

13. Bidirectional Collaborative Research Program

Four years have been passed since 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 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 confinement, 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 enabled, 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 with use of 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 important roles of the collaboration committee is to make a plan for evolving the research activities in universities according to the guide line of "Policy for executing Japanese nuclear fusion research". The change of the project of Kyushu University is the first result. A new device, QUEST (Q-shu University Experiment with Steady-State Spherical Tokamak) which is a tokamak with very low aspect ratio, started its construction in 2006 as a new program in Bidirectional Collaborative Research. The objective of QUEST is to study the high-beta long-pulse operation in spherical tokamak. Although the magnets are made of normal conductor, it can be operated in steady state. The construction has been completed successfully in this year, and the machine will start operation next year. It will be also a first trial that the experimental program of QUEST will be conducted by the executing board which will be chaired by the professor of University of Tokyo, and the board members will consists of researchers in Japanese universities as well as Kyushu University.

In this year, fifty nine subjects were adopted in this category, among which were 14 at Tsukuba University, 16 at Kyoto University, 12 at Osaka University, 16 at Kyushu University, and the one for Japanese spherical tokamak research activity which supports QUEST program. The activities of these subjects are reported here.

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