

Robert van de Graaff Biography

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Biography

Robert Jenison van de Graaff was born in Tuscaloosa, Alabama, on December 20, 1901. He earned bachelors and masters degrees in mechanical engineering at the University of Alabama in 1922 and 1923, respectively. He worked briefly for the Alabama Power Company before enrolling at the Sorbonne in Paris. In 1925, he moved to Oxford University as a Rhodes Scholar and earned both a bachelors (1926) and Ph.D. (1928) degree.

While at Oxford, van de Graaff became interested in the difficulties of accelerating particles to high velocities for use in nuclear research. It occurred to him that one technique that could be used would be to deposit electrical charges on a moving belt, and then to accumulate those charges inside a hollow metal sphere. In 1929, he began work on the construction of such a device. The result of this research was the machine that now bears his name, the van de Graaff generator.

The van de Graaff generator consists of a long vertical hollow column containing a moving belt. At the top of the column is a dumbbell-shaped sphere that holds the electrical charge swept off the belt. The earliest models of the machine were able to generate a potential of 80,000 volts, although later machines produced particles with an excess of 5,000,000 volts. Van de Graaff envisioned a number of applications for his machine. He was particularly interested in bombarding heavy atoms, like uranium and thorium, with protons. He thought that such bombardment might result in the disintegration of these already unstable atoms, or, if the heavy nuclei caught protons, they might transform into elements with atomic numbers greater than 92.

Later in his career, van de Graaff devised methods for accelerating uranium atoms to be used in the bombardment of other uranium atoms. In the process, he was able to create uranium ions in which up to fifty electrons had been removed from the corresponding atoms! Van de Graaff worked at the Massachusetts Institute of Technology (MIT) from 1931 to 1960. He then resigned to cofound the High Voltage Engineering Corporation (HVEC). He continued his research at HVEC for the remainder of his career, and died in Boston on January 16, 1967.