

MEMORANDUM OF UNDERSTANDING

between

University of Science and Technology of China

and

Institute of Plasma Physics/Chinese Academy of Sciences

and

Princeton University / Princeton Plasma Physics Laboratory

For Cooperation on Fusion Energy

University of Science and Technology of China (USTC) and the Institute of Plasma Physics/Chinese Academy of Sciences (AISPP) on the one hand, and Princeton University/Princeton Plasma Physics Laboratory on the other hand, hereinafter collectively referred to as the “Participants”:

WHEREAS, magnetic confinement fusion research has made significant progress in the world. The International Thermonuclear Experimental Reactor (ITER), the biggest international cooperation project jointly organized by the European Union, China, United States, Japan, South Korea, Russia and India, has begun its construction in France. The development research of fusion energy has become one of the most important international cooperation projects. Fusion energy will be the ideal new energy for human sustainable development in the future.

WHEREAS, USTC is a renowned university in China and overseas. USTC was the first university in China to establish a plasma physics major, from which many outstanding science and technology talents have been educated. USTC not only possesses the advantages of complete disciplines in the fields of natural science and advanced engineering technology, but also has an established School of Nuclear Science and Technology that aims mainly at developing nuclear energy and carries the research mission of the China Fusion Engineering Test Reactor (CFETR). USTC receives the full support of the nation in plasma theory, fusion experiment, fusion device design and the like. USTC is developing rapidly.

WHEREAS, in 2011 China’s Ministry of Science and Technology designated USTC as a supporting institution to establish National Integration Design Group for

Magnetic Confinement Fusion Reactor (CNMFRDG). CNMFRDG consists of 19 members who come from all the major fusion institutes and universities around China. Through the efforts of the CNMFRDG, USTC has built close cooperation relationships with all of China's important fusion institutes and universities. At present, the integration design work of CFETR is proceeding smoothly. In addition, a talent exchange and cooperation agreement has been signed between USTC and ITER International Organization, which has nurtured good and close cooperation with the international fusion community.

WHEREAS, the Princeton Plasma Physics Laboratory (PPPL) is a national fusion laboratory in the United States managed by Princeton University. PPPL has made great contributions to the development of fusion energy, cultivating a large number of talents for the international fusion community.

WHEREAS, ASIPP is a major fusion research institute whose EAST tokamak is expected to provide 400 seconds ITER-like long pulse divertor plasmas in the next five to ten years. ASIPP has responsibility for more than 60 percent of ITER procurement package tasks in China.

WHEREAS, ASIPP participated in design and manufacturing studies for PPPL's NCSX project. Although NCSX had finished about half of the investment in design and manufacturing, the NCSX project was stopped. Both United States and Chinese scientists hope to finish the NCSX project through cooperation and, therefore, to make a significant contribution to the development of fusion energy research.

WHEREAS, China has provided large and constantly growing support to the development of fusion energy as well as related basic research and engineering technology; and has supported international cooperation, with the prospect of making important contributions to the development of fusion energy research.

WHEREAS, under the direct support of the U.S. Department of Energy, all major fusion research institutes, colleges and laboratories of the United States have been promoting international exchange and cooperation proactively. In particular, through active cooperation in ITER, as well as close partnership on experiments at NSTX and EAST, exploiting their complementary advantages, the exchanges and cooperation among PPPL, ASIPP and USTC can be expanded and strengthened continuously, jointly contributing to the development and research on fusion energy.

NOW THEREFORE, the Participants state their intentions as follows:

I. OBJECTIVE

1.1 The Participants intend to collaborate to jointly establish a center focused on advanced fusion energy research and collaborative innovation.

1.2 The center is expected to be hosted by USTC with the purpose of establishing close collaborative relationships among the Participants in an effort to build a world-class research, teaching and theoretical simulation platform. Other U.S. and Chinese institutions may be invited to participate in the work of the center.

1.3 The collaboration is expected to contribute to efforts to establish fusion energy as a sustainable energy source.

II AREAS OF POTENTIAL COOPERATION

2.1 The Participants intend to collaborate in the areas of basic plasma physics, experimentation, fusion engineering technology, and training.

2.2 Other areas of collaboration may be added by the Participants' mutual consent of the Participants in writing.

III. FORMS OF POTENTIAL COOPERATION

3.1 Exploring joint education programs in plasma science and joint education programs for postgraduate students.

3.2 Exploring joint scholarships for education and research in plasma science to cover expenses in education, and support exchange of scientists.

3.3 Fostering collaborations among scientists from the Participants in conducting joint experiments on EAST/NSTX and other devices.

3.4 Fostering group work of scientists from Participants for the next fusion reactor design.

3.5 Fostering activities related to ITER.

3.6 Fostering alternative advanced magnetic confinement fusion and basic plasma science approaches such as stellarator and MRX.

IV. POTENTIAL CONTRIBUTIONS OF PARTICIPANTS TO COLLABORATION

4.1 USTC may contribute (i) host the center, (ii) establish the research platform infrastructure, (iii) perform undergraduate and graduate recruitment and training, (iv) contribute to the overall fusion reactor design, (v) perform fusion plasma physics and diagnostics, and (vi) develop nuclear fusion disciplines in order to build a hierarchy, layout, and reasonable discipline of magnetic confinement fusion personnel training system.

4.2 PPPL may (i) provide core competencies in graduate enrollment and training, (ii) contribute to the overall design of the fusion reactor, (iii) develop the basis of plasma physics and fusion discipline, and (iv) contribute to advanced stellarator device design, construction and operations.

4.3 ASIPP may (i) participate in the infrastructure construction of the major research platform, especially EAST experimental device construction and perfection,

(ii) undertake joint postgraduate training, (iii) contribute to the overall design of the fusion reactor, (iv) perform critical fusion technology research and development and the completion of ITER procurement package task.

V. MECHANISMS OF COOPERATION

5.1 A Council should be established to coordinate the collaboration of the Participants and the activities of the center. Each Participant should be represented on the Council and a member of USTC is to serve as the Chair.

5.2 A Science and Technology Commission, to advise on science and technology of the center, and an International Advisory Board, to advise on overall center activities, should be established under the Council.

5.3 The Council may appoint a Director or Chief Scientist who should be responsible for the scientific direction of the center, and Deputy Directors.

5.4 Under the leadership of the Director, research departments and a secretariat may be set up. Upon the recommendation of the Director and approval of the Council, a director and deputy directors for each research department may be appointed.

5.5 A Secretary General and Deputy Secretary Generals who should be responsible for the administration of the center under the guidance of the council, the Commission and director may be appointed.

VI. GENERAL CONSIDERATIONS

6.1 This MOU does not create any legally binding obligations between or among the Participants.

6.2 This MOU is for planning purposes only; collaborative research and development (R&D) can only be conducted under an appropriate formal agreement.

6.3 Each Participant should conduct the cooperation contemplated by this Memorandum of Understanding (MOU) in accordance with applicable laws and regulations to which it is subject, and international agreements to which its Government is a party. This includes, but is not limited to, areas such as export control and equipment transfer/loans.

6.4 Each Participant is to be responsible for the costs it incurs in participating in cooperative activities under this MOU. The conduct of cooperative activities contemplated by this MOU are subject to the availability of funding, personnel, and other resources.

VII. COMMENCEMENT, MODIFICATION AND DISCONTINUATION

7.1 Cooperative activities under this MOU may commence upon signature by the Participants and continue for a five (5) year period unless discontinued in accordance with paragraph 7.2 of this Section.

7.2 The Participants may discontinue this MOU at any time in writing. A

Participant that wishes to discontinue its participation in this MOU should endeavor to provide at least ninety (90) days written notice to the other Participants. The withdrawal of either (a) PPPL or (b) both USTC and AISPP constitutes discontinuation of this MOU.

7.3 This MOU may be modified in writing by mutual consent of the Participants, and may be extended for additional periods.

Signed in triplicate on August 13, 2012.

For University of Science and Technology of China:

Prof. Dr. Jianguo Hou
President



Place: University of Science and Technology of China, Hefei, Anhui, P. R. China

Date: Aug. 13, 2012

For Institute of Plasma Physics/Chinese Academy of Sciences:

Prof. Dr. Jiangang Li
Director



Place: University of Science and Technology of China, Hefei, Anhui, P. R. China

Date: 2012-08-13

For Princeton University/Princeton Plasma Physics Laboratory:



Prof. Dr. Stewart Prager
Director

Place: University of Science and Technology of China, Hefei, Anhui, P. R. China

Date: 8/13/12