

Werner Heisenberg – 1932 Nobel Prize

The German Nobel Prize winner for physics, Werner Heisenberg, was a theoretical scientist whose career focused on quantum mechanics. His biggest known accomplishment was for asserting the uncertainty principle in the quantum theory. It was from this that he became a globally recognized physicist and eventually won the Nobel prize. Further contributions he made were in the fields of nuclear physics, quantum field theory, and particle physics. Heisenberg worked to establish the matrix formulation of quantum mechanics in 1925 with the help of Max Born and Pascual Jordan. For his work in the creation of quantum mechanics and its discovery of the various forms of hydrogen, Heisenberg was awarded the 1932 Nobel Prize in Physics. Now for a more detailed examination of his life.

Heisenberg was a single child. His parents, Kaspar Earnesta August Heisenber and Annie Wecklein were respectable people within their own rights. Heisenber was born in Wurzburg, Germany where his father, Kaspar, worked at the local secondary school. His father taught medieval and modern Greek studies and became the only one to do so in the German university system. Due to his father's higher education and family status Heisenberg was encouraged to pursue a good education from a young age. He went on to study physics and mathematics from 1920 to 1923 at the Ludwig-Maximilians University and University of Munich. He received his doctorate in 1923 at Munich. He went on to receive his habilitation in 1924. In 1922 Heisenberg's professor Sommerfeld, took him to the Bohr Festival. Bohr gave a series of lectures on atomic physics that highly interested Heisenberg. The meeting with Bohr proved to be very influential on Heisenberg.

The next stage in Heisenberg's life was his paper. He began to write his doctoral thesis using a topic that was suggested by his professor. Said topic was "the stability of laminar flow and the nature of turbulent flow". The problem of stability was investigated by the use of the Orr-Sommerfeld equation, a complex equation that his professor and mentor conceived and taught him. After World War 2

Heisenberg returned to the topic for a short time. In 1928, Albert Einstein nominated Heisenberg, Born, and Jordan for the Nobel prize in Physics, however it was decided that the Nobel prize in 1932 should be delayed until 1933. It was however announced at the time that Heisenberg had won the Prize for 1932. One can rightly ask why Born was not awarded the Prize in 1932 along with Heisenberg. Many people believe that it was because Jordan had joined the Nazi party and hence become a storm trooper. The Nobel committee often did not agree with acts like that. From Jordan's new Party affiliations and his subsequent links to Born more than likely stopped Born from receiving the award. Born did later receive the Nobel prize in 1954 alone. Heisenberg was very affected by the fact that he alone and not Born nor Jordan had won the Nobel prize. In 1933 he even went as far as to write a letter to Born. He said he delayed writing it because he had a bad conscience about being the only winner out of the trio to win the much sought after prize. Heisenberg openly recognized that he would not have been able to make the same advances that he did without the help of Born and Jordan. In an article he wrote in 1954 Heisenberg credited Born and Jordan for many mathematical formulations of the matrix mechanics. Heisenberg went on to stress how great their contributions were to quantum mechanics, which were not quote, "adequately acknowledged in the public eye".

Nearly 2 years later Heisenberg's professor and mentor Sommerfeld was at the age of retirement at the University of Munich. In 1935, the Munich Faculty drew up a list of candidates to replace Sommerfeld as ordinarius professor of theoretical physics and head of the Institute for Theoretical Physics at the University of Munich. The three names suggested were Werner Heisenberg, Peter Debye recipient of the Nobel prize for chemistry, and Richard Becker. Heisenberg was by far their first choice, he was considerably more qualified than the other candidates and was also internationally recognized. However, there were also supporters of *Deutsche Physik* and elements in the REM had their own list of candidates and the battle dragged on for over four years. During this time, Heisenberg came under vicious attack by the *Deutsche Physik* supporters. One attack was published in *Das Schwarze Korps*, the newspaper of the SS, headed by Himmler. In this, Heisenberg was called a "White Jew" who should

be made to disappear. These attacks were taken seriously, as Jews were violently attacked and incarcerated. Heisenberg fought back with an editorial and a letter to Himmler, in an attempt to resolve this matter and regain his honour. At one point, Heisenberg's mother visited Himmler's mother. The two women knew each other as Heisenberg's maternal grandfather and Himmler's father were rectors and members of a Bavarian hiking club. Eventually, Himmler settled the Heisenberg affair by sending two letters, one to SS Heydrich and one to Heisenberg, both on 21 July 1938. In the letter to Heydrich, Himmler said Germany could not afford to lose or silence Heisenberg as he would be useful for teaching a generation of scientists. To Heisenberg, Himmler said the letter came on recommendation of his family and he cautioned Heisenberg to make a distinction between professional physics research results and the personal and political attitudes of the involved scientists. Overall, the Heisenberg affair was a victory for academic standards and professionalism. However, the appointment of Wilhelm Müller to replace Sommerfeld was a political victory over academic standards. Müller was not a theoretical physicist, had not published in a physics journal, and was not a member of the DPD his appointment was considered a travesty and detrimental to educating theoretical physicists.

For a quick background information on Heisenberg's personal life In January 1937 Heisenberg met Elisabeth Schumacher at a private music recital. Elisabeth was the daughter of a well-known Berlin economics professor. They married on 29 April and had fraternal twins, Maria and Wolfgang, in January 1938. They had five more children over the next 12 years. Their names were Barbara, Christine, Jochen, Martin and Verena.. Heisenberg enjoyed classical music and was an accomplished pianist he performed several times but never professionally He was a Lutheran Christian but did not practice much. Heisenberg died of cancer of the kidneys and gall bladder at his home, on 1 February 1976.