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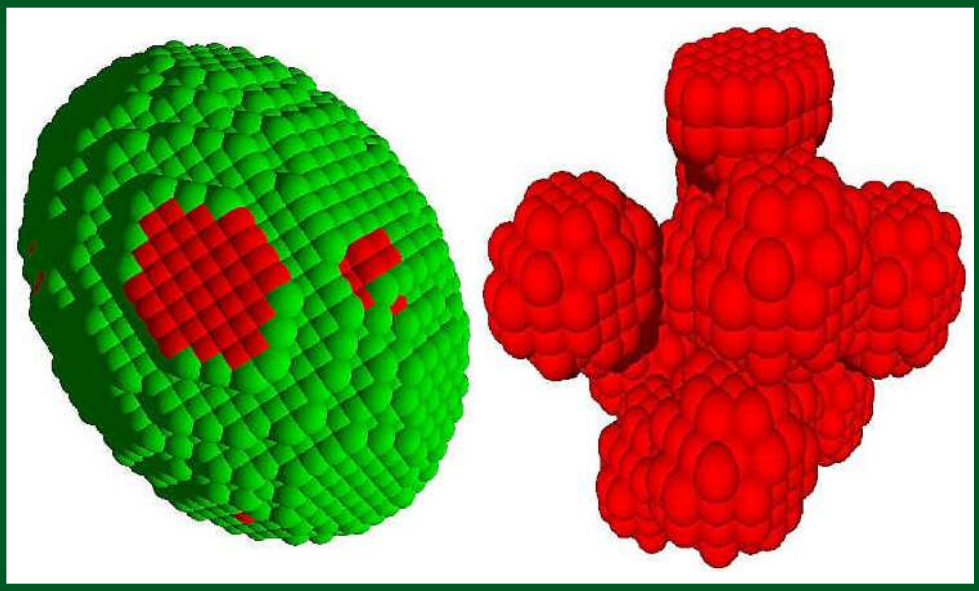

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On the Occasion of Louis de Broglie's Birthday (August 15, 1892)

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Louis de Broglie, more properly Louis-Victor-Pierre-Raymond, 7^e duc de Broglie, extended Einstein's work on the wave\particle duality of the photon to electrons which allowed him to deduce the allowed energy levels in the hydrogen atom and explained the assumption made by Niels Bohr that an electron orbits the nucleus in certain stable orbits whose angular momentum was quantized. Bohr's work reproduced the well-studied spectrum of the hydrogen atom. De Broglie published this work in 1923. In 1927, experimental work by Clinton Davisson and Lester Germer in the United States and George Thomson in Scotland provided solid evidence for the dual wave/particle nature of the electron and vindicated de Broglies hypothesis which many in the physics community had considered a crackpot idea [1].

De Broglie received the 1929 Nobel Prize in Physics for this work [2]. He became a member of the French Academy of Sciences in 1933 and served as permanent secretary for mathematical sciences from 1942 until 1975. He was also elected to membership in 18 international academies and scientific societies including the U.S. National Academy in 1947 and gained fellowship in the Royal Society in 1953. He was elected to the Académie Francaise in 1958 [3]. He held the Grand Cross of the Légion d'Honneur [4].

From 1928-1952, de Broglie first worked on applications of wave mechanics to real world problems accepting the probabilistic interpretation introduced by Born, Bohr and Heisenberg although he continued to be philosophically dissatisfied with it. Like Einstein, de Broglie wished to find a classical causal explanation for quantum mechanics although he had little success in finding one before 1928 and when he and his students worked on it again beginning in 1952 [5].

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In addition to his work on the nature of the electron, de Broglie held a number of significant academic and advisory positions. After 1945, he acted as an advisor to the French Atomic Energy Commisariat [1] and was one of the Co-Founders of CERN in1954, a laboratory which he had been the first high level scientist to propose in 1949 [3]. Although de Broglie never achieved his goal of a causal interpretation of quantum mechanics, he worked with a number of younger physicists and was remembered as one of the founders of modern physics after his death on March 29, 1987 [5]. He was also the author of at least 14 books on physics including several for the general public. In 1952, he was awarded the first Kalinga Prize by UNESCO in recognition of his efforts to explain quantum physics to the public [5].

Biography

Louis de Broglie was born on August 15, 1892 as the second son of an aristocratic family the head of which was the Duc de Broglie in France and held a German title of Prince. The family had a long, proud tradition of service to France in the diplomatic, military and political spheres although not in science. Young de Broglie studied at the Lycée Janson de Sailly in Paris and graduated in 1909. At that point, the young student envisioned a career in the diplomatic corps and enrolled at the Sorbonne intending to study history, but after considerable soul-searching, switched to theoretical physics so that he received his undergraduate degree, the Licence ès Sciences, in 1913 [2].

His decision to study physics may have been influenced by his brother, Louis César Victor Maurice de Broglie, who was born in 1875, and thus was seventeen years older than his brother. Maurice had served in the French Navy from 1895-1908 before leaving the Navy to study physics, breaking with family tradition [6].

At this point, World War I erupted, and Louis de Broglie took time out from his studies to serve in the army. He was assigned to the wireless telegraphy section and stationed in the Eiffel Tower. At the war's end, de Broglie turned to the full time study of theoretical physics which was at that time in a state of flux. He also continued to perform experiments on X-rays in Maurice's well-equipped laboratory housed in the family's hotel in Paris. Conversations with his brother convinced Louis that electromagnetic radiation demonstrated both wave and particle properties at the same time [2]. He decided that electrons should also exhibit a dual nature and presented the idea first in a publication at the end of the summer of 1923 in *Comptes Rendus de l'Académie des Sciences* and then in a dissertation to the Faculty of Sciences at Paris University in November, 1924 [5].

de Broglie's controversial dissertation clearly contained very radical ideas, and it is reputed to have been a mere ten pages long. It might well have been dismissed out of hand, but the de Broglie family in general and Maurice, in particular, were important to France and its physics community. To avoid offending them, Paul Langevin, who had advised Maurice's dissertation [7], decided to send the dissertation to Einstein, then acknowledged as the best theoretical physicist in the world. Einstein was intrigued by de Broglie's ideas and said so. The Faculty of Sciences could thus justifiably award the doctorate in physics to de Broglie. Einstein publically spoke of the importance of de Broglie's ideas [5].

Despite Einstein's support, de Broglie's ideas remained very controversial until they were verified experimentally by Davisson and Germire and Thomson in 1927. De Broglie remained at the Sorbonne teaching physics for two years after his dissertation was accepted. In 1928, he was offered and accepted an appointment as professor of theoretical physics at the newly founded Henri Poincaré Institute where he continued to teach until his retirement in 1962. In 1932, he was also appointed to the chair of theoretical physics at the Faculty of Sciences at the University of Paris [4]. When Maurice, the 6th Duc de Broglie, died in 1960 [6], Louis became the 7th Duc de Broglie. He died in 1987 in Paris. de Broglie never married and there are no stories of serious personal attachments. He left no children. However, his ideas and his students remind all physicists that it is important to retain visionaries in modern theoretical physics.

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