to new theoretical work.

Through the mid-1980s, Thomas—with Pecker and Stuart Jordan—organized a monumental series of monographs by experts on all aspects of nonthermal phenomena in stellar atmospheres. From 1977 to 1986, Thomas worked at the National Center for Scientific Research, also in Paris. In 1986, he returned to Boulder, where he consulted for Radiophysics, Inc.

Thomas in his later years became convinced that mass flows from stars originate deep in their envelopes, not in their extended atmospheres. He pursued this controversial hypothesis single-mindedly until felled by a stroke several years ago.

Recognizing the general inadequacy of available data on the Sun's chromosphere, Thomas persuaded Walter Roberts and John Evans to field an expedition to observe the 1953 Khar-toum total eclipse. The analysis of the resulting spectra occupied Thomas, Grant Athay and a host of other students for a decade afterward.

Thomas is best known for his central role in creating a novel theory of spectral line formation in opaque stellar atmospheres. He realized very early that local thermodynamic equilibrium (LTE) cannot strictly apply in the outer regions of a star where many of the strong lines originate. He established quite conclusively that most ionization and excitation processes in such regions are governed, in a steady state, by the local collisional processes and the nonlocal radiation field. He was a key member of the small group that developed the formalism required to calculate line spectra and that applied it to studies of the strong Fraunhofer lines. From its simple beginnings with hand calculators, the new theory blossomed in the era of fast computers to become the orthodoxy that is known today by the name of Non-LTE.

Thomas had no patience for sloppy thinking. His career was marked by extraordinarily high standards for research, a passion for understanding and an unrelenting commitment to his science. Although he offended many by his self-assured criticism, he nevertheless attracted many of the best minds in the field to his point of view. He was tireless as a researcher, with few other interests beyond spectator football and large dogs. As a person, he was easily approached and unsparing of his time. He will be missed by his many colleagues for more than his gadfly ability to stimulate thought.

JOHN T. JEFFERIES

JACK B. ZIRKER

*National Solar Observatory
Tucson, Arizona*

Lyman G. Parratt

Lyman G. Parratt, a noted researcher in x-ray physics, a group leader in the Manhattan Project and longtime member of Cornell University's physics department, died on 29 June 1995 in Redmond, Oregon.

Parratt was born on 17 May 1908 in Salt Lake City. He earned an AB in physics from the University of Utah in 1929 and three years later was awarded a PhD by the University of Chicago for his work in x rays. In 1933, after a postdoctoral year at Chicago, he went to Cornell University, thus beginning a 60-year association with Cornell's physics department, from which he officially retired in 1973.

In 1941 the US Navy requested that Parratt take leave from Cornell to work at the Naval Ordnance Laboratory in Washington, DC, on submarine detection and the demagnetization of surface ships. Two years later, he was called to Los Alamos and spent the rest of the war years as a group leader in the Manhattan Project. He returned to Cornell in 1946 and took part with four others in the physics department's reorganization, which soon put Cornell at the forefront of the nation's physics departments. The reorganization established the Laboratory of Nuclear Studies as a major component of the department. A decade later, in 1959, Parratt was chosen as the department head at the time of a second reorganization. This one resulted in the establishment of the Laboratory of Atomic and Solid State Physics. He served as head for two five-year terms.

Parratt's abiding interests related to x rays. Early on, he was particularly interested in "satellite" lines accompanying K alpha radiation and multiply ionized inner shells. By making his high resolution wavelength and intensity x-ray measurements on many of the elements, he provided support for the Wentzel-Dryvesteyn theory. This high-resolution work led him to consider the effects of solid-state binding on x-ray spectra, both in emission and absorption, which involved relaxation of outer electrons around an inner electron vacancy. He also studied thin films and solid surfaces by means of total x-ray reflection. At the time, his instrumentation and measurements were without peer.

Parratt's work elucidated the states of multiply excited atoms and greatly extended our understanding of atomic structure. With his student Charles Hempstead, he also studied anomalous dispersion in x-ray scattering and absorption. Their determination of anomalous scattering coefficients, in use to this day, made a significant