

The second discusses microbiology in deep cracks in Earth. Many geologists disagree with the ideas presented in these works, but the concept of “life in cracks” seems to be fairly well accepted.

Among many honors, Tommy was a fellow of the Royal Society. He received the Gold Medal of the Royal Astronomical Society in 1985.

In his leisure time, Tommy was a competitive skier, both on snow and water. He was also a master carpenter. Whatever project he undertook, he did with enthusiasm and confidence. Many of his ideas were of fundamental importance to physics and astronomy, and those that have survived have been outstanding contributions.

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Robert Aloysius Hein

Robert Aloysius Hein, known worldwide for the low-temperature-physics and superconductivity work he carried out during his long career at the Naval Research Laboratory (NRL) in Washington, DC, died of cancer on 3 August 2004 at his home in Catonsville, Maryland.

Bob was born on 26 September 1925 in Reading, Pennsylvania. At the age of 17, he enlisted in the US Army and, during the winter of 1944, fought with the 75th Field Artillery Battery B at the Battle of the Bulge. Bob maintained a lifelong connection with his comrades from the Field Artillery.

He returned from the war to finish high school and then enrolled at the Catholic University of America in Washington, DC. In 1950, when he was a junior in college, he was hired to work in NRL's cryogenics branch as a research physicist.

The late 1940s and early 1950s were exciting times in low-temperature physics, especially at NRL. The laboratory had recently purchased from the Arthur D. Little Corp the second commercially available Collins-type liquid helium cryostat. Francis Bitter of MIT had developed high-field magnets that could provide steady magnetic fields in excess of 3 tesla, and NRL had installed such a Bitter magnet. And one of Bob's colleagues, Warren Henry, had just invented an all-metal cryostat that was far more robust than the glass Dewar systems previously used to hold liquid helium at low temperatures for experiments.

Bob recognized that by merging those new tools he could systematically study the properties of superconducting materials at high mag-

netic fields and low temperatures. He developed adiabatic demagnetization techniques to reach temperatures well below 1 K and established one of the first research groups in the US to routinely perform superconducting materials research at these very low temperatures. From the mid-1950s through the mid-1960s, he collaborated with many leading superconducting materials scientists such as Henry, Bernd Matthias of Bell Labs, and John Hulm of the Westinghouse Research Laboratories.

Bob and his group are credited with discovering superconductivity in tungsten ($T_c = 0.016$ K) and in iridium ($T_c = 0.10$ K). In 1964, his team was the first to find superconductivity in doped germanium telluride compounds—the first superconducting semiconductors ever reported. Low transition temperatures in these low-electrical-carrier (doping-dependent) materials had just been predicted by Marvin Cohen. That discovery also has great historical significance because it demonstrated that low-electrical-carrier materials could be superconductors. Twenty-two years later, superconductivity was discovered in another low-electrical-carrier material, lanthanum copper oxide, the first member of the new class of high-temperature superconductors.

Under an NRL fellowship program, Bob continued his education at Catholic University and in 1967 received his PhD under Paul Meijer. His thesis was entitled “Critical Magnetic Field of the Superconducting Semiconducting Tellurium–Tin Compounds.”

Bob subsequently expanded his research group at NRL and began working on applied and fundamental aspects of superconductivity. He headed

the newly formed cryogenics and superconductivity branch from 1972 to 1979. During that time, his group developed multi-filamentary wire for magnet applications, such as motors for naval ship propulsion, and superconducting quantum interference devices for magnetic sensor applications, such as anomaly detection and extremely low-frequency (less than 1 Hz) communication systems. He also served for one year as the scientific liaison officer to the Office of Naval Research in London. In that capacity, he disseminated information to American scientists about European research that was of possible interest. Beginning in 1975, Bob was a visiting scientist first at the Research Institute for Precious Metals and Metal Chemistry in Schwabisch Gmünd, Germany; then at the University of Giessen; and later at the University of California, San Diego.

In 1979, Bob left NRL for NSF to direct its low-temperature physics program. He remained in that post until his retirement from federal service in 1981. He then became a research professor at Catholic University and later a visiting scientist at the University of Washington in Seattle.

Bob was not from Missouri, but he could have been. An experimentalist at heart, Bob only really believed a measurement when he could reproduce it himself. Scientists who worked with Bob learned to be careful with their experiments and analyses and to be very precise in the published reports of their work. Bob was excited about his research and frequently would spend all night working in the laboratory. His enthusiasm for science rubbed off on those who worked with him, and many lively scientific discussions could be heard coming from Bob's lab, his office, or in nearby hallways.

As a manager, Bob did not shrink from difficult or unpopular decisions. Rather, he approached them thoughtfully and seriously, particularly those decisions that would affect his colleagues' careers or personal lives. He was compassionate and supported and encouraged his younger colleagues.

An avid bowler, Bob also was active in German language clubs and enjoyed gardening and keeping in contact with his friends. Those who knew or worked with Bob quickly recognized him as a man of character and integrity.

Don Gubser
Tom Francavilla
Marty Nisenoff
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