

## IOVITZU SEEN BY NICHOLAS IONESCU-PALLAS

Ioan-Iovitz Popescu – Born on 1-st October 1932, Romanian physicist, specialist in Plasma Physics, Optics, Spectroscopy, and Laser Physics, professor of physics at Bucharest University, member of the Romanian Academy.

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Popescu Ioan-Iovitz, hence nicknamed simply Iovitzu, was born on 1-st October 1932 in Burila-Mare, a village about 40 km from the town of Drobeta Turnu-Severin, in the southern direction, in the Mehedintzi County. He is the son of Dumitru Popescu (a silviculturist) and of Elvira Popescu (born Iovitzu). The young Iovitzu enjoyed a childhood of love and intellectual plenty in the bosom of his family. Until reaching the age of seven, he lived in the county at Burila-Mare, in the house of his mother's parents, close to the Danube. Thereafter, he attended the elementary school (1939–1943) and the Lyceum Trajan (1943–1951) in Drobeta-Turnu Severin.

He was a very diligent and clever school-boy and finished his middle school reporting excellent outcomes to all subject matters. However, as a result of some lectures drawing his attention, he decided to orientate his future life toward the study of physical-mathematical sciences, especially for their minimal influence on behalf of social disciplines.

This rather unusual manner of thinking at so youthful an age was a result of the dramatic events in the life of his family: his grandmother Elena Iovitzu was deported in the plain of Baragan (the Baragan deportation was a large-scale action undertaken during the 1950s by the Romanian Communist regime with the aim to forcibly relocate social categories considered as destitute of political credence for their seating in the proximity of the Danube near the Yugoslav border). At the same time his parents and the new born brother, Tiberiu, were obliged to change the residence toward the middle of the country in Mures County, for many years to come (June 1951–1964). Only in 1964 Iovitzu's family was allowed to come back at their home in Turnu Severin.

Let us come back to the year 1951. Putting aside the worries and emotions due to uncertainty about the fate of his family, and glad, at the same time, to achieve the dream of his life, Iovitzu becomes, in the autumn of that year, a student at the Bucharest University, in the Faculty for Physics and Mathematics. In 1952, his option was for the Section of Physical Sciences. Gradually, at the extent of reducing the material cares (he obtained a stipend consisting in lodging and food at a student's canteen) the student Iovitzu focused his efforts toward improving the

quality of his studies, especially to the Department of Optics and Gas Discharge of the Physics Faculty. Here he had the great chance to meet two remarkable physicists from the Department Leadership – Professor Eugen Bădărău and Professor Radu Grigorovici. The connections of Iovitzu with these two men proved to be long lasting, determining the professional orientation and standing of the future scientist Ioan-Iovitz Popescu. In 1955, Iovitzu defended his B. Sc. Thesis entitled *The Sodium Vapor Lamp*, under the supervision of Professor Radu Grigorovici.

Among the recollections that Iovitzu gently relates, is a certain instant of his student life, when Professor Radu Grigorovici incognito sent him, through a member of the Optics Department, Ioana Savopol, the amount of 200 lei (\$20).

But the great lucky surprise that Iovitzu had at the end of his university studies was the notice from Professor Eugen Bădărău: *You will be a new member of our Department with a salary of 500 lei (\$50) per month. Tell me please by tomorrow if you agree!* On 12<sup>th</sup> April 1961 Iovitzu defended his Doctoral degree in Physics entitled *On the Mechanism of Cathodic Parts of Glow Discharges* under the supervision of Academician Professor Eugen Bădărău.

To succeed in a scientific career in Romania in the second half of the XX-th century was by no means a simple undertaking. In 1951, Iovitzu, of only 19 years old, considered Physics an ideal research domain in which a young, endowed by Nature with a real talent, could put in work his creative capabilities in the benefit of himself and of the society in the middle of which he tried to point out his personality, untroubled by the new social relations that had suddenly affirmed after the second World War. The error of this naïve approach to reality was soon realized by Iovitzu. He came across a person disposed to help him, but it was necessary to get, at the same time, the official approval of the single institution directing anything in Romania in that epoch – The Communist Party. This time too, it was the same Eugen Bădărău who came to his assistance. In 1962 he advised Iovitzu to adhere to the Communist Party, as the single way to hasten the delayed approval of his Ph. D. Thesis. Two years later Iovitzu's parents, brother, and grandmother were authorized to come back to Turnu Severin.

Thereafter, a certain leisure lasting for many years, permitted to both senior and young physicists to dedicate their time and efforts to the scientific research.

Concerning Professor Eugen Bădărău (who changed his birth locality from Ismail, Basarabia, in Ukraine to Foltesti-Covurlui, in Romania were in order to prevent a forced “repatriation” in the land of Socialism) the correct data of his biography were published not early than in 1982, seven years after his death (see *Personalities of Science and Techniques in Romania*, 1982; a biography of Ioan-Iovitz Popescu, who, at that time, in 1981, was appointed as rector of the Bucharest University, may be equally found in this Dictionary).

Now, let us imagine a jump in time, allowing us to put together the two biographies in a parallel approach. We dare to say that not only Iovitzu is a creation of Bădărău, but equally well that Bădărău is much indebted to Iovitzu and that Bădărău chose Iovitzu as continuer of his efforts to create a Romanian school in his professional branch (Plasma Physics). As a matter of fact, Bădărău understood the necessity to change the old-fashioned manner to approach Physics “mainly

experimentally” and encouraged Iovitzu to write an almost complete treatise on Gas Discharge Physics (Editura Tehnica, Bucharest, 1965), translated also in French and published by Dunod, Paris (1968). Moreover, Bădărău, resorting to his international scientific relations, organized in Bucharest the IX-th International Conference on Ionization Phenomena in Gases (1969) and appointed Iovitzu as its Secretary General.

Meanwhile, in 1963, Iovitzu married Denisa-Georgeta Chiru (his future closest co-worker) and, taking advantage from a political window open toward the western world, went together with his wife to Germany in a postdoctoral Humboldt Fellowship at the University of Kiel (1967–1969). There, Iovitzu and Denisa had the opportunity to work together with Professor Johannes Richter on a problem of high accuracy in the Atomic Spectroscopy (*Absorption Spectroscopy of Excited Cesium Atoms* – *Zs. Phys.*, **226**, 160 (1969)). Iovitzu considered this work as being the first of a series constituting “the birth of Optogalvanic Spectroscopy”. This was closely followed by a highly productive collaboration of Iovitzu and Denisa with Professor Carl B. Collins (the director of the Center for Quantum Electronics of the University of Texas at Dallas), leading to basic contributions in laser spectroscopy, published in top-ranked journals, such as the experimental discovery of the first atomic multiphoton spectra, *Multiphoton Excitation and Ionization of Atomic Cesium with a Tunable Dye Laser* – *Phys. Rev. A*, **9**, 1182 (1974). They extended the most sensitive method, called thermionic detection, to molecular multiphoton spectroscopy as well, see *Phys. Rev. A*, **8**, 1666 (1973); *Phys. Rev. A*, **8**, 2197 (1973); *Phys. Rev. A*, **10**, 813 (1974); *Phys. Rev. A*, **12**, 1425 (1975); *Phys. Rev. A*, **14**, 1662 (1976); *Phys. Rev. Lett.*, **44**, 139 (1980); *Appl. Phys. Lett.*, **37**, 888 (1980); *J. Chem. Phys.*, **74**, 1053 (1981); *J. Chem. Phys.*, **74**, 1067 (1981); *J. Chem. Phys.*, **75**, 4852 (1981). This whole joint Romanian-American scientific endeavor has been generously supported by the US National Science Foundation (NSF).

The scientific activity of Ioan-Iovitz Popescu is complex and varied; its starting point is the experimental equipment, and its objective aims at fundamental knowledge about the structure of matter, through the intermediary of increasing the accuracy and of inventing new and powerful procedures. He was able in this way to give a new and interesting course of the old and classical field of gas discharges and even to suggest new analogies into the nuclear domain. Particularly fruitful was Iovitzu’s seminal idea of a possible energy release from long-lived nuclear isomers – a conjecture made in his plasma physics lectures held in 1978 about an analogical mechanism of radiation triggering of atomic metastables transposed to nuclear spectroscopy. This idea has been worked out and launched with his student Silviu Olariu and Professor Carl B. Collins in the articles *Amplification of Gamma Radiation from X-Ray Excited Nuclear States* – *Rev. Roum. Phys.*, **27**, 559 (1982) and *The Coherent and Incoherent Pumping of a Gamma-Ray Laser with Intense Optical Radiation* – *J. Appl. Phys.*, **53** 4645 (1982), and in the previous ones

published with Marius Petrascu in *Phys. Rev. Lett.*, **42**, 1397 (1979); *Phys. Rev. C*, **20**, 1942 (1979); *Phys. Rev. C*, **23**, 50 (1981).

Dramatically, this hypothesis, made 30 years ago, stirred up, since a few years on, an international controversy, see Wikipedia under the title *Induced gamma emission: Hafnium controversy*.

This began shortly after the First International Gamma-Ray Lasers NATO Workshop, held in Predeal, Romania, 1995 (volume 107 of the journal *Hyperfine Interactions*, 1997, is entirely devoted to its proceedings), when Carl B. Collins and his international team (to which Iovitzu and Calin Ur belong too, as well as the Romanian students Claudiu Rusu and Catalin Zoita) focussed their research on the long-lived high-spin Hafnium-178 isomer. They did succeed to demonstrate experimentally, for the first time, that controlled triggering of gamma rays from this isomer is possible with photons in the soft X-ray range and published their achievements in *Phys. Rev. Lett.*, **82**, 695 (1999); *Phys. Rev. C*, **61**, 054305(7) (2000); *Hyper. Inter.*, **135**, 51 (2001); *Europhys. Lett.*, **57**, 677 (2002); *Laser Phys.*, **14**, 154 (2004); *Radiation Phys. and Chem.*, **71**, 619 (2004); *Laser Phys. Lett.*, **2**, 162 (2005). These works represent the experimental discovery of induced gamma emission of the 31-yr isomer of Hafnium-178 for which about 10 keV were needed to trigger its high excitation energy of 2.445 MeV. Prior to these works it has been thought to be impossible to trigger the release of the great energy density stored electromagnetically in nuclear spin isomers.

A successfully independent confirmation of this valuable scientific achievement has recently been made at the National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory and presented by Patrick McDaniel and his team in a Sandia Report (SAND2007-2690, January 2008) entitled TRiggered Isomer Proof (TRIP) Test. It is perhaps worthwhile to mention that this whole effort has been funded by the US Defense Advanced Research Projects Agency (DARPA).

A companion project has been supported by the US European Office of Aerospace Research and Development (EOARD) through the Induced Gamma Emission Foundation at Bucharest (directed by Iovitzu) for the production of the Hafnium-178 isomer, as reviewed in the present issue by Calin Ur and Sarkis Karamian.

In a fascinating contrast, the recent linguistic outburst of Iovitzu is also reviewed in the present issue by the outstanding German linguist Professor Gabriel Altmann.

Finally, the social relevance of Ioan-Iovitz Popescu is one of the most impressive among those to be encountered in the second half of the XX-century in Romania. A simple enumeration reveals a continuous promotion, step by step, from the simple stage of assistant at the Physics Faculty in 1955, to that of professor in 1972, Dean of the Faculty in 1972, Director of the Institute of Physics and Radiation Technology in 1977, Rector of the Bucharest University in 1981, corresponding member of the Academy in 1974, full member of the Academy in 1990, and Director of the Romanian Foundation for Induced Gamma Emission in 1995. A similar honors list is to be found to the late Professor Ioan Ursu.

Iovitzu enjoyed the friendship and collaboration of many valuable scientists, among which we nominate here his mentor Academician Professor Eugen Bădărău, his wife Dr. Denisa Popescu, Professor Carl B. Collins, Professor Johannes Richter, Professor Gabriel Altmann, Professor Radu Titeica, Dr. Silviu Olariu, Dr. Calin Ur, and many other close colleagues as professors Iancu Iova, Florea Uliu, Constantin Stanciulescu, Mihail-Lucian Pascu, Constantin Ghita, Geavit Musa, Ani Surmeian, Mihai Ganciu, Rudolf Emil Nistor, Razvan Bobulescu *et al.*

We have only to add that the professional ascensions of the two mentioned scientists – Ursu and Iovitzu – are motivated by their works and results, as well as by their respectable and moral standing of their lives.