was one of a team of spectroscopists working on the Zeeman-effect experiment and analysis that established that uranium was a member of a second rare earth series and not a homologue of tungsten. An important consequence of this work was the rearrangement of the periodic chart of atoms, which correctly placed Th, Pa, and U along with the transuranic elements on a separate line below elements Ce to Lu rather than as homologues of Hf, Ta, and W.

Humphreys was among the first to recognize that the improved radiometric techniques that had evolved during the war permitted a new assault on the infrared spectrum of hydrogen. Thus it was by a radiometric technique that he was the first to observe and report the sixth series of the emission spectrum of atomic hydrogen of a wavelength of 12.37 micrometers. This series is now called the "Humphreys Series" in physics textbooks. His work in infrared atomic spectroscopy piror to 1954 was recognized in an invitation to give a talk at the Rydberg Centennial Conference on Atomic Spectroscopy held at the University of Lund, Sweden, 1954. He shared this signal honor with William F. Meggers, Niels Bohr, Wolfgang Pauli, A. G. Shenstone, G. Racah and H. Kopfermann.

The availability of photoconductive detectors following the end of World War II made possible the extension of high-resolution observations into the infrared region well beyond the limit accessible to photography. His recording of a line in Xe I at 55 772.4 Å was the farthest observation in the infrared by this method at that time.

Humphreys achieved a significant breakthrough by 1955 with the development of a Fabry–Perot interferometer system for use in the infrared, capable of operating at order numbers in the range of 10^5. Negative results for similar attempts at other institutions were being reported during this same period. His success lay in the development of a mechanism for scanning the interference pattern across a slit by a uniform rotation of the interferometer. Up until this time optical standard wavelengths of eight significant figures were essentially limited to the 0.3–0.9-micron region. However, progress in molecular spectroscopy made for an acute need for wavelength standards in the 2–7-micron region. In 1958, Humphreys and his coworkers were able to report values in this region to eight significant figures—and indeed, some of his values of argon and neon lines were accepted as provisional wavelength standards by Commission 14. These were the first wavelengths of lines beyond the photographic limit ever to be considered in the half century of the Union's existence. Three years later independent, concordant determinations made by entirely different techniques were submitted by E. R. Peck and T. A. Littlefield to satisfy the provisions of the IAU for standard wavelengths, so that they no longer needed to be considered as provisional.

In addition to his many scientific achievements, Humphreys was known for his warm and friendly personality, for the many droll stories, always appropriate to the occasion, that he would recall and deliver in his inimitable manner, for his silent step, his ready smile and his inexhaustible vocabulary.

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James William Broxon

James William Broxon died 8 September 1986 after a long illness. He was 89.

Broxon graduated from Wabash College in 1919 and received his PhD from the University of Minnesota in 1926. Most of his professional career was spent at the University of Colorado in Boulder where he was an active member of the faculty from 1922 until his retirement in 1963. During part of World War II he worked in the Manhattan Project Laboratories at the University of Chciago.

His early research was on ionization processes in gases at high pressure, which led him to study cosmic rays using a high-pressure ionization chamber. His ion chamber recorded continuously the fluctuating intensity of cosmic rays that penetrated approximately 0.3 m of lead and steel, and he then correlated these intensities with sunspot activity, magnetic storms and other variables. This research spanned much of his professional career and resulted in approximately 40 publications. Assisted by graduate students, he worked without funding through the years of the Great Depresion when financial support for research was almost nonexistent.

For many generations of students Broxon was at the center of the undergraduate and graduate curricula. His favorite courses were mechanics and electricity and magnetism and in 1960 he published an undergraduate text, *Mechanics* (Appleton–Century–Crofts).

He is remembered by his students as a teacher who demanded much and who gave much in return.

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