

SPHS Devil Physics Nobel Prize Winner Extra Credit Essay

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Max Planck Physics Nobel Prize Winner 1918

In Kiel, Germany on April 23rd, 1858 a surprising future laid ahead of a little baby named Max Karl Ernest Ludwig Planck. He would have an astounding career as a theoretical physicist and contribute to helping people understand the world through physics. His law-professor father introduced him to a teacher at the University of Munich who introduced him to the wonder of math and science combined: the world of physics. Eventually, Max would attend the University of Munich to pursue a career in physics in 1874. In 1877 he transferred to the University of Berlin to finish his schooling. In 1879 he received his doctorate degree. Studying in Germany meant that he had the opportunity to take advantage of his father's societal influence which also meant he held several leadership positions at Kiel University where his professor, Gustav Kirchoff, prompted his curiosity in thermodynamics and the relationship between frequency and energy. Finally, he was promoted to a full professor at the University of Berlin.

While he was teaching in Berlin during the 1880s and 1890s, Planck gravitated (pun intended) to one particular area of physics that would one day help him leave his mark on the world. He had a profound interest in the heat and energy emitted during radiation. He was intrigued by "blackbody" radiation (a hypothetical body that can absorb any wavelengths of thermal radiation applied to it and looks black because of this). After analyzing, William Wien's

John Rayleigh's laws he realized that they wouldn't be consistent with low frequencies as well as high ones. From these two equations, Planck then derived the "intensity radiated by a blackbody" (Eric W. Weisstein, Wolfram Research) in the form of a wavelength and related the wave's frequency to the energy emitted. The equation was known as Planck's law ($E=nh\nu$). He also came up with a constant that for his equation (h). The constant is 6.626×10^{-34} joules x second. Essentially, Planck's equation stated that the radiation at higher frequencies required more energy than that at low frequencies. This launched an entirely new discovery that would win him the Nobel Prize in 1918.

Planck's blackbody radiation involvement directed him to make a prediction about the characteristics of light that would forever change the world of physics. In 1900, he predicted that waves of light could only occur with a "quanta" amount of energy. This "quanta" was supposedly the amount of energy radiated or taken in during radiation. It meant that light was actually given off not in continuous streams, but very small particles. Eventually, these particles were named photons. Planck's discovery opened the door to a brand new branch of science: quantum mechanics. He published his findings in a paper in 1900 that eventually allowed another physicist and brilliant mind to establish his own theory, that man being Albert Einstein. Without Planck's quantum theory, Einstein's theory of relativity wouldn't have been possible.

Planck wasn't expecting to get breakthrough in the world of physics. He was simply trying to understand and explain an incident. He didn't understand why the laws of classical physics didn't apply to super small particles like atoms or wavelengths. He followed in his predecessors paths and continued to observe the energy radiated out of a small hole in an enclosed oven. He focused on the charges inside the oven that were producing the waves leaving the oven to see if he could somehow connect energy and wave frequency. When he predicted

that the energy coming out and going into the oven wasn't continuous, he found the missing piece to a puzzle that physicists couldn't seem to get. Although his discovery was brilliant, he didn't do it for the recognition, he did it to further explain and understand.

Although his discoveries were tremendous advances in the physics world, Planck didn't have such a tremendous life at home. In 1887, he married the daughter of a baker in Munich. Marie Merck. Together, they had four children; two sons and two twin daughters. His twin daughters died while their mother was giving birth. Approximately twenty two years after their marriage, Marie died in 1909. Tragedy struck his family once again when his first born son was killed during World War I. He lost his other son during World War II, 1944, because his son was found guilty for conspiring against Hitler.

Living in Germany during World War II effected Planck's life and career in ways unimaginable. Planck never would have thought that a war could cause so much pain and difficulty in his life. During this time, Adolf Hitler's persecution of the Jews had a severe impact on Planck's studies. Many of his fellow physicists were being forced to quit their jobs because of their Jewish nationality. Being the president of the Kaiser Wilhelm Gesellschaft Society for the Promotion of Science (later named the Max Planck Society for the Advancement of Science) from 1908 to 1937 meant he was especially bitter when the Nazis decided to restructure the society and resigned from his position as president. Planck took his concerns about the future of German science to Hitler directly in 1933. Hitler ignored his plea. The war wrecked Planck's career, family and home. In 1944 his home and everything in it, including his scientific journals, was destroyed during an Allie bombing. This was a particularly tragic year for Planck because his son was killed by the Gestapo in 1944 too.

Although Planck led a challenging life, his accomplishments showed the power of his strength during times of adversity. Throughout his life, he won prestigious awards and held prestigious positions. In addition to being president of the Kaiser Wilhelm Gesellschaft Society he was the permanent secretary of the Prussian Academy of Sciences, elected as a foreign member of the Royal Society and received the Copely Medal from them in 1928.

In addition to awards, Max Planck's legacy remains today in institutions established in his name. Max Planck Society established in 1948 has published over 1300 articles in scientific journals. It also has 80 research facilities and institutions. One of which is the Max Planck Florida Institute for Neuroscience that was the first institute that the Max Planck Society opened in America. The institute focuses on "brain function and neural circuits, using the most advanced techniques to visualize microscopic molecular processes" (Max Planck Florida Institute for Neuroscience.) Its research has collaborated "outstanding scientists with a broad range of expertise" (Max Planck Florida Institute for Neuroscience) to dive deeper into the depths of neural circuits. In addition, the Society gives an award called the Max Planck award to two "internationally renowned scientists" (Max Planck Society). The society picks one scientist working in Germany and another working somewhere else in the world. The award is to recognize the scientist's great achievements, achievements that are similar to those of Max Planck himself.

Max Planck's willingness to go against what other people that was true ended up being one of the best decisions of his life that would help him leave his mark on the world. His discovery of "quanta" made so much more possible. Without his discovery, there wouldn't be quantum physics, "photons" wouldn't have been discovered until much later (or maybe not at

all) and the name Albert Einstein would only be a name. Planck's legacy made an enormous impact on society back then as well as society today.

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