13. Bidirectional Collaborative Research Program

The bidirectional collaborative research program started in 2004 as a third collaborative category of NIFS. This program is different from other two in that the budget is paid separately by the Ministry of Education, Culture, Sports and Technology. The purpose of the program is to enforce the activities of nuclear fusion research in universities after the Committee of the Science Subdivision under the Council for Science and Technology required executing their plan by promoting collaborative research. This policy of the committee is summarized in the report "Policy for executing Japanese nuclear fusion research", where it is pointed out that the continuous scientific research activity is necessary for a comprehensive understanding of toroidal plasma physics under the parameters which can be extrapolated to the fusion reactor. Therefore the Large Helical Device (LHD) has been selected as one of four principal fusion research programs in Japan, and NIFS is expected to expedite collaborating research. It is also noted in the report that the universities must contribute to the study of important issues in nuclear fusion research, such as the function of electrostatic potential on plasma confinement, high beta plasma physics, optimum magnetic configuration for plasma transport, steady state plasma generation, and so on. NIFS is requested to play a leading role in the execution of these studies among universities as an inter-university research institute.

The bidirectional collaborative research program has been set up so as to accomplish the role of NIFS proposed above. In past collaborative programs, university researchers come to NIFS and joined the research activity at NIFS. But in this program, the opposite movement of researchers is encouraged, that is, NIFS researchers can go to the universities and join the research activities carried out at the universities. Hence a more efficient use of resources in both facilities is possible and the synergetic effect is expected. The current program involves four major university research centers; Plasma Research Center, University of Tsukuba / Laboratory of Complex Energy Process, Institute of Advanced Energy, Kyoto University / Institute of Laser Engineering, Osaka University / Advanced Fusion Research Center, Research Institute for Applied Mechanics, Kyushu University. In this collaborative program, the researchers of NIFS and of those four research centers can move back and forth to each other to work on the same research subject. In addition to this, each research center can have its own collaboration programs using its major facility so that the researchers of other universities can come and join as if the facility belonged to NIFS. It is unique and important that all these activities are supported financially as research subjects of the NIFS bidirectional collaborative research program. The subjects of the bidirectional research program are subscribed from all over Japan every year as one of the three categories of the collaboration research program of NIFS, and the collaboration committee, which is organized under the administrative board of NIFS, adjudicates and selects the subjects.

One of the topics of this year is that a new device in Kyushu University, QUEST (Q-shu University Experiment with Steady State Spherical Tokamak) which is a normal conducting small spherical tokamak, started to be served as a main collaboration facility. The objective of QUEST is to study the high-beta long-pulse operation in spherical tokamak, and the experimental program is conducted by the executing board which includes the researchers in Japanese universities other than Kyushu University. The QUEST has been operated routinely, and achieved its first target of 10kA operation. The experimental data are stored by the data acquisition system of NIFS (LABCOM/X) via SNET which is based on a closed VPN on Japanese academic internet backbone SINET3. The collaborators of QUEST can access their data more easily from their universities using the same procedure as that for LHD. The same system has been constructed for University of Tsukuba, GAMMA 10.

In this year, seventy four subjects were adopted in this category, among which were 18 at Tsukuba University, 20 at Kyoto University, 16 at Osaka University, 19 at Kyushu University, and 1 at NIFS (Activity on all-Japan ST research program). All of these collaborations have been carried out successfully. Among these subjects, 15 topics from University of Tsukuba, 15 from Kyoto University, 11 from Osaka University, 16 from Kyushu university and 1 from NIFS are reported here.

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