

6. Fusion Science Archives (FSA)

The Fusion Science Archives was established in 2005 to learn a lesson from the past fusion science archives preserved and to maintain collections of historical documents and materials that are related to fusion research in Japan. These activities are important from the viewpoint of the historical evaluation of fusion research, its social accountability and making references for seeking the future direction.

Since then historical materials on fusion research and/or organizations related to fusion research have been collected and preserved at FSA. They are stored in acid-free folders and boxes. The total number of registered items is now about 25,371. Most of those catalogues are available to the public through the internet in a hierarchical structure and can be accessed by the use of an electronic retrieval system.

Following collaborative works are performed this scal year along this line:

- **Collection of Historical Materials on Fusion Research in Japan by Oral History Method**

(NIFS16KVXV001) C.Namba *et al.*

FSA has tried to collect and preserve any available materials so as to fulll wide variety requests from various view point of fusion science archive, but never complete. Oral histories through interviews with fusion researchers who played important roles in the past may supplement the incompleteness. In the scal year of 2016, Dr. I. Kawakami who worked as a principal editor of “Kakuyugo Kenkyu” and played an important role in establishing the fusion research community was interviewed. Edition of the interview record is almost completed and will be published soon.

- **Collaborative Activities at NIFS Fusion Science Archives (NIFS FSA)**

(NIFS16KVXV002), S. Kubo *et al.*

The purpose of this collaboration is to arrange and promote the general archival activities under the NIFS collaboration framework. More than 50 researchers from universities and research institutions have joined this collaboration research. Online publishing the catalog database using a commercial cloud server is running.

About 1,700 items among total number of 25,371 are open through Internet now. The rst natural science archives meeting in this scal year under the research institutions of SOKENDAI framework was held at KEK on August 2nd and 3rd with the theme “Utilization and Application of the Archived Materials”. The second meeting was held at NIFS in December 7th and 8th, 2016 with the theme “ Digital Archives”.

- **Studies on History of Nuclear Fusion Research at the Dawn Stage**

(NIFS16KVXV004), T. Amemiya (CST, Nihon Univ.) *et al.*

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

“On the discussion of establishment of IPP in Kakuyugo Tokubetsu Iinkai” and “Effort of nuclear fusion community in Japan toward the Second United Nations Conference on the Peaceful Uses of Atomic Energy” were studied this scal year.

- **Study on the Practical Issues in the Operation of the Internet Searching System between Natural Science Archives**

(NIFS16KVXV005), Y.Takaiwa (KEK) *et al.*

It is important to provide compact and easy cross referencing method to discuss the history of a scientific research by archiving historical documents stored individual research institutes, since any scientific research activities are performed under mutual interactions or in uences between them. This project is now studied in two systems, [A] *The SOKENDAI Archival Information Database* and [B] *A database server for nding aids of Memorial Archival Libraries of H. Yukawa, S. Tomonaga, and S. Sakata placed at YITP, Kyoto University*. These two systems have been operated fairly well, but still needs upgrades to be user friendly system. The system [A] is adopted by NIFS FSA, KEK Archives Office and Sokendai Archives and effectively utilized.

Issues here is that it is necessary to extend the database over the eld of the other Sokendai's parent institutes, which does not have rigorous archival organization inside.

- **Search and Analysis of the Historical Materials on Fusion Research and Development Project**

(NIFS16KVXV006), H. Yoshida *et al.*

It is important to historically analyze the development research in fusion, in particular, how the Japanese fusion development research was started. The tokamak research history beginning in 1960's JFT-2/JFT-2a through JT-60/JT-60U evolved to ITER project is analyzed from more than 900 historical materials contributed by Kenzo Yamamoto and Shigeru Mori. The intension of K.Yamamoto and S.Mori, the effect of Shoichi Yoshikawa in PPPL and the contribution of Masaji Yoshikawa are clarified and re-recognized

to have had played important roles in selecting tokamak as a main research and development stream. The history of the fusion engineering development research beginning in the middle of 1970's is also analyzed. The origin of the systematic fusion engineering development research can be identified in the JAEA internal meeting organized by S. Mori.

- **Archival Studies on Collaborations in Heliotron Studies at Kyoto University**
(NIFS16KVXV007), T. Mizuuchi (IAE, Kyoto Univ.) *et al.*

This archival study is focused on the fusion oriented high temperature plasma experiments performed in the series of Heliotron devices at Kyoto University. After the POP experiment in Heliotron E (Kyoto Univ.), the Helical-Heliotron concept is now in its parameter expansion phase and a lot of remarkable results have been obtained through the LHD project in NIFS. On the other hand, a new generation of the heliotron concept, Helical- Axis Heliotron configuration, was proposed and has been experimentally examined its basic ideas through the Heliotron J project in Kyoto Univ. Comprehensive and systematic collection of the research materials on each heliotron device, including the materials about technical notes in the R&D phase of machine construction and of control sequences, the minutes of experimental meetings/discussions at each stage are pursued under the collaboration program. In addition to collecting these documents, making a digital library of photographic slides of experimental devices and presentations in the Heliotron E era, restoring the raw data of Heliotron E experiments (including some program files for data analyses) into a set of hard-disk (HD) have been performed.

- **Archives of the Historical Material related to the Plasma Spectroscopy**
(NIFS16KVXV008), N. Yamaguchi *et al.*

Plasma spectroscopy is a cross sectional research area which covers plasma physics, atomic and molecular physics, spectroscopy and diagnostic technics. The plasma spectroscopy research in Japan was started and developed along with the plasma physics research in Institute of Plasma Physics, Nagoya University (IPP). Masamoto Ohtsuka (Prof. emeritus of IPP) is one of the pioneers of this field. The research methods and lecture notes of him are found in the collected archives. These materials are analyzed and edited to be an introductory text for plasma spectroscopy.

- **History of the establishment and evolution of Inter-University Corporation System**
(NIFS16KVXV009), H. Iguchi *et al.*

The "Inter-University Research Institute Corporation System" had been developed by research centers established in individual universities. The roles of these systems had been transferred to newly established institutes directly under ministry of education since KEK was established in 1971 until NIFS was established in 1989. The history of these systems is analyzed in relation to the Japanese science research policy.

- **Establishment and Evolution of the Inter-University Research Institute Corporation System**
(NIFS16KVXV010), K. Matsuoka *et al.*

Here the history of Institute of Plasma Physics, Nagoya University (IPP) is analyzed. The topic of the first year of collaboration is the reason why IPP could not take the initiative at the foundation of NIFS irrespective of the substantial number of staff at IPP. IPP was founded in 1961 and combined to form NIFS in 1989 together with Plasma Physics Laboratory Kyoto University and Institute for Fusion Theory Hiroshima University. The reason could be attributed to the research policy at the middle period of IPP history (1970s).

The original mission of IPP was to investigate basic plasma physics and attained remarkable achievements in the basic plasma physics as symbolized by the three Nishina Memorial Prize awarded researches in 1956, 1965 and 1969. At the middle period JIPP-I stellarator (1971) and JIPP T-II stellarator /tokamak were constructed in view of the importance of confinement study. However, they could not form a major group under the tendency of emphasizing "originality" in the machine concept, and a variety of machines based on several "originalities" were constructed, but never survived as a fusion machine.

- **Accountability of Research Activity and Archives**
(NIFS16KKGV002), E. Kikutani *et al.*

In the archives activity during this one decade, we have analyzed a history of the inter-university research institutes and discussed the value of these existence. The importance of the knowledge of archives themselves and the method of operating archives activity have been re-recognized. "The accountability of research activity" is picked up this year. Main body to perform the responsibility to explain the research results should be "Public Relation Division" or equivalent in each institute. Archives can contribute to this accountability by preserving the records of research activity in each institute. In this regard, the meeting is organized with the theme "Digital Archives" during December 7 to 8, 2016. Invited speaker was Dr. S. Tokizane (U. Tokyo) with the title "Development of Digital Archives". Related six contributions are given and discussed the issues of "Digital Archives".

(S. Kubo)