1.5. LHD Project Research Collaboration

The fusion technology and the plasma physics must be developed in a long-term program. Success with this program requires collaborations with scientists and researchers from universities and institutes in Japan and also from all over the world.

The aim of the LHD Project Research Collaboration, being reported here, is to research and develop both technology and the scientific foundations that are useful for both the LHD group and the universities, and then, to apply these results to LHD experiments for the improvement of LHD. The characteristic of this collaboration program is that some R&D’s are performed in each domestic university or institute, instead of in NIFS as conventional research collaborations. The advantage of this type collaboration over conventional one is that co-workers can devote themselves to R&D’s more efficiently and enthusiastically by spending much more time.

From four years before, the LHD Project Research Collaboration started to invited public participation from universities and institutes in Japan. Three committees and one advisory council participate in selection process of collaboration subjects. At the beginning, the committees of the Fusion Network in Japan select and recommend some proposed plans to the committee of the LHD Project Research Collaboration in NIFS. NIFS has partnerships with Fusion Network linking three major research fields in Japan: fusion engineering, fusion science and plasma science. Although these fields have been developed independently, intimate collaboration between them is essential for further progress of fusion research. NIFS, as a Center of Excellence (COE) should develop a network of fusion research activities of universities and government institutions, including information exchange, planning, collaboration with foreign institutions and education of graduate course students. The Fusion Network has two committees related to this collaboration: one deals with the fields of fusion and plasma science and another with fusion engineering. An important point to choose a subject of collaboration is a new attempt, which is useful for the LHD project and is not planned in NIFS.

From last year LHD team proposed three subjects for supporting research in universities to drive forward the future deuterium experiment in LHD effectively. Another important point is whether that program can contribute to stimulate university researches and LHD programs.

As the fusion-plasma science program, following subjects were approved last year and reported in this book.

1. Improvement of plasma performance by strong ECH with hydrogen.
2. Formation mechanism and transport of dust particles in the divertor plasmas.
3. Development of integrated simulation code for helical plasma experiments.
4. Production mechanism and transport control of impurity hydrocarbon in LHD plasma.
5. Development of 2-dimensional Thomson scattering measurement.
6. Study of helical magnetic configuration and plasma energy measurement.
8. EBW ECH and ECCD in high density plasma.
9. Wave physics study in high beta plasma.
10. Development of real time control system for MHD instability.
11. Comprehensive study and experimental technique for plasma turbulence and transport.

12. Development of magnetic island detection by magnetic measurement.
13. Characteristic evaluation of RF ion source with Cesium seeding.
14. Study of correlation between density fluctuation and ECCD using high harmonic electron Bernstein wave.

As the fusion-engineering program, following subjects were also approved last year and reported here.

3. Measurement of the negative ion and control of recombination plasma in the LHD Divertor.
6. Experimental study on liquid lithium flow for IFMIF target.
12. In situ measurement of surface modification of plasma-facing material during the long duration discharge.
14. Dynamic Behavior of Tritium Release from Stainless Steel for LHD.
16. Change in properties of superconducting magnet materials by fission neutron irradiation.
17. Feasibility Study of LiPh-He-SiC High Temperature Blanket Concept.
18. Development of advanced superconducting conductors for fusion devices.
19. Basic studies for reduction of tritium retention, and for recovering and recycling of H, D and T under LHD-DD operations.
22. Assessment study on biological effects of low-dose radiation.

These subjects are planned basically as the three years program. Therefore, the reports presented here represent one portion of the total subjects.

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