

## The scientific life of Victor Franz (Francis) Hess (June 24, 1883–December 17, 1964)



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### ABSTRACT

On the seventh of August 1912, from the measurements upon his seventh balloon ride that had taken him up to an altitude of 5.350 m, Victor Franz (Francis) Hess (1883–1864) discovered the cosmic radiation. His colleagues having continued casting doubts on the existence of such extra-terrestrial impingement for many years, the Austrian scientist was awarded the Nobel Prize for Physics in 1936 only. Victor F. Hess' discovery opened novel fields of research with topics challenging until today. Hess was teaching physics at the Universities of Vienna, Graz, Innsbruck and, from 1938 onwards, of Fordham, New York, and all his life long continued being true to 'his' topic. Suffering himself of radium burns, Hess pioneered to install the first routine measurements of radium poisoning in the USA.

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### 1. Introduction

What remains of a human is what we get in mind when mentioning his name in addition to what he has created and to what from his name produces a sign for admiration (Fig. 1), rejection or indifference. We reflect on his thinking and are able to reconstitute his thought in the image of our own thought. Such proceeding might be difficult to achieve with an overall genius like Leonardo da Vinci whose talents appear to their utmost development. If someone shoots out in a defined particular point, for us there is nothing but to concentrate our power of imagination onto this specific character of his to reproduce a semblance of his striving for the discovery. The specific talent of Victor Franz Hess based on his extremely accurate and strict method of working (Fig. 2) and on the scrupulous checking of his hypotheses, what illustrates well the device for life he gave to his step-grandson William Breisky: "Never assume!" [1].

Add to this a life-lasting unremitting perseverance in investigating the one sole subject: 'Radioactivity and electrification in the air', a self-chosen restriction, which upon Victor F. Hess' applying for the professorship-qualification his many-sided teacher Franz Exner would reproach him with. However, at a time when many physicists renounced searching for the causes of that irritating ionization, which they declared fallacious, when the hypothesis of the existence of a cosmic radiation was considered a fantasy and when the mere talking about such radiation was

not a mark of decent behavior, it had been this obstinacy, which caused Victor F. Hess to give evidence of its existence through tedious and assiduous measurements. From this practice his being awarded the Nobel Prize for Physics—it happened only after a long time of waiting for approbation and after numerous objections—would result by correct inference. With simple measure Victor F. Hess had proved the existence of cosmic radiation the research on which opened multiple novel fields in physics, but in 1938, after the 'heroic' epoch from 1925 until 1935, the discoverer would cruelly become discarded from the first line of research.

The present paper therefore subdivides into describing mainly two separate periods:

- The method of Victor F. Hess, or, how the residual ionization, a tenacious 'shelf warmer', opened up new fascinating fields of the physical research.
- Research work by Victor F. Hess in exile.

### 2. The method of Victor F. Hess

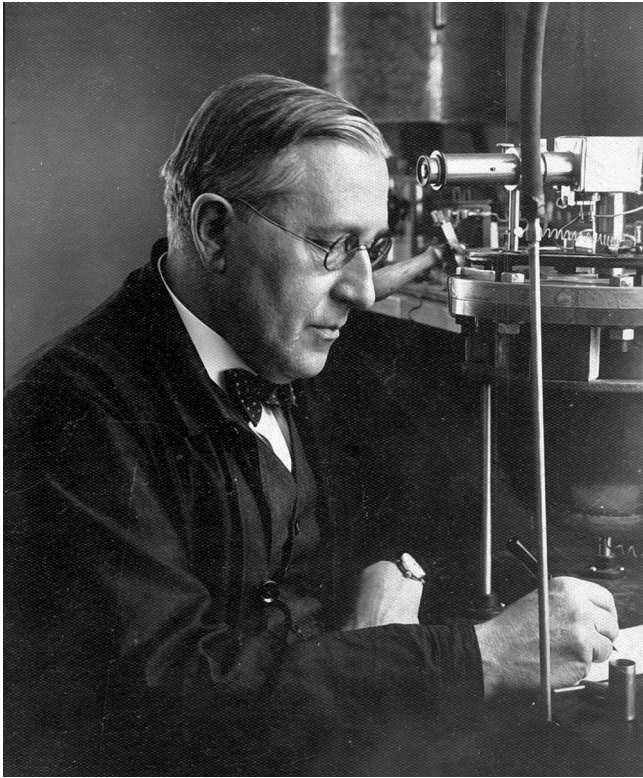
Victor Franz Hess was born at Waldstein Castle near Deutsch Feistritz in Styria, Austria (Fig. 3), on June 24, 1883, his father was the chief forester in charge of the estate. After his secondary studies Victor F. Hess took up the study of physics at the University of Graz under the supervision of Leopold von Pfaundler.

On June 16, 1906, to Victor F. Hess, who had doctorated with excellence, was conferred the Dr. *philosophiae sub auspiciis Imperatoris* (Fig. 4). Graz had been waiting for another such event since four years, now, the extraordinary ceremonies gathered the elite

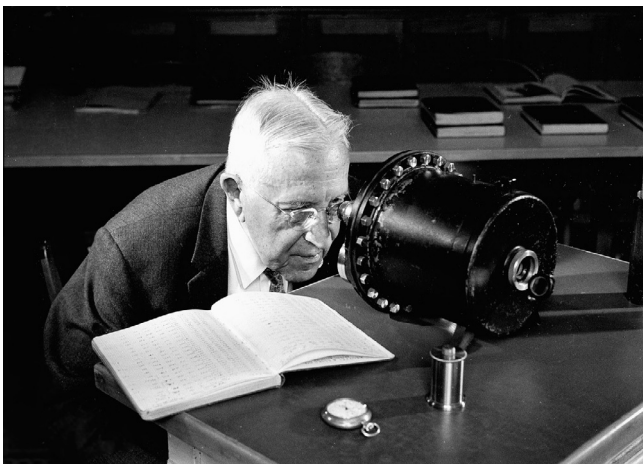
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**Fig. 1.** University of Innsbruck in 1931: Victor F. Hess, Ordinate Professor for Experimental Physics and Director to the newly-founded *Institute for Research on Rays* (“Institut für Strahlenforschung”) at his measuring apparatuses.



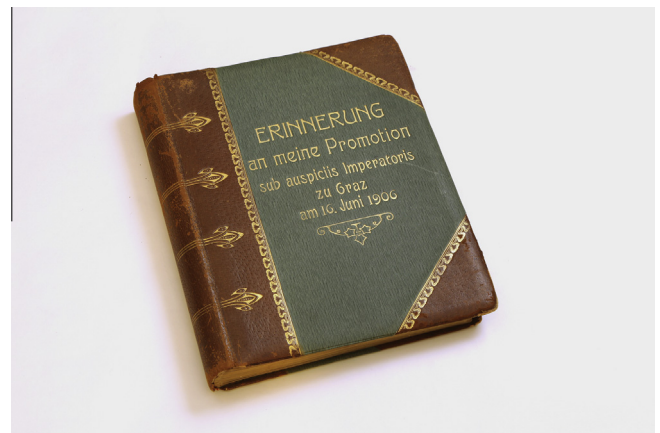
**Fig. 2.** V.F. Hess in front of his modified Wulf (two-fibre)-electroscope apparatus at Innsbruck University, 1958.

of science and politics and the entire high society of Graz, and was reported in detail by the media [2]. Victor F. Hess had given a lecture for the occasion, the original handwritten manuscript of which remains and is held at the Victor F. Hess Society [3] and which demonstrates the young physicist being determined to entirely and without reservation dedicate himself to physics.

Being awarded with a scholarship Hess decided to continue research in the same field of his doctorate’s thesis at the Institute of Prof. Paul Drude in Berlin. A few days later, the suicide of Drude happened, which remains to be an enigmatic issue of the history of physics, and Hess had to give up his plans. Pfandler then ar-



**Fig. 3.** Schloss Waldstein from a postcard, which V.F. Hess sent to William J. Breisky, USA, on July 20, 1955.



**Fig. 4.** A memorandum of my promotion *sub auspiciis Imperatoris* in Graz, on the 16th of June 1906 (“Erinnerungen an meine Promotion *sub auspiciis Imperatoris* zu Graz am 16. Juni 1906”).



**Fig. 5.** Extraordinary Session at the [Physics] Institute of *Türkenstrasse*, Vienna, on March 16, 1909, in honour of the 60th birthday of Franz Exner (March 24, 1849 – October 15, 1926).

ranged that Hess would obtain a working place at the 2nd Physical Institute of the University of Vienna, then directed by Franz Exner (Fig. 5).

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