U.S. Department of Energy's

Office of Science

Annual Report of the IEA Implementing Agreement on Cooperation on the Large Tokamak Facilities
June 2004-May 2005

35th Meeting of the

IEA Fusion Power Coordinating Committee

IEA Headquarters, Paris, France; 28 Feb – 1 March, 2006

Erol Oktay, ExCo Chair
Susana Clement Lorenzo,
Liason to FPCC

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Introductory Comments

- A comprehensive 5-year End of Term Report on the IEA LT was provided by Mitsuru Kikuchi and Susana Clemente at the FPCC meeting in March 2005;
- The annual reports cover the period of June-May;
- The Chair rotates among the three parties annually (EU, JA, US);
  - My term ends on June 28, 2006 at the next ExCo meeting at Cadarache;
- The IEA LT is one of three tokamak related IAs that work closely together to provide physics input to ITER and burning plasma studies through IEA/ITPA Joint experiments;
- The state of the collaborations in this IA is well and very active.

Mission, Current Foci, and Objectives of the IEA Large Tokamak IA (1)

- Mission: enhance scientific and technological achievements of large tokamaks by means of cooperative actions for the advancement of the tokamak concept and contribute to ITER;

- Collaboration breadth has expanded during this year:
  - Poland and Slovenia participate in this agreement as parties in the EFDA agreement;
  - Enhanced university collaboration with JT-60U in Japan
  - ITPA/IEA Joint experiments now include participants from Russia, China, and Korea.

Mission, Current Foci, and Objectives of the IEA Large Tokamak IA (2)

- Active tokamaks involved in this IA include
  - JET in EU
  - JT-60U in JA
  - DIII-D, C-MOD, and NSTX in the U.S.
- Current foci of the collaborations include:
  - Control of plasma instabilities and long duration high beta steady-state discharges
  - ITER demonstration discharges
  - JET tritium trace experiments
- New capabilities are being added to the partner tokamaks:
  - Installation of ITER like first wall and divertor material on JET
  - Ferritic inserts in JT-60U to reduce ripple
  - Modification of beam orientation and pumping in DIII-D
  - Extensive new diagnostics on all tokamaks

Highlights of the reporting period June 2004-May 2005 (1)

- Major contributions from JET, JT-60U, DIII-D, and C-MOD at the FEC 2004 held at Villamoura in October 2004
- ITPA/IEA Joint experimental planning held at Oxford, UK in November 2004 and (at San Diego in November 2005)
- JET was shutdown during the reporting period for installation of Mark II divertor and diagnostics
- JT-60U was operated for about eight weeks and then shutdown for installation of Ferritic inserts and commissioning of the MG system;
- DIII-D completed 33 weeks of operations in ~ one year of contiguous operations (then shutdown for a year for modifications)
- Collaborations are carried out in seven topical areas which mostly follow the ITPA Topical Group identifications.

Highlights of the reporting period June 2004-May 2005 (2)

- In EU, the extension of the EFDA Agreement to December 2006 was approved;

- In Japan, JAERI and the JNS (Japan Nuclear Cycle Development Institute) were integrated into the Japan Atomic Energy Agency (JAEA).

- In the U.S. the US ITER Project Office and the US Burning Plasma Organizations were established to manage both the ITER Project activities (acquisition of US hardware) and the physics contributions to ITER.

Highlights of the reporting period June 2004-May 2005 (3)

- Three workshops were held by this IA during the reporting period:
  - W58: 3rd Joint Workshop of Large Tokamak, Poloidal Divertor, and TEXTOR on planning of ITPA/IEA Joint Experiments (October 2004, Oxford)
  - W59: Shape and Aspect Ratio Optimization for High Beta Steady-State Tokamak (February 2005, San Diego)
  - Satellite Workshop on 'Heating and Control for Long Pulse Operation in Large Tokamaks (September 2004, Giorgio Cini Foundation, Italy)
- Additional workshops since May 05 include
  - W60; Burning Plasmas at Tarragona in July; Summary paper was published in Fusion Science and Technology;
  - 5th ITPA/IEA Planning Workhsop of Joint experiments at San Diego
- An extensive number of personnel exchanges
- Executive Committee meeting at PPPL in May 2005

- The next ExCo meeting at Cadarache on June 28-29, 2006; to be held jointly with the IEA PD ExCo.

Future Strategy and Collaboration Inside/Outside IEA

- The ITPA/IEA coordination of joint experiments was initiated by the IEA LT ExCo in June 2002;
  - These joint experiments will be enhanced in collaboration with other IAs and bilateral agreements to prepare for ITER and burning plasma experiments;
  - Technological cooperation on topics such as tritium and remote handling, heating system development, and diagnostics will also be enhanced;

- The IEA LT website http://www-jt60.naka.jaea.go.jp./lt/ maintained by the operating agent JAEA has up to date information on our activities, including historical data, meeting presentations, etc.

Executive Committee membership

- EU:
  - Members: Jerome Pamela, Susana Clement Lorenzo
  - Alternate Members: Michael Watkins, Martin Cox
- JA:
  - Members: Mitsuru Kikuchi, Yukitoshi Miura
  - Alternate Members: Yutaka Kamada, Takaaki Fujita
  - Expert: Yukio Nakamura (NIFS)
- US:
  - Members: Erol Oktay, Rich Hawryluk
  - Alternate members: Ron Stambaugh, Earl Marmar
- Executive Secretary: Kouiji Shinohara
- The extension of the Agreement has been approved by CERT to January 2011
  - JA has completed its internal process for approving the extension;
  - EU is in its final stages of the approval

Message to Policy Makers

- The Executive Committee has articulated the following message to Policy Makers:
  - The IEA Large Tokamak Agreement is one of the strongest fusion IAs and has been effective in developing tokamak research to reach break-even conditions and in developing the necessary databases for the next step device ITER and a steady-state tokamak reactor. This Agreement provides leadership in coordinating ITPA joint experiments with other tokamak related IAs. Please visit our homepage to understand our activities and send us any comments for improvements.