OBITUARIES

Giulio Racah

Giulio Racah, leading Israeli theoretical physicist and rector of the Hebrew University of Jerusalem, was asphyxiated by gas from a faulty heater on August 29 in Florence, Italy. He was 56 at the time of his death.

Professor Racah, a native of Florence, had been visiting there while enroute to Amsterdam, where he was to have participated in the Zeeman centennial conference on atomic spectroscopy in early September. He had headed the Hebrew University's Department of Theoretical Physics since 1939.

Professor Racah was educated at the University of Florence, where he received his PhD, and pursued further graduate work at the University of Rome, studying under Enrico Fermi, and at the Federal Polytechnic Institute in Zürich, under Wolfgang Pauli. In 1932, at the age of 23, Professor Racah was appointed to a full professorship at the University of Florence, where he remained for six years. He spent the next year at the University of Pisa, but was forced to leave Italy when the Italian Fascist government adopted its anti-Semitic policies. He went to Israel the following year and was immediately named professor of theoretical physics and head of the Department at Hebrew University.

In the years just prior to the establishment of Israel as a state, Professor Racah, who traced his ancestry to a family that had settled in Italy during the Hebrew dispersal from Palestine in the first century, was actively engaged in underground work. In 1947 and 1948, the Hebrew University's campus on Mount Scopus became separated from the rest of the Hebrew sector in Jerusalem, and he served as deputy commander of a section of the Haganah, the Jewish underground, in the fighting that took place there.

Professor Racah had a world-wide reputation as a theorist. Among his contributions to physics was his development of the Racah coefficient in the quantum-mechanical theory of angular momentum. In 1950, he came to the United States to spend a year at the Institute for Advanced Study at Princeton and at the National Bureau of Standards in Washington. He was chairman of the Science Section of the Israeli Academy of Sciences and Humanities from 1960 to 1963 and was elected rector of the Hebrew University in 1961. He was a member of the American Physical Society.

Cornelius Bol

Cornelius Bol, retired Stanford University research physicist and the inventor of the mercury-vapor lamp, died at his home near Palo Alto, Calif., on July 30.

A native of Tienhoven, Holland, he was born on March 8, 1885. He was educated in the United States, where he received a bachelor of science degree in 1914 from the University of Montana and pursued graduate studies at Stanford University from 1914 to 1916. He then returned to Holland and joined the physics laboratory of Philips Gloeilampenfabriken, in Eindhoven, where he began his work on miniaturized high-pressure mercury lamps.

He remained at Philips until 1936, when he transferred his research to Stanford. In the first years after returning to Stanford, while working as a research associate, he endeavored to decrease the size of the mercury-vapor lamp while continuing to make it brighter. By 1939, he had perfected a midget lamp which was three inches long and the width of a kitchen match. He was named a research professor at Stanford in 1940 and research physicist in 1947. He retired three years later.

Professor Bol was formerly a member of the American Physical Society.

H. W. Russell

H. W. Russell, a physicist at the Battelle Memorial Institute's Columbus Laboratories and one of the original staff members of the Institute, died on July 13 in Columbus, Ohio.

Dr. Russell was born in Denver, Colo., 64 years ago. He was educated at the University of Denver, where he received his AB degree in 1921, and at Cornell University, where he received his PhD in physics in 1927. He served as an assistant professor at the Carnegie Institute of Technology from 1927 to 1929, when he joined Battelle as a chief physicist. In 1947 he was promoted to technical director at the Columbus Laboratories.

A specialist in nuclear and metallurgical research, Dr. Russell served as the Institute's consultant to the US Atomic Energy Commission. In 1948, he was the recipient of the US Armed Forces certificate of appreciation for contributions to the country's war-time program of metallurgical research. He was a fellow of the American Physical Society and a member of the Optical Society of America and the Institute of Aerospace Science.

Three LASL scientists

Robert B. Day, Frank E. Pretzel, and Herbert E. Ungnade, senior scientists at the Los Alamos Scientific Laboratory, died in a mountain-climbing accident on August 15 in southern Colorado.

Dr. Day, who was 42 years old, was born in Cleveland, Ohio. He received his AB degree from Haverford College in 1943 and an MS degree in 1947 and a PhD degree in physics in 1951 from the California Institute of Technology. During World War II, he served as a physicist with the Naval Research Laboratories. He joined Los Alamos in 1952 where he worked on reactions in light nuclei and neutron reactions. He was a member of the American Physical Society.

Dr. Pretzel was born 44 years ago in Chicago and educated at the University of Chicago, where he received his BS in 1942, his MS in 1948, and his PhD in 1951. Prior to joining Los Alamos in 1952, he served as an instructor in general analytical chemistry with the Chicago Board of Education. His research interests included

solid state studies including radiation damage. He was a member of the American Physical Society.

Dr. Ungnade, an organic chemist, was 54 years old. He was born in Bodenwerder, Germany and educated at Michigan State College in East Lansing, where he received a bachelor's and master's degree and at the University of Minnesota, where he received his PhD in 1938. He held several teaching positions at the University of Missouri, New Mexico Highlands University, and Purdue University, before joining Los Alamos in 1954.

William T. Allen

William T. Allen, associate professor and chairman of the Department of Physics at the University of the South in Sewanee, Tenn., died on June 26, in Washington, D. C., following open-heart surgery. He was 38 years old.

Dr. Allen was born in Cleveland, Ohio, and attended Oberlin College, where he received his BA degree in physics in 1948. He continued his studies at Syracuse University, where he received his master's degree in 1954 and his PhD degree in physics in 1958. He served as an instructor in physics and mathematics at Robert College in Istanbul, Turkey, from 1947 to 1951. After completing work on his doctoral degree, he taught at Franklin and Marshall College in Lancaster, Pa., until 1961, when he joined the faculty at the University of the South.

Dr. Allen was involved in the establishment of the Sigma Xi Club in Sewanee and served as its first president. He directed the University's Computer Center and was chairman of the University's Combined Engineering Committee. He was a member of the American Physical Society and the American Association of Physics Teachers.

George R. Sears

George R. Sears, a senior research associate in the Physics and Mathematics Department of the Institute of Paper Chemistry in Appleton, Wis., died on April 24 of a heart attack. Dr. Sears, a specialist in the physical and physico-chemical properties of paper and pulp, had been associated with the Institute since 1936 and had served as chairman of its Graphic Arts Research Section since 1953.

He was born in Beaver Dam, Wis., on September 12, 1904. He attended the University of Wisconsin where he received a BA degree in 1926, an MA degree in 1927, and a PhD degree in physics in 1937. He spent several years with E. I. du Pont de Nemours and Lawrence College before joining the Institute of Paper Chemistry as a research assistant in physics. He was promoted to research associate in 1941 and to his last position of senior research associate in 1956. In 1963 and 1964 he directed the Institute's annual conference on paper and chemicals.

Dr. Sears was a member of the American Physical Society, the American Association of Physics Teachers, the Electron Microscopy Society of America, and the American Association for the Advancement of Science.

Harley E. Howe

Harley E. Howe, professor emeritus of physics at Cornell University, died on August 18 in Ithaca. He was 83 years old.

Professor Howe was born in Linneus, Missouri. He received a bachelor of science degree from the University of Missouri in 1906 and an MA degree in 1909 and a PhD degree in physics in 1916 from Cornell. While pursuing graduate studies at Cornell, he served as an instructor in physics. After receiving his doctoral degree, he spent six years at Randolph-Macon College in Virginia as professor of physics.

In 1918, he returned to Cornell as an assistant professor. He was promoted to professor in 1937 and retired as emeritus professor in 1950. Professor Howe's research interests lay mainly in the areas of optics, colorimetry, and absorption by organic salts. However, he was best known for his abilities as a teacher. At Cornell, he developed basic courses in physics for nonphysics majors, and after his retirement continued to associate with colleagues and former students at the University. He was the author of a textbook, *Introduction to Physics*, published by the McGraw-Hill Book Company.

Professor Howe was a member of the American Association of Physics Teachers, the American Physical Society, and the Optical Society of America.

Robert T. Keyes

Robert T. Keyes, vice president and research director of the Intermountain Research and Engineering Company (IRECO) in Salt Lake City, Utah, died on June 23.

Dr. Keyes was born in Ogden, Utah, on June 20, 1923. He received a bachelor's degree from the University of Utah in 1949 and a PhD in physics from Utah in 1954. The following year he became assistant technical director of the University's Institute of Metals and Explosives and was named associate research professor in 1958. He resigned from Utah last year to become research director at IRECO, of which he had been a founder six years earlier.

Dr. Keyes specialized in the field of high explosives. His research interests included detonation phenomena, high-velocity impact, high-pressure physics, ionization in flames, and shocks and detonations.

A. E. Becker

A. E. Becker, a retired physicist who had formerly served on the staff of the Standard Oil Development Company, died in Neshanic, N.J., on April 27 after a long illness.

Dr. Becker was born in Lowell, Ohio, on September 1, 1886. He was graduated from Marietta College in 1909 and pursued graduate studies at Harvard University, where he received a master's degree in 1910 and a doctorate in physics in 1917. During World War I, he served as a physicist with the National Advisory Committee for Aeronautics and the National Bureau of Standards, and after the war he worked for a time with the Aluminum Castings Company. In 1920, he joined Standard Oil, where he was engaged primarily in studies of lubrication and automotive fuels. He retired in 1951.