

HORIA HULUBEI AN EMBLEMATIC FIGURE FOR ATOMIC AND NUCLEAR PHYSICS IN ROMANIA IN THE CENTENARY OF THE GREAT NATIONAL UNION

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ABSTRACT

The paper presents the life and work of the founder of the Romanian school of atomic and nuclear physics, reviewing his contribution to the building of the Academy of Sciences of Romania in its 13 years of existence in which he began as a correspondent member in 1935 and finished as vice president of the same Academy in 1947.

Moreover the paper it is a tribute to the man HORIA HULUBEI as a prominent figure in the 100 years that have passed since the Romania Great National Union.

INTRODUCTION

There have been several stages in the development of modern physics since the last century.

The first stage of the scientific revolution, when experiments were possible using cheap equipment and simple means, ended in 1916 and is known as the heroic era of modern physics. It is illustrated by the great individual achievements of scientist such as: Curie, Rutherford, Plank, Einstein and Bohr.

The second phase, which lasts until 1939, is characterized by the development of research activity in larger collectives, by expanding the field of physics and developing technologies resulting from the latest scientific advancements. During this period the researches were still carried out in the laboratories of the universities, but after 1939 there were research groups, which under the leadership of authority figures in the field became independent institutes. For example, one can remember The Curie Radio Institute in Paris or the Cambridge Institute where under Rutherford direction, nuclear reactions were studied.

The discovery of nuclear fission in 1937 and the possibility of chain reaction of uranium nucleus fission in 1938 took place just before the beginning of World War II. This eventually led to the construction of the atomic bomb, a feat that remained in history as the fastest application of science for military purposes. In the absence of war, studying nuclear fission would have led directly and quickly to the creation of nuclear reactors, their adaptation to energy production and to multiple uses of this phenomenon in scientific and technical applications.

This was the international context in which a prominent scientist was to be born, formed and developed namely Acad. Prof. Dr. Horia Hulubei, who was to establish the Institute of Atomic Physics from Bucharest-Măgurele as well.

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HORIA HULUBEI – LIFE AND OPERA

Horia Hulubei was born in Iasi on November 15, 1896, therefore 22 years before the Great Union. He attended the high school of science in the locality where he graduated in 1915 as the head of the promotion. He continued his studies in physics and chemistry at the Faculty of Sciences in Iasi. Due to the First World War that had just begun, he broke up his studies and joined himself in the fights on the Moldova front. In 1916 he left as a volunteer in France to become a pilot on combat aircraft. He was injured and received the Legion of Honour from the French state. It was only in 1922 that he could resume his interrupted studies for seven years, succeeding in completing the Faculty of Sciences in 1926 with Magna cum Laude. After graduating, he worked for one year at the Department of Physical Chemistry, led by his mentor professor Bogdan, and then he went to Paris where he began working with Prof. Jean Perrin in Sorbonne Physical Chemistry Laboratory. After a strenuous 10 years he defended his doctoral thesis in physics on Tuesday 12/07/1933, achieving "very honourable" in front of a commission chaired by Marie Curie herself, with Jean Perrin and Charles Mauguin as members, with a thesis entitled "Contributions to the Study of Quantum Diffusion of X-Rays". He then dealt with the organization of a nuclear physics laboratory equipped with high-performance equipment including an intense neutron source and a current source for accelerating positive ions [1]. For these achievements he became "Master of Research" and then just "Director of Research" at the French "Centre National de la Recherche Scientifique", the only Romanian who ever held such a function. In this position he worked six months a year from 1933 and until 1940, when France was invaded by fascist Germany. From 1933 he returned to Romania where he worked for 6 months a year as well. For his activity in France, Horia Hulubei was invited to participate in the organization of stands with the latest scientific applications at the Palace of Discoveries and he was awarded the prize "Henri de Jouvenel", the second foreign winner who has been awarded this prestigious award. But the highest distinction which he obtained was the fact that the Academy of Sciences of Paris awarded him the "Henry Wilde" prize in 1938 and elected him as member of the Department of Physics in the June 1940 session, thus recognizing his merits as a high class physicist [1], [2].

Parallel to the intense activity in France, Horia Hulubei took an active part in the scientific life in Romania. This is how he became lecturer at the Department of Physics and Chemistry of the University of Iasi, and since 1935 he became the titular of the course "Radioactivity and Structure of Matter". In this position he becomes quickly known and is elected on 21 of December, 1935 as the correspondent member of the Academy of Sciences of Romania, recently established on March 29, 1935 [4]. Three years later, in 1938, when he was already a professor at the Faculty of Sciences in Bucharest, he was elected a plain member of the Physics Department of the Romanian Academy of Sciences. In 1943 he became the president of the Physics Section, having as vice-president Professor Vasile Bianu and as secretary the professor Traian Gheorghiu from the Faculty of Sciences of Bucharest. Finally, on November 16, 1947 at the General Assembly of the Academy of Sciences of Romania where the former president Dr. Constantin Angelescu deposited his mandate, Dimitrie Pompeiu was elected as the new president and Horia Hulubei became one of the three vice-presidents together with Eugeniu Neculcea and Gheorghe Nicolau [5].

It has to be mentioned that in addition to his affirmation in the Academy of Sciences of Romania, Horia Hulubei was also elected in May 1937 as a correspondent member and in May 1946 as member of the Romanian Academy.

As it is known on June 9, 1948, the Decree of the Presidium of the Great National Assembly of the Romanian People's Republic was published, by which the Academy of Sciences of Romania ceased its activity, being integrated into the Academy of the Romanian People's Republic into which the former Romanian Academy has been transformed. All movable and immovable assets were transferred to the patrimony of the new Academy, and as far as members of the Academy of Scientists were concerned, only some were co-opted into the new Academy [5].

Horia Hulubei had difficulties in this regard, being considered a former Legionnaire, which is why he was arrested by Ana Pauker order. There followed a period of great uncertainty about his fate, in which the scientific community in Romania and France mobilized exemplarily, so Joliot Curie succeeded in intervening directly at Stalin for his release. Eventually Gheorghiu Dej was warned directly by Stalin in a phone call and consequently Horia Hulubei has been urgently released from prison. Gheorghiu Dej apologized himself in front of Horia Hulubei telling him that he did not know anything about Horia Hulubei case. The Hulubei response was literary: "Yes, I excuse you, but I do not believe you!"

Following his rehabilitation, Horia Hulubei was then co-opted into the newly established Academy of the Romanian People's Republic and became the head of the Physics Section in the new Academy [4], [5].

In 1948 Horia Hulubei was appointed director of the new Institute of Physics of the RPR Academy. From this position he personally supervised the creation and endowment of this institute, which soon after has been divided in two: The Institute of Physics of Bucharest and the Institute of Atomic Physics (IFA), Bucharest-Magurele, Horia Hulubei becoming the director of the latter. In this capacity he had an overwhelming influence on the development of atomic and nuclear physics in our country. IFA was created specifically for the development of nuclear reactors physics with the stated aim of obtaining nuclear energy at industrial scale. That is why the "star" of the Research Sections was the S-1 that is The Section-1 of Physics and Technology of Nuclear Reactors.

But Horia Hulubei had a broader vision and decided to develop other areas of atomic and nuclear physics research as well. Therefore, animated by the same concept of a high-end level institute, in a cooperative agreement with the former USSR, he was able to build a 2000 kW light-water and 10% enriched uranium research reactor at IFA-Bucharest, which was commissioned into operation on July 31, 1957. Thus Romania became the eighth country in the world with such an installation that propelled it to the forefront of that era.

A second objective was that within the framework of the same agreement with the former USSR, a cyclotron could be built, which came into fruition on 14 of January 1958 and which has allowed Romania to do high-performance nuclear physics research for many years [3], [4].

In this respect one can observe his research within IFA consisted of:

1. Nuclear reactor physics: studies on the neutron characteristics of the active area and dynamic behaviour under different operating conditions of the reactor (neutron spectra in the active area and the reflector or in the internal thermal column);
2. Low energy nuclear physics: the elastic and inelastic spread of protons;
3. Elementary particle physics: determining masses of elementary particles and many others that have brought international prestige to atomic and nuclear physics in the era.

As a result of exceptional research into the field of nuclear reactor physics, IFA was able to organize the Conference on Nuclear Research Reactors in the Socialist Countries in 1961, the Conference on Reactor Dynamics Methods in 1964 and other symposia or conferences with the Nuclear Energy Committee from France or IAEA-Vienna [3].

Horia Hulubei was also an outstanding doctoral adviser for a whole host of young physicists, among which is included the main author of this paper, who is the first in IFA to obtain his doctoral degree in nuclear reactor physics under the supervising of Horia Hulubei.

In 1963, Horia Hulubei was appointed as Romania's representative to the IAEA-Vienna as governor. Sometime later he was elected president of the IAEA-Vienna Department of Physical Sciences, remaining in this position until the end of his life.

Once the Unified Nuclear Research Institute in Dubna (IUCN), USSR was created, Horia Hulubei became a member of the its Scientific Council in 1956. In this position he was involved in sending to working there the best Romanian specialists in the field of theoretical and nuclear physics. Over time, Șerban Țițeica, Alexandru Mihul and Aurel Săndulescu become deputy directors at IUCN-Dubna [4].

In 1965 he also became chairman of the State Committee for Nuclear Energy, a position he held until 1970.

He prematurely died on November 22, 1972 after a short and heavy suffering!

CONCLUSION

Horia Hulubei entire activity as a scientist and citizen is characterized by a high degree of relevance and is the natural result of his love of his native country and his people, and by a complete confidence in the Romanian creative potential.

He is the man who laid the foundations of modern physics research in Romania by creating the Institute of Atomic Physics Bucharest-Măgurele. The period 1957-1972 and another 5 years after that, when the Institute functioned according to the rules conceived by him, was probably by far one of the most fecund in the history of Romanian physics. This is one of the pillars of the development of Romanian science in the centenary of the Great Union with huge contributions to the research of top physics.

Horia Hulubei is responsible as well for the development of the most important research institute of Romania (IFA) and the creation of an atomic and nuclear physics school of exceptional level materialized by the formation of a large number of scientists members of the Romanian Academy such as: Ioan Ursu, Aurel Săndulescu, Vlad Valentin, Horia Scutaru, Nicolae Victor Zamfir, Dorin Poenaru, Cornel Hațeganu, or of the Academy of Scientists from Romania, such as: Mărgărit Pavelescu, Doru Delion, I.V. Popescu, Dumitru Mihalache, Dorel Bucurescu, Vasile Cuculeanu, as well as Ionel Purica who was chief of IFA Section-1, prematurely deceased in 1990.

In recognition of Horia Hulubei immense contribution, today the Institute of Physics and Nuclear Engineering (IFIN), the direct successor of the IFA, is named after him.

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