

## A worthy disciple of his great teacher

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The scientific and social life of Georges Lochak is inextricably linked with the name of the outstanding physicist Louis de Broglie, whose contribution to the formation of modern physics is beyond doubt. Having first met Louis de Broglie during his formative years as a physicist, Georges Lochak became his pupil, then a follower and supporter of de Broglie's ideas, achieved great results in theoretical physics.

Georges Lochak became de Broglie's closest collaborator and friend, continued the work of the de Broglie's school with honor and did a lot for the wide dissemination of de Broglie's ideas. A great place in his scientific activity was occupied by books in which he continued the traditions of the scientific school of Louis de Broglie in presenting complex physical theories, the foundations of modern physics to the general public in scientific and popular language. He considered this activity very important, as did his great teacher. Georges had a talent for expounding concretely, figuratively and expressively, led to an understanding of the essence of the most abstract physical theories. Among such books that have become famous all over the world are "Quanta, Grains and Fields", "La Géométrisation de la Physique", "Louis de Broglie, un prince de la science" [1-3].

In theoretical physics, he presented a coherent theory and is the author of the "Lochak Monopole". Lochak has been developing the theory of the leptonic magnetic monopole for 30 years. For the first time, back in 1956, he published, with de Broglie's approval, a note on the formula derived from the Dirac equation, which remained incomprehensible for many years. Then Lochak returned to this theory and, together with his colleagues, continued to develop it. In 2010, an international conference dedicated to the magnetic Lochak monopole was organized in Paris, at

which both theoretical results and experiments on the detection of these particles were reported. Today, this theory has taken its place in the list of modern physical theories.

My personal acquaintance with Georges Lochak took place in 2009 in Paris at the Louis de Broglie Foundation. I came at the invitation of the Louis de Broglie Foundation to discuss with its president, who was Georges Lochak, the contents of selected scientific works of Louis de Broglie in Russian. The first volume "Selected scientific Works of Louis de Broglie" was published in 2010, and the last fourth volume was published in 2014 [4]. It is a great honor for me to recall the role and significance of Georges Lochak for our joint publishing project and for me personally, because in addition to publishing "Selected scientific works of Louis de Broglie", I defended my scientific dissertation for the degree of Doctor of Sciences "Louis de Broglie and his role in the development of quantum mechanics". The dissertation Council in Moscow received a positive review from Georges Lochak written in Russian on the eve of my dissertation research report. I will always remember with gratitude his kind attitude and support.



A friendly reception in Georges' apartment, Paris, February 2010. L. Urutskov is on the left of G. Lochak, the author of the article is on the right.

Georges Lochak headed the editorial board for the publication of works in Russian by his great teacher. Besides me, the editorial com-

mittee for the preparation for the publication included professor Leonid Urutskoev, personal friend and co-author of many scientific works by G. Lochak, as well as well-known Russian scientists Henri Rukhadze, Yuri Rybakov and Nikolai Samsonenko. Russian professors Rybakov and Samsonenko had a scientific internship at the Institute Henri Poincare in different years and spoke at the famous Louis de Broglie seminar.

Even in his younger years, Georges received invitations to scientific conferences held in different countries, spoke and was always surrounded by friends and like-minded people. He had such like-minded people in Russia. In order to carry out a publishing project to publish de Broglie's works, Georges flew to Moscow, where he met personally with the rector of the state technical university, who agreed to support our project. Georges Lochak delivered a brilliant lecture on the state of modern physics to Russian students and was met with great enthusiasm. For his contribution to the development of physical education, Georges was awarded the title of honorary professor at two universities in Russia - the Moscow State University of Printing and the Peoples' Friendship University of Russia. I was lucky enough to communicate a lot with Georges for several years, to interview him. In these interviews he talked about the significance of de Broglie's work, the questions he posed that are still waiting for an answer, the mission of the Louis de Broglie Foundation, as well as his personal contribution to the development of modern physics. These interviews have been published in the Russian scientific and technical journals "History of Science and Technology" and "Engineering Physics". Thanks to such activity of Georges, de Broglie's ideas found a response and followers far beyond the borders of France, and the name of Louis de Broglie became familiar to younger generations.

Georges Lochak was connected with Russia not only by his Russian origin, his parents had left Russia before Georges was born, but also most of his scientific activities. In 1956, being a fairly young man, Georges Lochak came to Moscow as part of the exchange of scientists between the Soviet Union and France - France, represented by Louis de Broglie, accepted a Soviet physicist for work, and Georges Lochak came to the Soviet Union. For more than a year, he and his wonderful wife Michelle Lochak lived in Moscow. Georges worked in the Theoretical Department of the Joint Institute for Nuclear Research (JINR). JINR a world famous scientific center that is a unique example of integration of fundamental theoretical and experimental research with development and application of the cutting edge technology and university education. The rating of

JINR in the world scientific community is very high. This place is a great place to start a successful scientific career. So it happened with Georges, who returned to the Institute Henri Poincaré (IAP), in the Louis de Broglie group. Until the end of his life, Georges Lochak considered himself a disciple of de Broglie, was spiritually connected with him, shared and developed his ideas for creating a mathematical apparatus for the theory of double solutions, in which there would be a fused image of a wave and a particle. In 1992, Georges wrote the book "Louis de Broglie, un prince de la science", which presents the most complete scientific biography of Louis de Broglie and which can be attributed to the best examples of popular science literature. In 2010, this book was translated into Russian and it was included in the first volume of our joint publication of scientific works by Louis de Broglie [4].

Of great importance for the younger generation of physicists entering the path of science are popular science books, which demonstrate the history of the emergence of various concepts. Such books were written by Georges Lochak, who was already a famous physicist. In 2005, the magnificent book "Geometrization of Physics" was translated into Russian and sold very quickly.

With a great love for science, Georges Lochak tried to comprehend its role in modern civilization in his book "Science and the Shadow", which was translated into Russian in 2009 [5]. Georges has his own unique style, which combines sarcasm and irony, a brilliant command of the history of science and philosophy. When reading his popular science books, you always realize that they were written by a brilliant theoretical physicist who also knows the experimental basics.

I want to express my gratitude to Dominique, who has been Georges' assistant for many years, with her help we received the necessary photocopies of books and numerous articles from the Louis de Broglie Foundation. Our publishing project was completed in 2014, but we continued to communicate with Georges Lochak. With the support and assistance of Georges Lochak, I was able to summarize a lot of material about the de Broglie scientific school, in which the main role was played by a scientific seminar that existed for several decades and the dissertations of numerous de Broglie students. My article about Scientific school of de Broglie and its role in the development of theoretical physics was published in the «Annales de la Fondation Louis de Broglie» [6]. I am very grateful to Georges for the preface he wrote to my article: «L'École de Louis de Broglie a été en son temps très nombreuse jusqu'à des centaines

de membres. Elle a eu une grande influence dans le monde occidental. Avec Olivier Costa de Beauregard et Marie-Antoinette Tonnelat j'ai été un des derniers représentants de cette Ecole de de Broglie... C'est dire combien le travail du Professeur Alexandra Smyk est particulièrement le bienvenu dans les Annales de la Fondation Louis de Broglie».

The memory of Georges Lochak, a wonderful man, a great scientist and a faithful disciple and follower of Louis de Broglie, will forever remain in my heart.

## References

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