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The Origin and Development of the Quantum Theory

Max Planck (1858 – 1947)

Read by: Phil Schrempf Language: English
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Quantum theory was formulated by German physicist Max Planck while seeking the reason that radiation from a glowing body changes in color from red to orange and blue as its temperature rises. He postulated that energy exists in individual units in the same way that matter does, rather than as a constant electromagnetic wave, that it could therefore be quantified. He constructed a mathematical equation involving a figure to represent these individual units of energy, which he termed quanta, and presented his theory to the German Physical Society in 1900 as a basis for explaining the nature and behavior of matter and energy at the atomic and summertime and some subatomic levels. Also referred to as quantum physics and quantum mechanics, physicists gradually came to understand that the existence of quanta implied a completely new fundamental understanding of the laws of nature.

Planck was awarded the Nobel prize in 1918 for his theory. This book is the address given at the awards ceremony in 1921. Quantum theory, together with Einstein's relativity theory, form the basis for modern physics. Its premises have been repeatedly tested and applied in an increasingly number of areas including optics, chemistry, computing, and cryptography.

Max Karl Ernst Ludwig Planck (April 23, 1858 - October 4, 1947) was a German theoretical physicist whose discovery of quantum mechanics revolutionized modern physics. He was born into a scholarly family in Kiel, Holstein during a period of constant war; his father was a law professor and his grandfather and great-grandfather were theology professors. When the family moved to Munich Planck came under the tutelage of mathematician Herman Mueller, who taught him astronomy, mechanics and mathematics. At the University of Munich he studied physics, against the advice of a professor, who believed everything had already been discovered. By 1888 had earned a doctorate; in 1892 he became a full professor at the Frederick Wilhelms University. In 1894 he turned his attention to the issue of black body radiation, which had baffled his peers. In 1899 he proposed the "principle of elementary disorder" as an explanation which corresponded well with the experimental data. He revised his approach with the formulation of the Plank black-body radiation law. Uncomfortable with the implications, in what he called "an act of despair", he postulated that electromagnetic energy could be omitted only in a quantized form and proposed what has come to be known as the Plank constant or the Plank action quantum. Applications of the theorem were not immediately obvious but became apparent over time and led to Planck being awarded the Nobel Prize in Physics in 1918. In 1948, the German scientific institution Kaiser Wilhelm Society was renamed Max Planck Society and now includes 83 institutions representing a wide range of scientific directions.