Hans Geiger

Fiftieth Anniversary of the Publication of His Doctoral Thesis, 23 July 1906

Divine curiosity and a childlike impetus to play are, Einstein told us, the driving forces of the true investigator. If any scientist fills this definition, he is Hans Wilhelm Geiger, with his desire to explore the unknown and his enjoyment of the ingenious devices of his own design. Those who were fortunate enough to witness one of Geiger's presentations of a problem in modern physics will never forget the grandeur of the performance. They will recall Geiger's pleasure, pride, and happiness when, with the counter clicking, he would convince his audience of the transmutation of the atom, and of the existence of a world beyond that revealed to the unaided senses. This world fascinated Geiger and inspired him in his efforts to create and to be understood.

Geiger was born on 30 September, 1882, in Neustadt in der Rhein-Pfalz, one of Germany's loveliest wine districts. His great achievements are the Geiger-Nuttall relation, Geiger point counter, Geiger-Mueller counter, and the coincidence principle. The trend of Geiger's contribution is revealed in his thesis on "Strahlungs-, Temperatur- und Potentialmessungen in Entladungsröhren bei starken Strömen," which was directed by Professor Wiedemann and presented on 23 July 1906 to the Philosophical Faculty of the Friedrich-Alexanders-University at Erlangen, Bavaria.

On first inspection, Geiger's thesis appears similar to the other dissertations produced at that time. It is classical in form and arrangement, with the customary dedication to "My beloved parents." However, a closer look reveals an unusual talent for observation, a skill in arranging experiments, and the ability to think and write clearly. Geiger's problem originated in the studies of one of the professors of the Physics Institute, A. Wehnelt, who discovered the Wehnelt cathode. The problem involved experiments with and measurements of electric discharges in vacuum tubes, and it served to make Geiger familiar with a technique so fundamental to his later discoveries.

The years 1906–1912 Geiger spent in England with Ernest Rutherford, exploring and investigating the fundamentals of radioactivity. Soon he became known by his valuable contributions to the new field, and in 1912 he was appointed head of the new Laboratory for Radioactivity of the Physikalisch-Technische Reichsanstalt (PTR) in Berlin. Here, in 1913, Geiger selected W. Bothe as his coworker, and years of extremely successful teamwork began. The outstanding experiment of the years at the PTR was the confirmation of the Compton effect in 1925, using two Geiger point counters in coincidence for the simultaneous detection of the scattered quantum and of the recoil electron.

H. Geiger

[Courtesy *Die Naturwissenschaften*]

In 1925 Geiger accepted the chair of physics at the University of Kiel, specializing in the development of new counting devices, while Bothe concentrated on the development and application of the coincidence method. In 1928 the first publication on a new counting device, later called the Geiger-Mueller counter, appeared in the *Physikalische Zeitschrift*, opening a wealth of stimulation and progress in nuclear research. Many studies and many applications of the counter have been reported since 1928. In research as well as in industry, the counter has proved its versatility in many situations and, only to mention briefly, it was a photon Geiger tube that was used as detector in the first automatic scintillation counter device. Of course it was a long way from the first counter to the modern equipment as available as amperemeters and voltmeters on the market today.

In 1936 Geiger moved to Berlin-Charlottenburg as chief of the physics department of the Technical University. Despite the many administrative and teaching obligations connected with this position, he found time for research in cosmic-radiation physics, artificial radioactivity, and uranium fission. The editorship of the Journal *Zeitschrift für Physik* and plans for a new edition of the *Handbuch der Physik* occupied him mostly, when in 1940 a painful rheumatic condition confined him to bed, with a stiff body, for years. Improvements in his condition early in 1945 could not help him very much, for in June 1945 his home near Babelsberg was occupied. He lost all his possessions and was just fortunate enough to find a primitive dwelling place near Potsdam. Here he died on 24 September, 1945—his weakened health being unable to stand any longer the many physical and emotional stresses of the chaotic times.

No high honors and no decorations were bestowed on Geiger during his lifetime. It is the impact of his discoveries that has made him known all over the world. Today he is celebrated as one of the outstanding pioneers of the atomic age.

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If some great power would agree to make me always think what is true and do what is right, on condition of being turned into a sort of clock and wound up every morning before I got out of bed, I should instantly close with the offer.—Thomas Henry Huxley, *Materialism and Idealism.*