

# 6. Fusion Science Archives (FSA)

The following collaborative works are performed this fiscal year:

- **History of Establishment and Evolution of Inter-University Collaboration System**

(NIFS16KVX009) H. Iguchi *et al.*

The “Inter-University Research Institute Corporation System” has been developed by research centers established in individual universities. The history of such “Inter-University Research Institute Corporation System” can be divided into three generations. **1951 to 1975:** The Yukawa Institute of Theoretical Physics as the beginning, many “Joint Usage/Research Centers of Japanese National Universities”, have been established based on the advice of the “Science Council of Japan”. The Ministry of Education started to govern Japanese science policy. **1976 to 2000:** Many “Inter-University Research Institute Corporations under the direct control of the Ministry of Education” were established after KEK (High Energy Physics Institute, established in 1971). NIFS was established in 1989, and was almost the last in this trend. These institutes organized the “Graduate School of Advanced Study” to give a specialized education and the degree of doctor. **2000 to present:** National universities and inter-university research institutes became independent corporation in 2004. The joint research system was reorganized to introduce the “Joint Usage/Research Center of Excellence” system.

- **History of Institute of Plasma Physics Nagoya University**

(NIFS16KVXV010) K. Matsuoka *et al.*

Following last year’s investigation, it was investigated how the research was performed in the Institute of Plasma Physics, Nagoya University (IPPJ) developed or affected the present researches. These were roughly divided into three fields, “Fusion Science”, “Reactor Technology” and “Plasma Science”. In the field of “Fusion Science”, it was found that the Akihiro MOHRI had built a SPAC-I ( $l=2$ ,  $m=21$  Torsatron) in 1970. This configuration that forms flux surfaces by external winding coils is now a standard “Heliotron” configuration adapted in Heliotron-E, CHS, and LHD. In the “Reactor Technology” area, the Council for Science and Technology issued the statement in 1980 to promote R-project in terms of the long term policy of fusion science in the universities. The development of the negative ion-based neutral beam injector (N-NBI) was initiated in IPPJ. In the “Plasma Science” area, many pioneering researches, including quiet high density plasma production by TPD-I and II were started and subsequently developed into new area of sciences and technology or were applied to industry.

- **Historical investigation of collaborative research meeting on plasma spectroscopy**

(NIFS17KVXV011) 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). This fiscal year, data of the workshop on “Plasma elementary process” were collected from “KAKUYUGO KENKYU” and its suppliments (1962-1984), “IPPJ Letter” (1983-1987), “IPPJ monthly” (1987-1989), “Annual NIFS research achievement reports” (1990-2017), “IPPJ steering committee records”, “IPPJ experts committee under steering committee records”, and “IPPJ 25th annals”. The first workshop on “Plasma elementary process” was held in 1969 under the support of KAKENHI SOUGOU (B) “Research on plasma elementary process”. The workshop in 2017 was 50-th anniversary.

- **Studies on History of Activities of Researchers at the dawn stage of Fusion Research in Japan**

(NIFS17KVXV012) T. Amemiya (College of Science and Technology (CST), Nihon Univ.), *et al.*

The investigation of the laboratory of the history of science of CST, Nihon University captured the general trend of fusion science picked up from the international collaborations, conferences or dawn of the history of fusion science from 1950’s to 1960’s. The focus is placed more on the individual researchers or the organizations that have led fusion science development in the dawn of fusion science in Japan from this fiscal year utilizing the archives in the FSA and the KEK archives office. Featured researchers and organizations are Mitsuo TAKETANI, Koji HUSHIMI and KAKUYUGO Kondankai.

- **Development of a Cooperating System of Archives Finding Aids and Technical Terms Databases**

(NIFS17KVXV013) Y. Takaiwa (KEK) *et al.*

Technical terms often appear in the historical materials related to the science and technology areas such as those in KEK or in FSA. It is desirable to provide a proper dictionary of such technical terms in order to utilize those historical materials efficiently. Furthermore, the incorporation of such a dictionary for the search systems greatly increases the availability of the database. At present, the historical databases in KEK and FSA are accumulated by both general purpose software (FileMaker Pro) and commercial cloud database system (Infolib). Utilizing Wikipedia or something similar would be one of the solutions, but the maintenance of its quality and responsibility are issues. Possible candidates among free or open license softwares are noted. The next task will be to link such a dictionary database to the historical database.

- **Making name authority data about persons, groups, and organizations appearing in FSAD, related to fusion science in Japan**

(NIFS17KVXV014) H. Goto (Kyoto University Museum) *et al.*

FSA accepts various materials related to the fusion science history and necessary informations of them are picked up, categorized, and registered in the database. The catalog created in such a way is provided to the users of interest. Researchers or research groups committed to fusion science and their mutual relations are not clear to the user only from the catalog. The purpose of this research is to clarify the method of accumulating and sorting the directories of those who have committed to fusion science. This fiscal year we have confirmed the difficulty in retrieving necessary relations between researchers or research groups. We have started this activity by digitizing the 15 annuals of NIFS or the 25 annuals of IPPJ, or registering the information of a few famous researchers using the *ArchivesSpace*. As for the NIFS related researchers, records of the collaboration program of NIFS can be a useful source if they are used with the existing academic database such as CiNii, KAKEN or Scopus.

- **Archival Studies on Heliotron Studies at Kyoto University**

(NIFS17KVXV015) 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. Comprehensive and systematic collection of the research materials on each heliotron device are pursued under the collaboration program. In addition to collecting these documents, finding image video records in the very early phase of the Heliotron E experiment and 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-disks (HD) have been performed. Due to the limited room for preserving materials and, furthermore, the recent strict requirement for efficient usage of the university facilities, the space is the main issue, in particular, for relatively large fusion experiment devices, or related hardware. This issue should be jointly discussed with FSA in NIFS.

- **Study and analysis of documents in the start up phase of the fusion technology research**

(NIFS17KVXV016) H. Yoshida *et al.*

The start up phase of the fusion technology research in Japan was investigated from the view point of Japan Atomic Energy Agency (JAEA) and the Institute of Plasma Physics, Nagoya University (IPPJ) under the collaboration with FSA. The origin of the systematic investigation toward the fusion reactor is found to be the workshop organized by Shigeru MORI in 1969 gathering the fission reactor specialists as well as fusion scientist from the historical materials of Kenzo YAMAMOTO and Shigeru MORI. Shigeru MORI organized research group on reactor design (1972), heating technology (1973), blanket (1975), super-conducting coil (1976), surface and vacuum technology (1976), materials development (1978), neutron technology, neutron source (1979), and tritium handling facility (1985) inside JAEA. From the interview with Shigeru MORI, a direct links of these facilities with similar facilities established in the 1980's in IPPJ or in universities was not found.

- **History of the early days of Nuclear Fusion Research Group in Japan**

(NIFS17KVXV017) C. Namba *et al.*

The organization "Informal Gathering of Fusion Science" (KAKUYUGO KONDANKAI) was established in 1958 and continued to perform an important role in the research and development in fusion science in Japan as a voluntary organization for researchers until it became "The Japan Society of Plasma Science and Nuclear Fusion Research" in 1983. Based on the interview with Dr. I. Kawakami who worked as a principal editor of "KAKUYUGO KENKYU", the journal of the "KAKUYUGO KONDANKAI", the environment at the establishment of "KAKUYUGO KONDANKAI" was clarified. "KAKUYUGO KONDANKAI" was formally established on February 10, 1958, at its inaugural meeting held in Tokyo. The first advisory chairman was Hideki YUKAWA. In October 1959, H. YUKAWA formally expressed his wish to retire since the research system was almost established. It was proposed and discussed at the gathering in February 1960 to ask H. YUKAWA to be an advisory chairman emeritus and to organize a standing committee.

- **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 their existence. The importance of the knowledge of archives themselves and the method of operating archives activities have been re-recognized. In this trend, we have held two meetings every year, one at KEK and the other at NIFS over these several years. "Archives and historical analysis" was set as a theme of the meeting at NIFS in 2017. The invited speaker was Dr. Tadashi NISHITANI. He gave a talk titled "Shoichi SAKATA and his laboratory (E-lab)". Related talks were given and discussed the common issues regarding archives and their historical analysis.

(S. Kubo)