§54. All-Japan ST Research Program

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Based on the recommendation of the Fusion Research Working Group and the conclusions of the "Kyushu University Plasma Boundary Dynamics Experimental Device Review Committee", a formal proposal was made to reorganize spherical tokamak (ST) research in Japan as the All-Japan ST Research Program, and to build a new ST device at Kyushu University to fulfill one of the missions of this program, steady state operation. This proposal was officially approved by the NIFS Collaboration Committee.

In 2005, All-Japan ST Research Program was organized under Bi-Directional Collaboration of NIFS, and Steering Committee was formed with membership consisting of leaders of experimental and theory/simulation research groups in Japan. In November 2006, the NIFS Bi-Drectional Collaboration Promotion Subcommittee was established formally in the field of ST research. This subcommittee will replace the All-Japan ST Research Program Steering Committee.

All-Japan ST Research Program promotes creative and innovative research at universities and other institutions. To maintain international competitiveness and to make significant contributions internationally, it is crucial to integrate all resources, including experimental research using existing devices in addition to the new ST, as well as theoretical and computational research. The purpose of this collaborative research is to support and carry out the activities of All-Japan ST Research Program.

Four meetings were held during FY2006. Strategy of Japanese ST research, priorities of various research elements, roles of different research groups, utilization of experimental devices, and collaboration among different groups were discussed. The design of the QUEST device currently under construction for Kyushu University, was also discussed.

The third meeting of All-Japan ST Research Program was held at Kyushu University on May 18, 2006. The status of ST programs world wide was reported by Dr. Peng. Research activities of different groups in Japan were reviewed and activities of All-Japan ST Research Program were discussed.

The first meeting of QUEST Device Design Examination Committee was held at the University of Tokyo on July 5, 2006. Magnetic configurations achievable on QUEST were reported, and the standard configuration was changed to a more stable configuration with an elongation of 1.6. Criteria for divertor configuration were established.

The summer open meeting of IEEJ ST Research Expert Committee was held at JAEA on Aug. 9 and 10, 2006. Numerous design change recommendations, including locations of poloidal field coils, configuration of the ohmic heating solenoid, and size of pumping ports, were made.

The first meeting of NIFS Bi-Drectional Collaboration Promotion Subcommittee for ST Research was held at University of Tsukuba on Nov. 28, 2006. The role of the Subcommittee was explained by Prof. Komori. The status of Japanese ST research activities and the plan of All-Japan ST Virtual Laboratory were reported. The status of the IEA Implementing Agreement for Cooperation on Spherical Tori and the planned activity under this Agreement were reported by Dr. Peng. The role of the Bi-Drectional Collaboration Promotion Subcommittee for ST Research and possible activities were discussed.

A common understanding of objectives, mission, and basic strategy was developed through meetings of the All-Japan ST Research Program Steering Committee and Bi-Drectional Collaboration Promotion Subcommittee for ST Research. All-Japan ST Research Program aims at establishing the scientific basis and contributing to broadening the options for fusion power plants by creative and innovative research with emphasis on the two main research elements, "ultra high beta" and "ultra long pulse". Plasma start-up, current drive, heat and particle control, and plasma-wall interaction are important enabling research elements necessary to support the main objectives of the program. High quality research on these elements will be realized by collaboration on the all-Japan scale. Research which cannot be pursued on ST devices in Japan, such as the sustainment of very high beta plasmas, will be performed utilizing international collaborations.

The formal establishment of the NIFS Bi-Drectional Collaboration Promotion Subcommittee for ST Research marks a great progress. ST research in Japan will continue to be supported by NIFS Bi-Directional Collaboration. The NIFS Bi-Drectional Collaboration Promotion Subcommittee on ST Research will lay down the research plan for the All-Japan ST Research Program.

On Feb. 20, 2007, IEA Implementing Agreement on ST came into effect by signing by Prof. Motojima on behalf of National Institutes of Natural Sciences, which is the Contracting Party representing Japan. This Agreement will be utilized to collaborate internationally.

As part of this year's activity, the design of the QUEST device, which has the role of steady state heat and particle control and plasma wall interaction under the All-Japan ST Research Program, was reviewed and several design changes were recommended. Many of these recommendations were implemented, contributing to substantial improvements in the capability of the device. There was also a change in the management structure of the The QUEST Program has started its activity under a new management structure with external participation, utilizing the remote conferencing capability. In addition, progress was made in connecting the major nodes of the All-Japan ST Research Program, the University of Tokyo and Kyushu University, to the Super SINET, to realize a virtual research center.