Werner Karl Heisenberg

1901 - 1976

Awarded the Nobel Prize for Physics in 1932

Werner Karl Heisenberg was born on December 5th, 1901, in Würzburg, Germany, into a middle class family. His father was appointed as a Privatdozent at the University, where he specialized in Byzantine history. His mother, Annie, had no formal education, but she learned Russian in order to help in translating papers for her husband. Werner was the second and fondest son of his mother, probably because of his weak health: at the age of 5 he nearly died of a lung infection. Werner and his elder brother Erwin were in continual competition, encouraged by their father. The children were taught music; Werner played first cello, and later piano, and music accompanied him throughout his life.

In 1911, Werner entered the elite Maximilian Gymnasium in Münich. He was excellent in mathematics and had taught himself the calculus. **At the age of eighteen he published a paper on number theory.**

According to his biographers, young Heisenberg supported the nationalist movement in Germany and took part in several street fights against communist groups. Later, he was involved in one of the nationalist groups and, being the most talented and a strong sportsmen, he was chosen as its leader. However, Werner was more interested in sport than in politics.

While still a student, Heisenberg, in one of his first published papers, explained the phenomenon which was named the 'Zeeman effect' and concerned with the splitting of spectral lines in a magnetic field. From that time he was accepted as a theoretician. It was said that he could not even 'solder two wires together'.

In 1926, Heisenberg received an invitation from Niels Bohr, the mentor of theoretical physics in Copenhagen. He returned to Germany as Professor at the University of Leipzig. Developing quantum mechanics, he came to the conclusion that if the spins of two separate hydrogen nuclei are in the same direction they form ***orthohydrogen***; if they are in opposite directions they form ***parahydrogen***. For the work devoted to this problem Heisenberg was awarded the 1932 Nobel Prize for Physics.

He found that when the uncertainties in the measurement of momentum and position for a particle are multiplied together, the product must be equal to or greater than Plank's Constant

$$\Delta p \Delta x \geq \hbar$$

Heisenberg's main achievement in theoretical physics was his ***principle of uncertainty*** which can be stated as: '***if we know very accurately where a particle is, then we cannot find out how fast is it moving'.***

Apart from physics, Werner was keen on hiking and playing chess, but music was his favourite pastime. Once, participating in a chamber music concert, Werner met a young women, tall and slim, with a warm smile. Her name was Elisabeth Schumacher. She was a book dealer and quite well educated. He accompanied her home, **then in two weeks they were engaged and in three months they were married.** They had three sons and four daughters. The whole family often gathered to play chamber music.

Heisenberg was the director of the Max Planck Institute in Berlin and later he held similar appointment in Münich. It is claimed that during World War II, the two famous physicists Bohr and Heisenberg had a meeting. All the facts about the conversation became the subject of controversy except one: they spoke about the military application of atomic energy. After this meeting the partnership never continued. Nazi Germany did not succeed in constructing atomic bombs under Heisenberg's leadership, but why? According to one of the versions, the answer is that the German physicist overestimated the critical mass needed for a bomb, but the fact is not clear.

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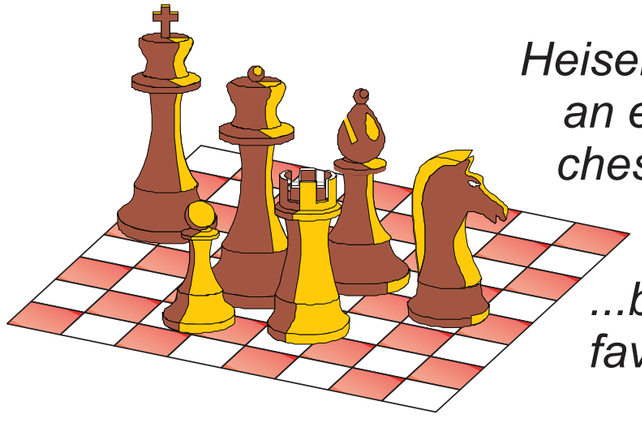

Heisenberg was an excellent chess player

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