

*At a meeting of the FACULTY OF ARTS AND SCIENCES on November 2, 2021,  
the following tribute to the life and service of the late David Layzer  
was spread upon the permanent records of the Faculty.*

## **DAVID LAYZER**

BORN: December 31, 1925

DIED: August 16, 2019

David Layzer was a theoretical astrophysicist and an outstanding teacher. His intellectual interests spanned an enormous range, from the Earth's ionosphere to the origin and evolution of the universe to the implications of the growth of order with time.

David was born in Cleveland, Ohio, and lived there until he entered Harvard in February 1943. After three terms, he was drafted into the army and spent two and a half years in the Signal Corps, where he became a master of Japanese Morse code. He returned to Harvard and graduated in 1947 with a degree in mathematics. He then enrolled in Harvard's graduate program in astronomy and received a Ph.D. in 1950, having written his thesis under Donald H. Menzel. After postdoctoral positions at Michigan, Berkeley, and Princeton, he joined the faculty of the Department of Astronomy at Harvard in 1953. He was tenured in 1960 and appointed the first Donald H. Menzel Professor of Astrophysics in 1979, a position he held until his retirement in 1997 at age 71.

When asked by an interviewer if he was a theoretician, David responded, "As pure as the driven snow." His range of investigations was astonishing. They included the E layer of the Earth's ionosphere, the nature of pulsars, the origin of the universe, and the evolution of life. His Ph.D. thesis involved quantum mechanical calculations of atomic spectra, which, along with his subsequent work in the field, helped in the understanding of the radiation processes in the sun. While at Princeton with John Wheeler, he provided a complete analysis of how gases of different density mix in an astrophysical setting due to the Rayleigh–Taylor instability. That 1955 paper remains highly cited. It explains a broad range of phenomena, including "elephant trunk globules" in the interstellar medium.

David was noted for proposing thoughtful alternative interpretations of physical phenomena that were outside the mainstream. He developed an alternative theory to the Hot Big Bang model for the origin of the universe, the Cold Big Bang model. It had many attractive characteristics, most notably providing novel explanations for the origin of galaxies from primordial density fluctuations and for the formation of the chemical elements. His model

was eventually superseded because it was unable to account for the near-perfect blackbody nature of the cosmic microwave background radiation as a fossil of the Big Bang.

Since his first research paper with Donald Menzel on the physical principles of quantum theory, he was drawn to foundational issues in science. Early in his career, he was drawn to cosmology and theorized on the growth of structure in the universe and the formation of galaxies. A major contribution was the cosmic virial theorem, an innovative idea about the clustering (“clumpiness”) of galaxies in an expanding universe. He studied the concept of “the arrow of time,” originally introduced by Arthur Eddington. He made a substantial contribution to understanding the paradox of the growth of order and information in the evolving universe, despite its general increase in entropy.

In the 1970s David began a decade-long inquiry into the mathematical foundations and assumptions behind the analyses of the heritability of IQ and conclusions drawn from them. This brought him into conflict with the work of Jensen and Herrnstein. Working alongside population geneticists and evolutionary biologists including Richard Lewontin, his colleague at Harvard, he concluded that, while genetics are an important factor in determining intelligence, there is no established limit on the educability of individuals. He published his ideas in peer-reviewed journals and popular articles.

David published three books that focused on the evolution of order in the cosmos: *Constructing the Universe* (1984), *Cosmogenesis: The Growth of Order in the Universe* (1990), and his final book, *Why We Are Free* (published posthumously in 2021). That work builds on the idea in his earlier books, in which the growth of information in the universe is inconsistent with the concept of a deterministic universe. For David, ontological chance and primordial randomness are the origins of genuine possible alternative futures for astronomical and biological evolution. Just as the cosmos was not limited by its initial conditions, the human will is not limited by deterministic physical laws and human intelligence is limited not by its initial genetic component but by the possibilities of life experience and education.

David was heavily invested in teaching both undergraduate and graduate students. From the 1950s to 1970s, he was an anchor among his department’s theorists, joined by Cecilia Payne-Gaposchkin, Donald Menzel, Leo Goldberg, Max Krook, and Alex Dalgarno. He had 19 Ph.D. students, many of whom went on to distinguished careers. He developed and taught innovative courses in Harvard’s General Education and Core Curriculum for over 30 years, including “Space, Time, and Motion” and “Chance, Necessity, and Order.” He was awarded Phi Beta Kappa’s Alpha-Iota Prize for Excellence in Teaching in 1991. His student Craig Hogan wrote, “For many young people [who] passed through his world, he offered a unique kind of unconditional acceptance, like a college-level Mr. Rogers: everyone is OK, everyone is special, and he really meant that, and it was really true.”

A dedicated violinist and violist, David organized string quartets on Friday evenings, which began with dinner and often included students. He was an enthusiastic squash and tennis player, enjoyed skiing, and regularly swam at the Blodgett pool.

David was an editor of the *Annual Review of Astronomy and Astrophysics* for thirty years between its 1963 founding and 1995. He was a member of the American Academy of Arts and Sciences and the International Astronomical Union.

Although an avowed atheist, David was often invited by the Reverend Professor Peter Gomes to speak at services at Memorial Church.

David was married twice. He and his first wife, Rosemary Ford, had two children. His second marriage, lasting 60 years until his death, was to Jean Walker, to whom he was introduced by famed cosmologist Hermann Bondi in England. They had four children. He is survived by Jean, four of his six children, eight grandchildren, and six great-grandchildren.

Respectfully submitted,

Charles Alcock  
George Field  
Joseph Silk  
James Moran, Chair

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The authors of this Minute wish to thank to Professor Jay Pasachoff (Williams College), Dr. Robert Doyle, and Mrs. Jean Layzer for their contributions to it.