

In 1955 Bob brought Murray Gell-Mann to Caltech to cement the university's outstanding position in elementary particle theory. At about the same time, together with Dubridge and Jesse Greenstein, he initiated a radio astronomy program establishing the Owens Valley Radio Observatory, and thus added to Caltech's leading position in observational astronomy.

Bob continued as an adviser to the AEC and as a member of President Dwight D. Eisenhower's Science Advisory Committee. In 1959 he was a member of the US delegation on nuclear test ban negotiations. He stepped down as Caltech's division chairman in 1962 to become the university's first provost, a position he held until 1970. He remained on the faculty until his retirement in 1976. He and his wife, Jean, moved in the late 1980s to a retirement community.

Bob served the US and international communities well. He was president of the American Physical Society (1964–65), chair of the International Union of Pure and Applied Physics (1969–72), and chair of the Universities Research Association (1970–73).

A strong administrator with firm views and clear principles, Bob defended academic freedom when Linus Pauling was severely criticized by some university trustees. He insisted that Caltech retain ties to Pauling after Pauling resigned. He oversaw the university's conversion to coed status. And he had a clear idea of how he expected the university to operate. He always consulted widely with senior colleagues before acting on academic matters, but then was decisive.

Bob had many friends at Caltech and nationally who greatly miss his wise counsel.

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Clayton Hamilton Allen

Clayton Hamilton Allen, an acoustician who clearly enjoyed his work and offered an innovative approach to acoustical tasks, died on 25 August 2004 at Chebeague Island, Maine.

Born in Whitinsville, Massachusetts, on 2 June 1918, Clay received a BS in physics in 1940 from Worcester Polytechnic Institute. He entered Pennsylvania State College (now University) and earned an MS in physics in 1942. After three years at Wright-Patterson Air Force Base in Dayton, Ohio, where he worked on military communications gear, Clay resumed graduate work at Penn State.

Under the supervision of H. K. Schilling and Isadore Rudnick, Clay made significant contributions to high-intensity sound. Well known is his development of high-power sirens for use in air. He and Rudnick presented a paper on that topic at the May 1947 Acoustical Society of America (ASA) meeting and followed with an article in the September issue of the *Journal of the Acoustical Society of America (JASA)*. The siren reports caused quite a public stir and led to articles in *Life* magazine and *Popular Science*, and to a news short in movie theaters. Novel demonstrations included suspending marbles in a standing-wave field, heating a cup of coffee, and lighting a pipe. One of their sirens was used to study the biological effects of high-intensity sound. Clay received his PhD in physics in 1950.

Less well known is Clay's experimental study of finite-amplitude propagation. Using a baffled-piston source vibrating at 14.6 kHz, he discovered nonlinear acoustical saturation, or limiting sound-pressure level, as he called it. Saturation is the maximum sound pressure level achieved at a given distance at a given source frequency. Clay correctly explained it as caused by nonlinear distortion of the propagating wave. Distortion causes the transfer of energy to higher harmonics, where it is more efficiently absorbed. At saturation, any further increase in source level is accompanied only by an equal increase in absorption. Clay also discovered the blunting effect, and decreased side-lobe suppression, that increased absorption has on the directivity pattern of the radiation. Unfortunately, he reported his work only in his thesis (1950), in part of the Penn State Sig-

nal Corps report *Atmospheric Physics and Sound Propagation, Final Report for Period July 1, 1945 to May 20, 1950*, and in two papers presented at the June 1950 ASA meeting. As a result, his pioneering work is not widely appreciated even today.

After receiving his PhD, Clay immediately began working for Corning Glass Works in Corning, New York, where he directed sonic and ultrasonic research. In 1954 he joined the technology firm Bolt Beranek & Newman (BBN) in Cambridge, Massachusetts, to start what became a productive career as a consultant in acoustics. His early work was on the noise of components in the relatively new field of air conditioning, and a paper by Leo L. Beranek, George Kamperman, and Clay about that field was published in *JASA* in 1955. Clay's more complete work is reported in chapter 21, which he wrote for *Noise Reduction* (McGraw-Hill, 1960), edited by Beranek. In later work primarily for the textile, metal, and foundry industries, Clay applied his physics insight to machine design to reduce noise at the source.

At BBN, Clay's knowledge and experience set him apart from others. His physical intuition in high-amplitude sound, his expertise in design of high-power sources, and his uncanny ability to make complicated machinery work enabled the company to design outstanding test facilities. In 1958 he designed a powerful siren to be used in a high-intensity sound facility at BBN to measure the potential for failure of electronic and metal components. The siren operated over a frequency range of 50–10 000 Hz and had a maximum acoustic output of 1100 W. Besides periodic tones, it produced amplitude-modulated tones that simulated band-limited noise. Clay, with B. G. Watters, described the siren development in two *JASA* papers published in 1959.

Clay then designed a siren having an acoustic power of 25 kW as the basis for a full-scale, 25-siren research facility for the US Air Force. The facility was intended for research on noise-induced failure of jet aircraft and space vehicle structures during launch. Clay's leadership was essential to BBN in that and similar efforts. He left BBN in 1974 to establish the Clayton H. Allen Corp, which was formed a year later.

Clay's approach to noise control often led to patents. His first, in 1950, was with Rudnick for a siren. He also held four patents for earmuffs—including two for a design that provided a level-dependent attenuation for



Clayton Hamilton Allen

high-level noise impulses; a spring-operated miniature voice system for the GI Joe toy of the late 1960s; and improvement in the optics of a kaleidoscope. Clay was also a patent reviewer for JASA from 1980 to 1994.

His life was saddened when his son died in a car accident in 1977 the age of 19. Clay had planned for the two of them to work together after his son had graduated from college. He kept active, though, and spent the next 27 years on Chebeague Island with his second wife. He did consulting work, and wrote articles and obtained patents into the last decade of the century, yet still found time for gardening.

Clay gave much to the acoustics community. All who knew him personally were richer for it.

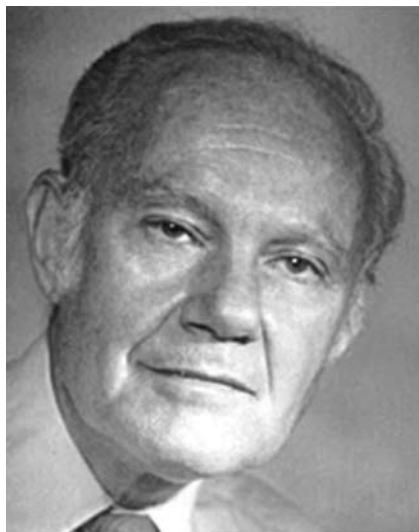
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Eugene Murray Allen

Eugene Murray Allen, best known for his achievements in and scientific impact on the field of color physics, died on 18 January 2005 in his hometown of Bethlehem, Pennsylvania, following a long illness. He and his wife, Beatrice, would have celebrated 69 years of marriage only five days later. Allen greatly influenced fields as varied as sorption, separations and catalysis, analysis of electronic and vibrational spectra at interfaces, and printing technologies for which he was known worldwide. Because most of these systems, especially interfaces, are of nanometer and subnanometer dimensions, he



Eugene Murray Allen

was a pioneer of nanoscience long before nanotechnology became today's flourishing field.

Allen was born Emmanuel Kaplan in Newark, New Jersey, on 7 November 1916. His early striving for a broad scientific background is apparent from his choice of educational institutions and fields. After graduating from Columbia University in 1938 with a bachelor's degree, he opted to study mathematics at the Stevens Institute of Technology in Hoboken, New Jersey. He concurrently did war-related work at the Picatinny Arsenal in Dover, New Jersey. In 1944 he received his MS from Stevens. He then studied chemistry, specializing in spectrophotometric physics, at Rutgers University while working at American Cyanamid Corp in Boundbrook, New Jersey. He received his PhD in 1952.

Six years later, American Cyanamid bestowed on Allen its Senior Research Award, which enabled him to spend six months in England studying the effect of ionizing radiation on textiles. In 1967 he took the directorship of the Color Science Laboratory at Lehigh University's Center for Surface and Coatings Research; he held that post until his retirement in 1981. He greatly contributed to the well-being and international recognition of the center.

To his colleagues and students, Allen was an expert adviser and guide who not only practiced his science, but always reached for wider connections between science, the arts, and the humanities through the language of mathematics, the development of human perception of physical phenomena, and music. At Lehigh's chemistry department and the Center for Surface and Coatings Research, he continued active research even after his retirement, and was a delightful partner in scientific discussions on a wide variety of subjects. He inspired friends and colleagues to study Chandrasekhar's radiative transfer, opened for us links between astrophysics and physical chemistry of colloidal dispersions, and introduced systematic use of computers in the art of color matching.

Allen's work continues to influence the application of computer color-matching programs that are routinely used today. His articles that described the mathematical methods for applying Kubelka-Munk equations to computer color matching laid the foundation on which all subsequent methods are based. Although others in industry had previously used and partially described such formalism, Allen's complete, matrix-based descriptions placed the methods within the grasp

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