# OTTO STERN-THE PRIME FATHER OF THE NMR-METHOD

Horst Schmidt-Böcking

Universität Frankfurt, Institut für Kernphysik, Max-von-Laue-Str. 1, 60438 Frankfurt, Germany
schmidtb@atom.uni-frankfurt.de

In 1919, the theoretically trained physical chemist Otto Stern developed at the University of Frankfurt the so-called Molecular Beam Method MBM. This method makes it possible to measure transverse momentum changes (deflections caused by e.g. an external magnetic force) with extremely high resolution for individual atoms flying in a vacuum. In 1922, together with Walther Gerlach in Frankfurt, Stern was able to prove for the first time that certain atoms have a magnetic moment and that these moments are quantized in size and direction. This was the first direct experimental proof of angular momentum quantization in atoms. By improving the MBM, he was able to measure the magnetic moment of the proton and the deuteron for the first time in 1933 at the university Hamburg. He thus became the pioneer in the investigation of inner nuclear and elementary particle structures. Since Otto Stern was a Jew, these successful pioneering experiments in nuclear physics were practically ended when he was forced by the NAZI regime to emigrate to the USA. However, his pupil Isidor Rabi and Rabi's students continued Stern's experiments at Columbia University in New York and later at MIT in Boston and developed the foundations of the NMR method.