

§3. Studies on History of Nuclear Fusion Research at the Dawn Stage

Amemiya, T. (CST, Nihon Univ.),
Matsuoka, K., Iguchi, H., Namba, C., Kuroda, T.,
Kimura, K., Endo, M., Matsuda, S. (Tokyo Inst. of Tech.),
Yoshida, H. (JAEA), Uematsu, E. (CST, Nihon Univ.)

1. Background and Purpose

The studies on history of plasma physics and nuclear fusion research in Japan have been accomplished by historians of science, sociologists of science and nuclear fusion researchers. In 1987, Satio Hayakawa and Kazue Kimura published three articles “Kakuyugo Kenkyu Kotohajime (the beginning of nuclear fusion research at the dawn stage in Japan) (1), (2), (3).” Their articles discussed the historical facts in detail in the 1960s with the historical materials. Therefore, many papers and articles on history of nuclear fusion in Japan frequently cited several texts from Hayakawa and Kimura’s article as secondary sources. However, there are a lot of historical facts which did not be covered in previous studies.

In recent years, a lot of historical materials have been collected by NIFS FSA and it becomes rather easy to retrieve new materials. This report summarized the results of our research on history of plasma physics and nuclear fusion research in the 1960s carried out by the joint research program of CST Nihon University and NIFS FSA.

2. Research Result: On the origin of the A-B plan and Institute of Plasma Physics (IPP) based on the questionnaires of future plan of nuclear fusion research in Japan

In this fiscal year, our research was focused on the historical fact about the origin of the A-B plan and Institute of Plasma Physics (IPP), Nagoya University. The results of our research were presented at the 2014 fall meeting of the Physical Society of Japan.

The A-B plan was proposed and discussed in Kakuyugo Senmonbukai (the Special Panel on Nuclear Fusion Research) between 1958 and 1959. The A-plan aimed at training and shape of the new theory (mainly basic research of plasma physics); the B-plan at introduction and makeup of the middle size device already in operation abroad. As the result of the A-B plan dispute (1959), the strategy of nuclear fusion research framework in Japan was decided to begin a basic research on plasma physics. After that, IPP was established as an inter-university research institute in 1961. That is, IPP was expected to play a role as the implementing body of the A-plan. However, based on the historical document of “questionnaires of future plan of

nuclear fusion research in Japan” (NIFS FSA Archives ID: 301-13-05/301-05-04), it has been clear that IPP was closely related to the A-B plan, contrary to the common belief.

In July 1958, Kakuyugo Kondankai (the Society of Nuclear Fusion Research in Japan) sent out questionnaires of future plan of nuclear fusion research in Japan to researchers nationwide. This questionnaire consists of (i) the research expense in the 1959 fiscal year, (ii) the research plan in the 1960 fiscal year and (iii) the framework of Central Laboratory of nuclear fusion research. According to the summary of questionnaires, for example, Group of the Faculty of Science, the University of Tokyo (Goro Miyamoto et al.) proposed that the Central Laboratory should perform both basic studies (plasma physics) and studies on makeup of the sizable device (plasma confinement). This proposal was just the A-B plan. On the other hands, Shoji Kojima (Tokyo University of Education) positioned Institute for Nuclear Study (the University of Tokyo) and Japan Atomic Energy Research Institute (JAERI) as the Central Laboratories. Also he proposed that the original device and new theory should be covered at Institute for Nuclear Study and JAERI should cover method of measurement and construction of an orthodox device like ZETA (U.K.). That is to say, the original of the A-B plan was proposed by a part of the researchers before the discussion of Kakuyugo Senmonbukai and was related to the Central Laboratory before the planning of IPP in Kakuyugo Tokubetsu Iinkai (the Special Committee of Nuclear Fusion). In August 1959, Hideki Yukawa (a chairman of Kakuyugo Senmonbukai) made a final decision of the postponement of the B-plan. Therefore, a research plan of nuclear fusion research in Japan was settled to start by the study the basic plasma physics. In this trend, IPP was established. As a result, IPP and the A-plan were interpreted to be closely related. However, strictly speaking, IPP (the Central Laboratory) was related not only to the A-plan but also to the B-plan judging from some answers to the questionnaires.

3. Summary and Future Planning

As a result of this collaborative research in this fiscal year, new historical interpretations of the relationship between the A-B plan and IPP were found by historical documents that are filed in NIFS FSA.

The following studies are planned in next fiscal year: (i) On the discussion of establishment of IPP in Kakuyugo Tokubetsu Iinkai and (ii) Effort of nuclear fusion community in Japan toward the Second United Nations Conference on the Peaceful Uses of Atomic Energy.

This work was conducted under NIFS Collaborative Research Program (NIFS14KVXP022).