Paul Langevin Biography

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Biography

Paul Langevin was born on January 23, 1872, in Paris. He received a first-rate education at the hands of Pierre Curie at the École de Physique et de Chimie Industrielles. He also studied under Joseph J. Thomson at the University of Cambridge and met such illustrious scientists as John Townsend (1868-1957), Charles Wilson (1869-1959) and Ernest Rutherford. Langevin received a Ph.D. in 1902 for his work on the ionization of gases and became professor of physics at the Collège de France in 1904. In 1909 he accepted the same position at the Sorbonne.

Langevin is most famous for his work involving ultrasonic wavelengths. These frequencies, which are too high-pitched to be audible, could be produced with Curie's piezoelectric effect: radio circuits were used to vibrate crystals to produce the wavelengths. Ultrasonic waves could reflect off small objects much more easily and efficiently than ordinary sound waves.

When World War I intervened, Langevin became involved in developing the use of ultrasonic waves to locate submarines. The war ended before he perfected his "echo location" device. Work on the device continued, however, and it ultimately led to the development of SONAR.

In the 1840s Michael Faraday had studied weak magnetic forces which he called paramagnetic (the force of attraction) and diamagnetic (the force of repulsion). He did not understand why the forces acted as they did, he merely noted their existence. In 1895 Curie had shown that the susceptibility of a paramagnetic substance to an external magnetic field varied inversely with temperature. Langevin theorized that a substance's magnetic properties hinged upon the valence electrons, an idea that influenced the work of Niels Bohr. This theory, conceived in 1905, was made on the basis of the electric charge of the electron within the atom. It was an extremely modern concept.

Other modern concepts included the theories of Albert Einstein, theories that Langevin not only understood but popularized for others. He received an impressive testimonial from Einstein, who said if he hadn't proposed the theory of relativity, Langevin surely would have done so himself.

During World War II Langevin, who was very outspoken in his condemnation of fascism, was arrested by the Nazis. He was placed under house arrest but, after the execution of his son-in-law and internment of his daughter at Auschwitz, he escaped to Switzerland in 1944. Following the war he returned to Paris, where he died on December 19, 1946.