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The Life of Dennis Gabor

Born in Budapest, Hungary, on June 5 of 1900, Dennis Gabor was the son of Bertalan Gabor. Bertalan served as the director of a mining company, also married to Dennis's mother, Adrienne. Gabor's interest in physics began when he was only 15 years old, prior to his visit to college. Gabor learned calculus and study the works of Chwolson, Abbe (theory of the microscope), and Gabriel Lippman (method of color photography. With his little brother George, Dennis built a small laboratory in his home in which he could repeat experiments modern to his time. Such experiments involved wireless x-rays and radioactivity. Yet, although Gabor desired to major in physics, he chose engineering due to the fact that a career in physics was not offered yet in Hungary.

With a degree in electrical engineering from Technische Hochschule Berlin (TH), Gabor favored visits to the University of Berlin, where physics was prominent, with names such as Einstein, Planck, and Nernst. Yet, although Gabor majored in electrical engineering, his work was almost always in applied physics.

As Hitler rose to power, Gabor ventured to Britain in order to seek new job opportunities. Yet, as Britain faced the depression, a job was difficult to find. Gabor found work at the British Thomson-Houston Company. As the war came to an end, Gabor's life seemed to become progressively more bountiful. Gabor began to write papers on communication theory, and developed a system of stereoscopic cinematography. In his final years, Gabor performed basic experiments on holography, at the time known as wavefront reconstruction. Gabor's original objective was to create a new electron microscope which enabled Gabor and others to see single atoms, thus improving the electron microscope. During this process, Gabor stumbled across the idea of holography and began to nurture it. Yet, Gabor argued that he and his colleagues at the AEI Research Laboratory started 20 years too early. Only later have auxiliary techniques for electron holography become a success.

After his departure from his previous British company, Gabor chose to pursue a career involving the teaching of applied electron physics until his retirement in 1967. Gabor enjoyed his time here as a professor, tackling intense problems with fellow collaborators. Some inventions of Gabor's during this period include a Wilson cloud chamber (measuring the velocity of particles by forcing frequencies on them), and other creations such as a holographic microscope, a new electron-velocity spectroscope, an analogue computer which was a universal, non-linear "learning" predictor, recognizer and simulator of time series, and a flat thin color television tube. Gabor also helped to introduce numerous theorems, such as communication, plasma, and magnetron theories. Gabor also worked on schemes for fusion, which he knew that something would go wrong due to the massive amount of temperature for the process to occur.

Even after Gabor's retirement, he kept in touch with past colleagues and thus continued his adventures as an inventor and engineer. Although Gabor did little to produce holograms, his theories of applications proved invaluable to those with the necessary resources to perform the task.

As stated earlier, Dennis Gabor invented the holographic microscope. It was for this that he received the Nobel prize for physics in 1971. In order to create such a thing, Gabor considered increasing the power of an electron microscope and then examining the electrons with a beam of coherent light. In his original experiment, the hologram was a record of the interference between the light diffracted by the object and a collinear background. Yet, the image produced from holography truly produced two images, one of them being an out of focus version of the desired product. The only method of focusing the image would reduce the light intensity too much, making it non-functional for holography. For many years, these interests became only theories until the development of the laser in the 1960's. The laser increased the intensity of the light, making it invaluable to Gabor's theories on holography.

The use of holography is key to physics life. With the use of holography, objects can be examined and looked over for areas of depression or other plausible defects. Due to the fact that the hologram is aerial, the focus of the microscope used to produce the image can be used to focus on certain areas of the image, providing a vital source of clear imagery while using holography. Irregularities of an object are clearly noticeable due to the refraction and splitting of a beam of light in the production of the image. Other uses of holography include the comparison of one hologram to the same hologram after it has been changed over a period of time to notice what changes have occurred to the object.

The picture produced by the hologram varies by the direction in which the observer looks at it, making it resourceful in pointing out irregularities in objects. To further prove this point, the planes of holograms can be combined into one plane with different colors, thus sectioning each separate original from the entire object.

However, due to the outrageous cost of materials, holography is rarely used in today's society. The prices of the complex laser system represent how costly it is to prepare a hologram and maintain it over a period of time. Holograms are only used when other methods of visuals have failed or are not clear enough to examine. It is for his work with holography and the development of the electron microscope that he was awarded the Nobel Prize for physics.

Works Cited

Encyclopedia Britannica. "Holography (optics) : Continuous-wave Laser Holography."*Encyclopedia Britannica Online*. Encyclopedia Britannica, 2013. Web. 16 Jan. 2013.

Nobelprize.org. "Autobiography." *Dennis Gabor* -. Nobelprize.org, 2013. Web. 16 Jan. 2013.