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Period 1

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Albert Abraham Michelson

The Nobel Prize for Physics was won by Albert Abraham Michelson in 1907. This prestigious accolade is given only once a year, and constitutes one of the five Nobel Prizes offered (The Nobel Prize is also offered for Peace, Chemistry, Literature, and Physiology or Medicine). The Nobel Prize was created by Swedish Chemist, Alfred Nobel in the year 1895, with the first Nobel Prize for Physics being given in 1901 to Wilhelm Rontgen. Alfred Nobel is the inventor of dynamite, and was saddened at the outcome of his invention. It led to the deaths of thousands and thousands of people, which he felt partly responsible for. This was never his desired effect, and to try and make up for his destructive invention, he invested his last will almost entirely to the foundation of the Nobel Prizes. The Nobel Prize for Physics is always offered in Stockholm, Sweden, where Albert Abraham Michelson received his in 1907. It was the Royal Swedish Academy of Sciences that awarded him the prestigious award. Michelson (along with every other recipient of the Nobel Prize thus far) has received a gold medal, a diploma, and a sum of money, which depends on the Nobel Foundation's income that particular year.

On December 19th, 1852, Michelson was born in the Kingdom of Prussia (present day Poland). At the age of two, along with his parents, he immigrated to the United States, being raised up in both California and Nevada. He completed his high school education with his aunt,

Henriette Levy, (mother of the notorious author, Harriet Lane Levy) in San Francisco California. Though born into a Jewish family, many people viewed him as an agnostic. In 1869, Michelson decided to study at the U.S. Naval Academy, where he spent four years as a mid shipman and two years at sea. After graduation, Michelson continued his stay at the Naval Academy as a physics and chemistry teacher until 1879. During this year, Albert worked very closely with Simon Newcomb, who viewed Michelson as his mentor. Simon completed several replica projects of Michelson's, (with additional funding) and obtained results very similar to Michelson's. Following 1879, Michelson worked in the United States Naval Observatory and then went to study abroad in Europe. Here he saw the universities of Berlin, Heidelberg, College de France, and Ecole Polytechnique. During his study abroad, Michelson became fascinated with the problems concerning the measuring of the speed of light. These fascinations led him to his works, which later brought him the Nobel Prize. The time period didn't affect his findings, as no significant war was going on in the United States at the time. His only ambition was to discover and satisfy his fascinations concerning the speed of light. His major success was found in the Michelson-Morley experiment, and after this, received the notorious Noble Prize in Physics. The Henry Draper Medal was also awarded to him in 1916, along with the Gold Medal of the Royal Astronomical Society in 1923. Albert Abraham Michelson breathed his last breath on May 9, 1931 at the age of 78, with a multitude of accolades and much respect among physicists around the world.

His first experiments of the measuring of the speed of light began in 1877 in Annapolis. He continued to refine his experiment until 1879, when he published his results, and concluded the speed of light in the air to be $299,864 \pm 51$ kilometers per second. This number would later be refined due to the numerous experimentations done by Michelson at Potsdam, Cleveland, Mt.

Wilson, Pasadena, etc. In 1883, he accepted a job at the Case Western School of Applied Science in Cleveland, Ohio as a physics professor. Here, Michelson concentrated his efforts in improving his interferometer, an instrument in which wave interference is employed to make precise measurements of length of displacement in terms of the wavelength. Once he had done that, he completed arguably the most notorious feats of his career with Edward Morley. This would later come to be formally known as the Michelson Morley experiment, the experiment that brought Michelson to fame and brought him the Nobel Prize for Physics. This experiment, conducted at Case Western University, resulted in the first strong evidence against the theory of a luminiferous aether, and in favor of special relativity. What was so significant about that was his previous experimentations (such as the ones done in Annapolis) had been dealing with a prototype that dealt with apparatus's with experimental errors that Michelson found to be too large to state anything concerning the aether wind. In the late 19th century, luminiferous aether, meaning light-bearing aether, was a term used to describe a medium for the spreading of light. To measure the aether wind, Michelson had to devise a more accurate and tightly controlled experiment, which would be his most famed one. With the assistance of Edward Morley, the two were able to create a prototype that detected the spread of light with more than enough accuracy. The experiment the two conducted consisted of consistently reflecting light back and forth along the arms of the interferometer, and took place between April and July 1887. The results were in favor of the belief that all uniform motion is relative, and that the speed of light is the same for all inertial observers regardless of the state of motion of the source.

The multitude of awards Albert won was due to his work on the measurement of the speed of light; and even more so for the Michelson-Morley experiment. The written reason to why Michelson won the Nobel Prize is "for his optical precision instruments and the

spectroscopic and metrological investigations carried out with their aid.” His instruments helped to measure light, even with the factor of drift present. Albert Abraham Michelson’s instruments and findings concerning how quickly the speed of light travels, were later used by a multitude of physicists, such as Albert Einstein, who founded the theory of relativity. Other notable physicists that used Albert Michelson’s instruments are Dayton Miller, Hendrick Lorentz, and Robert Shankland. Shortly after 1927, the arrival of new measurements of the speed of light using electro-optic devices, were all significantly lower than Michelson's value. Michelson looked for another measurement, but this time in an evacuated tube to avoid difficulties in interpreting the image owing to atmospheric effects. In 1930, he collaborated with Francis G. Pease and Fred Pearson to accomplish a measurement in a 1.6 km tube at Pasadena, California. Michelson died with only 36 of the 233 measurement series completed, and the experiment was shortly after plagued by geological instability and condensation problems before the result of $299,774 \pm 11$ km/s, which was consistent with the dominating electro-optic values. Michelson’s findings were later published after his death in 1935 even though he never was able to complete his experimentation.

The Nobel Prize in Physics is awarded once a year by the Royal Swedish Academy of Sciences. In the year 1907, Albert Abraham Michelson won the Nobel Prize for his work on the measurement of the speed of light, and especially for the Michelson Morley experiment. He became the first American ever to win a Nobel Prize in Physics. He continued contributing to Physics even after obtaining his Nobel Prize, such as being the first person to measure another star other than the sun. His contributions to Physics led to him having the honor of having a crater on the moon being named after him. Albert Abraham Michelson’s contributions to Physics have been very influential to the field itself, and have made a lasting impact on Physics.

Michelson compiled his findings in the *Experimental Determination of the Velocity of Light*. This compilation of his results was published in 1879 with a fellow colleague of his, Simon Newcomb. These results, along with his notorious Michelson Morley experiment, would prove vital in his winning of the Nobel Prize for Physics during 1907, which symbolizes the highlight of his career.