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Werner Heisenberg

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Werner Heisenberg in 1926.

Werner Heisenberg

By Jacob Christ, Chemical Engineering Sophomore

Werner Heisenberg was a German physicist and philosopher, and his work was vital to the modern understanding of quantum mechanics and the nature of the universe. He was born in Wurzberg, Germany, in 1901, and most of his work was done before and during World War II. His work has influenced modern computing, atomic bombs, and chemistry.

His “Uncertainty Principle” was his most famous theory and won him the Nobel Prize in 1932 for the creation of quantum mechanics. The theory states that it is impossible to know for certain the exact location and momentum of a subatomic particle. Both variables are opposite and equal at the same time. Light works by bouncing photons off objects and coming into our eyes. In order for light to bounce off something, like a piece of paper, it must hit the paper atom equally as hard, meaning that when you look at a paper molecule, you are looking at where the paper molecule was and not where it is. The more you shine light off an object the more you bounce it around and the less you end up knowing. This principle is the fundamental truth of the subatomic world.

The reason an atom does not collapse in on itself is because electrons don't get close to the nucleus. Electrons are elusive and would respond to being too close to the nucleus by moving so incredibly fast that they would be hurled uncontrollably into space.

One of the less appealing parts of Heisenberg's career was his work on the German atomic program during World War II. Although he was criticized for not being loyal enough to the Nazi regime, he found himself working for them, in direct opposition to the Manhattan project, on a bomb. He was unsuccessful, mainly due to factors outside of his control. Some attribute this failure to sheer incompetence on his part and others to outright sabotage against the fascist powers. Either way, the Germans lacked the degree of success achieved by the Manhattan project.

Heisenberg's Theory had major implications on both physics and the way that life can be viewed in general. Obviously, this presented some troubling challenges to thinkers at the time. When Heisenberg dared to challenge the worldview of others, he made some enemies along the way. Among the opponents of his theories was Albert Einstein. Einstein was quoted as saying, “God does not play dice with the universe.” He was so troubled by this idea that he dedicated the last few years of his life to disproving the superposition theory. All this work was in vain though because his thought experiments only proved to strengthen the theory he sought to disprove.

The universe is not as civilized as society would suggest. It is not objective and measurable but is chaotic and unpredictable. It cannot be said with certainty where an electron is: The electron's location can only be predicted. Maybe there are secrets not meant to be witnessed by mortal eyes. Maybe humans' primitive minds lack the ability to perceive higher dimensions. As humanity explores the extremes of the universe and the extremes of life, each discovery raises more questions. Every day, preconceived notions of life are challenged. Scientists may never be able to see where a particle lies, but that does not stop it from existing and making impacts on day-to-day life.

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