

Report from Academician V. A. Fock

The Journey to Copenhagen

Vestnik Akademii Nauk SSSR
(Vol. 27, No. 7, p. 54-57 (July 1957)

(Taken from a Danish translation)

On the invitation from the Danish physicist, Niels Bohr, I have, in February and in March, 1957, spent a little more than a month in Copenhagen. For many years I had thought about talking and working a little with Niels Bohr, who perhaps is the greatest among contemporary physicists, but these plans took a more concrete form in 1955, after a conference in Bern (Switzerland), which was held in commemoration of the 50th anniversary of the theory of relativity. At this conference Niels Bohr's collaborator, Professor Christian Møller, on behalf of Niels Bohr and the Institute for Theoretical Physics in Copenhagen of which he is the director, expressed the wish that I should come there and work for a while. This invitation was confirmed by Niels Bohr in 1956, and, when Niels Bohr's son, Professor Aage Bohr (who in Copenhagen has the Chair for Theoretical Physics) came to the U.S.S.R. in September, 1956, I arranged with him the time for my visit in February, 1957. The frightening events which took place at the end of 1956 luckily had no influence on the realization of these plans, and on the 12th of February, 1957, I flew from Moscow to Copenhagen, where I arrived in the evening of the same day.

After I had been installed at the hotel, to which Professor Aage Bohr and his wife brought me after they had welcomed me at the air field, I went the next day to the Institute for Theoretical Physics to meet the members and start working.

Besides a smaller number of permanent members (Danes and physicists from other Scandinavian countries), a considerable number (30 or more) of young physicists invited from countries all over the world are working at the Institute. In particular, three Soviet physicists had been invited, but regrettably had not yet arrived. At the Institute one sees a group of young theoretical physicists vividly occupied by a general scientific interest.

All the physicists come to the Institute every day. Every one of them has his own--even if not very big--office. At the Institute there are also experimental laboratories, and the term Institute for Theoretical Physics is, therefore, not quite accurate. The lunch room serves as Common Room, where everybody comes together twice a day for tea or coffee (one has to buy sandwiches in a nearby shop and bring them back). It is characteristic that besides paper napkins there are sheets of paper on the tables upon which one can write formulas.

During my stay, i.e. about a month, everyone gathered together twice for an evening's entertainment, where one showed movies and where the participants themselves entertained

(accompanied by general laughter, the theoreticians had to perform very simple experiments), and a modest evening meal was served.

My work at the Institute consisted of attending other scientists' lectures and speeches and above all conversations with Niels Bohr about the fundamental problems of quantum mechanics.

At the request of Professor Möller I gave in English three lectures on the theory of relativity. The theme of the first one was "On the Concepts of Homogeneity, Covariance and Relativity," the second, "Approximate Solutions of Einstein's Equation," and the third, "Gravitational Waves." Even if only a few physicists at the Institute were especially occupied with the problems of relativity theory, almost all of the members, including Niels Bohr, attended the lectures, and the discussion with him was very lively; my point of view, which is somewhat different from Einstein's, was met with interest and understanding.

All three lectures took place within the same week because Professor Möller, who more than anybody else was interested in them, had to go away for some time (to Italy). I gave the English text to the lectures to the Institute's library and sent a copy to Professor Möller in Italy.

Besides the lectures on the theory of relativity, I gave a lecture on my work from 1954 on the theory of the helium atom. In the United States and in Norway calculations are now being performed based on the formulas which I derived in this paper and, as a result, my lecture was discussed very vividly.

The most interesting thing for me was the conversations with Niels Bohr on the foundation of quantum mechanics. There were seven or eight such conversations. Some of them took place at the Institute, others in Niels Bohr's home, where N. Bohr and his wife received me with unique cordiality. We were not able at once to fix "the procedure" for the discussion. Above all, there was the difficulty that Bohr became so engaged in the formulation of his thoughts that it was difficult for me to enter into the conversation. Later, however, the situation was improved, and the conversations acquired a more two-sided character. Exchange of views was furthered by the fact that I gave Niels Bohr my answers in a written form and also that Aage Bohr (the son) and Aage Petersen (the assistant) took part in our conversations and helped me to clarify what N. Bohr thought about my point of view.

In this article I cannot enter into a detailed explanation of the content of our conversations. I only want to say that I have touched the question of how one can combine the objectivity of the properties of atoms with the necessity of considering the experiment as a wholeness and of drawing conclusions about atoms from the reading of instruments, the question of determinism in Laplace sense and of causality in a more general sense, the question of a s-called uncontrollable interaction, etc. Bohr declared from the

beginning that he is not a positivist and that he simply endeavors to consider nature as it is. I pointed out that many of his formulations suggested a positivistic interpretation, which obviously he did not at all wish they should. I stressed the necessity of giving all quantum-mechanical concepts "a rational foundation" as reasonable abstractions on the basis of his own interpretation of the experiment. He answered that in no way did he reject their lawfulness. Our points of view gradually became closer; in particular, it became clear that Bohr fully recognizes the objectivity of atoms and their properties. He realizes that one only has to neglect determinism in the sense of Laplace, but not causality in general, that the expression "uncontrollable interaction" is inadequate and that all physical processes are controllable. Perhaps it should be said that the similarity of our points of view only became clear through our conversations, but that it had existed before and independent of the conversations.

The conversations with Niels Bohr were extremely interesting, not only from the scientific point of view, but also they permitted me to get acquainted with this great scientist and admirable person.

I have become aware that even if he is more than seventy he is spiritually young, that he can get excited and talk passionately, but that he always speaks honestly. He doesn't try to impress you by his authority, but is convinced that he is right and he considers a patient exposition of his point of view as a weapon in a discussion. At the same time he is always ready to weigh his opponent's view and to accept from it what he considers right.

Bohr does very much to promote contact between scientists of different countries, and there is no doubt that just due to this endeavor there exists at Bohr's Institute the friendly spirit which is so important for a fruitful scientific collaboration. This spirit also showed itself when, during my work at the Institute, I was approached by young physicists from different countries, Americans, Danes, Norwegians, Frenchmen, Swedes, Yugoslavians, Japanese and others, who sometimes asked me questions and sometimes just wanted to show me their work. Of course, from this one cannot draw the conclusion that the spirit of collaboration in scientific work and of friendliness in personal matters also is extended to the political field. The influence of the reactionary propaganda is very strong in the West and even leading personalities in the West look upon many questions with quite different eyes than we do, and they see the white as dark and the dark as white. But the most important and most effective means in the fight against distorted ideas about the Soviet Union and its international role lies in personal contact between us and other countries. Not only should scientists, authors, actors, and athletes visit each other, but also ordinary tourists. The best way to establish a friendship, however, is common work, and, therefore, it seems that long scientific visits abroad of older as well as younger scientists are particularly important.

I have spoken with Niels Bohr many times about the necessity of strengthening personal contacts, once at a minor reception in the Soviet embassy arranged by our ambassador, N. V. Slavin (the 12th of March) in connection with my departure from Copenhagen (I left Copenhagen on the 16th of March).

Finally, a few words about my impressions as a tourist. Everywhere in Copenhagen one feels the closeness of the sea. Outside my windows in the hotel there is a canal (the entrance to the inner harbor) over which there is a bridge which can be opened for boats. The central part of the city is on the northern side limited by some long narrow lakes which give the impression of a river or a canal, but which unexpectedly end. On these lakes there are gulls, ducks and swans, and in the whole of Copenhagen, and especially in the older part of town, the pointed towers are particularly characteristic. In the town there are many parks and open places, but they make an unpleasant impression by the circumstance that they are filled with military huts* with concrete walls rising from the ground provided with portholes. These huts were built partly during the German occupation and partly after the end of the war. Considering the fact that in military respect they are useless, it is difficult to avoid the thought that the reason for their construction is to keep up the atmosphere of the "cold war." One must say, however, that this atmosphere is hardly shared by many. The relation to me as a Russian has the whole time been fully friendly, not only from the physicists but also from people who didn't know me at all. In Denmark one remembers the role of the Soviet Union as a liberator in the last war. I want to conclude these remarks with a feeling of deep gratitude towards my Danish colleagues and especially towards Professor Niels Bohr and his wife and to Aage Bohr's family for the cordial and friendly reception. My conversations with Niels Bohr--this great scientist and at the same time unusually modest and admirable person--will always remain in my memory.

* Translator's note: These are actually air-raid shelters.