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Dear Burning Plasma Aficionados:

This newsletter provides a short update on U.S. Burning Plasma Organization activities. E-News is also available online at <http://burningplasma.org/enews.html> Comments on articles in the newsletter may be sent to the editor (R. Nazikian rnazikian@pppl.gov) or assistant editor (Emily Hooks ehooks@mail.utexas.edu).

Thank you for your interest in Burning Plasma research in the U.S.!

Director's Corner by J. Van Dam

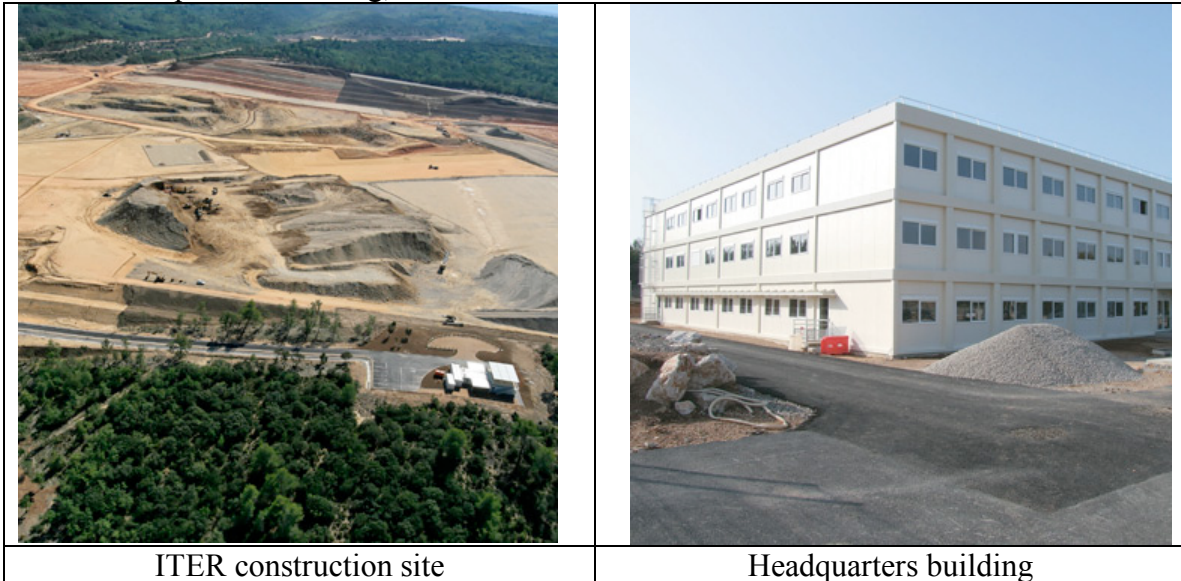
3rd ITER Council meeting

The third meeting of the ITER Council was held in Cadarache, France, November 19 and 20, 2008. The following is a brief summary of actions taken at that meeting:

- The Council re-elected Sir Chris Llewelyn-Smith and Academician Evgeny Velikhov as its chair and deputy chair, respectively, and it re-appointed Prof. Predhiman as chair of its Science and Technology Advisory Committee (STAC) and Dr. Robert Iotti as chair of its Management Advisory Committee (MAC).
- One of the important items of business at this Council meeting was to hear a progress report from Briscoe Review Panel, which had been requested to make recommendations about establishing a well-founded cost and schedule baseline for ITER and about effective management systems.
- The Council reaffirmed that the ITER Organization and the Domestic Agencies should work in a more tightly coupled manner and, for this purpose, agreed to establish Integrated Product Teams, with three “pilot” teams—for vacuum vessel, blanket, and power supplies—to be set up as soon as possible.
- The Council gave formal approval for a Test Blanket Module (TBM) program on ITER. Originally, this had not officially been part of the ITER Agreement. The TBMs will be used to test ideas for breeding tritium, in order to ensure fuel self-sufficiency for future fusion reactors. The Council will establish a TBM Program Committee to oversee this activity.

- Five Procurement Arrangements for a total of 415 million Euros were signed at the meeting. These included agreements with various ITER Members to construct parts of the vacuum vessel, toroidal field windings and structures, and winding facilities for the poloidal field coils.

The delegates to the Council meeting also visited the ITER construction site and the new ITER Headquarters building, both of which are shown below.



Phase 2 of the ITER Research Plan

Version 1 of the Research Plan had been presented to the STAC at its STAC-4 Meeting in May 2008. Following up on recommendations from the STAC, the ITER Organization now plans to undertake a second phase for further development of the plan, in time for its presentation at the STAC-6 Meeting in May 2009. Particular goals for the next phase of development are to incorporate the following items:

- Operations planning constraints based on RAMI (reliability, availability, maintainability, and inspectability) analysis
- TBM program
- Heating and current driven commissioning program
- Physics Work Program for 2009-2011
- Options for accelerating the arrival of the research program at DT operation
- Plasma scenarios for experimental operation
- Upgrade options and how they might fit into the research time schedule

The Domestic Agencies for the ITER Members are being asked to nominate experts who could participate in the Phase 2 development activities. Dr. David Campbell of the ITER Fusion and Science Technology Department, is leading this effort. On December 18, he organized a conference call of chief scientists from the ITER Members in order to discuss the anticipated Phase 2 activities.

ITER Integrated Modeling Expert Group

In addition to the expert group for ITER Research Plan and the new TBM Program Committee, both of which have already been mentioned in this column, the US is also

being asked to nominate participants for a new Integrated Modeling Expert Group (IMEG) for ITER. The function of the IMEG will be to coordinate between ITER and the seven ITER Members in developing a comprehensive suite of integrated modeling capabilities and the concomitant infrastructure. This effort is intended to complement the voluntary R&D being performed through the ITPA on model validation. Specifically, this expert group will work on establishing:

- Core modeling requirements that cover a spectrum of applications
- Documentation, verification and validation standards for core elements
- Installation and acceptance testing procedures for core elements
- Regression testing procedures for core elements
- ITER hardware (e.g., grid and HPC) and software needs
- Guidelines for the remote access environment

IEA/ITPA Joint Experiments Meeting

The International Tokamak Physics Activities (ITPA) organization held its annual Joint Experiments meeting, co-sponsored by the IEA, at MIT, December 11-13, 2008. Each of the ITPA topical groups proposed plans for cross-machine experiments. Representing the USBPO at this meeting were Amanda Hubbard (Council chair) and several members of the Research Committee. Scientific leaders from the ITER Organization also provided input concerning the relevance and value of the proposed experiments for addressing urgent ITER R&D needs.

📣 Announcements

Submit BPO-related announcements for next month's eNews to Raffi Nazikian at rnazikian@pppl.gov.

Reports

Summary of the 15th meeting of the ITPA Topical Group on Diagnostics

November 2008

Written by Rejean Boivin

The Fifteenth Meeting of the ITPA Topical Group (TG) on Diagnostics was organized by ITER-India and the Institute for Plasma Research and held in Ahmedabad, India, from 17 to 20 November 2008. The meeting was combined with a Progress Meeting on ITER relevant diagnostic developments in India.

During the Progress Meeting on ITER relevant diagnostic developments in India, Indian scientists presented the latest work in connection with their ITER scope. Additionally, a number of other Burning Plasma relevant diagnostic developments in India were discussed.

An update in the progress in the tasks designated as high priority (HP) were presented:

1. Development of methods of measuring the energy and density distribution of confined and escaping α -particles.

The evaluation and design of Collective Thomson scattering is being done at LHD using microwave system at 77GHz. The system is presently under construction. Separately, a high-energy neutral helium beam has been fielded on LHD, together with a compact neutral particle analyzer to look at the populations of “alpha” particles in the core of the plasma. The system was first used during He3 RF experiments in LHD.

A new scintillator was fabricated and used in the lost fast particle detector for LHD. This polycrystalline scintillator is less susceptible to ambient radiation and can be operated at higher temperatures. However, the application of this concept for ITER remains to be verified.

Results from the Lost Alpha diagnostic on JET were presented. This diagnostic is based on a probe located at the top of JET and used an activation technique, in this case using the escaping 14.7MeV proton generated in D-3He reaction. In spite of difficulties encountered in the measured count rates, clear peaks related to the expected activation reactions were observed.

This HP item will remain active, but the assessment of confined alpha diagnostics has been reduced to medium priority since the CTS system has been recently enabled on ITER baseline. Details of the tasks for the lost alpha diagnostics have been elaborated.

2. Assessment of the calibration strategy and calibration source strength needed.

The Neutron Working Group has reported some initial results in regards to MCNP calculations in support of the calibration strategy. The IO has provided tokamak models and recommendations for further studies have been provided.

In parallel with that activity, details of the integration of the neutron diagnostics have been shown, including the integration of the lower vertical neutron camera (LVNC), which is now in the baseline set. Changes in the in-vessel interfaces have been described following the design changes required by the in-vessel ELM control coils addition. The IO has launched a new R&D task in relation to the selection of neutron generators and sources required for calibration.

This HP will remain, but a conclusion is expected within a year or so.

3. Determination of lifetime of plasma facing mirrors used in optical systems.

The report of the Specialist Working Group on First Mirrors gave an overview of all activities in the field of first mirrors. New results were shown on the possible use of amorphous mirrors, which present good characteristics under erosion conditions. A new technique for mirror polishing was also shown which might help in reducing micro-crack

formation. Many presentations addressed in more detail the developments in the field of mirror research in a number of laboratories around the world.

A roadmap to guide the international R&D in the field of first mirrors was presented and was further detailed. This evolved into a special breakout session. A detailed workplan has been drafted and is now undergoing review and further refinements, including a prioritization of the tasks.

This HP item will remain but shorter-term elements have been identified.

4. Development of the requirements for measurements of dust, and assessment of techniques for measurement of dust and erosion (with a special emphasis on dust).

Dust and tritium control strategies were presented at previous meeting. Following that discussion, changes to the baseline design were accepted over the summer, which include new diagnostics for erosion, dust and tritium retention. In the case of tritium retention particle/gas accounting remains the main strategy, although some local measurements (by laser ablation) are also now included in the baseline. Measurement requirements for erosion, dust and tritium monitoring have been defined and accepted into the baseline as well.

Two depth-probing techniques were presented for erosion/deposition monitoring. A capacitance micro-balance is being proposed for local dust measurements. This will be proposed as a Joint experiment. Removal samples are also proposed to complement in-situ measurements.

Remaining issues include the specific question of hot dust, which is linked to safety and licensing issues. Consequently this HP item will be concentrating on that aspect only.

A discussion ensued regarding the realignment of these HP items versus the ITER R&D needs as shown at the last ITPA Coordinating Committee meeting in June 2008. The details of these changes were presented at the ITPA-CC meeting in December 2008. Furthermore, two new HP items have been selected for the group:

1. The assessment of impacts of in-vessel wall reflections on diagnostics.

Many of the optical diagnostics will have to work against the background of stray light coming from the plasma. Because the ITER plasma is much larger than existing tokamak plasmas this problem will be more severe than that experienced thus far. The problem needs to be evaluated through a process of modeling and measurements on existing machines and measurements of the reflectivity of relevant materials.

2. Assessment of the measurement requirements for plasma initiation and identification of potential gaps in planned measurement techniques.

The early phase of plasma formation and control may require additional or special measurements different than during the flat top phase. This task aims at assessing these needs and identifying any gaps in the associated techniques.

Other topics were also covered:

An overview of the issues in the field of diagnostic integration into ITER was presented on the new organization structure and new logo with an update on construction and local amenities. The impacts of the design changes and external review panels were also discussed. Recent developments include baseline changes in diagnostics for dust, erosion and tritium measurements.

The ITPA Parties reported steady progress in the development of many ITER relevant diagnostic techniques. Some examples of recent work presented at the meeting are; diagnostic neutral beam design and testing (IN), high-frequency magnetic coil prototypes (EU), THz laser polarimetry (JA), VUV spectrometer system (KO), divertor Thomson scattering system (RF) and the ECE in-vessel calibration source (USA). No reports were presented on the ongoing work in China.

Changes in the ITPA organization were reviewed and how they affect the ITPA Diagnostics TG in particular was discussed.

An analysis of the International Diagnostic Database was also presented and a discussion ensued on the next steps for its exploitation, including the identification of generic issues that may affect ITER systems, which would require a high level of reliability and availability. Other presentations covered new techniques in data analysis dealing with very large data sets.

A progress report was presented on the two diagnostic Joint experiments, which include First Mirror research (see above) and an analysis on the Thomson scattering – ECE discrepancy at high electron temperature. Detailed analysis of recent JET data is consistent with a modification of the bulk electron distribution function in the presence of strong RF heating. Theoretical work is needed to make further progress in this area.

It was proposed to hold the 16th meeting in St-Petersburg on 20-24 April 2009. The provisional location of the 17th meeting in the fall of 2009 would be in Korea.

2009 Burning Plasma Events

Jan 13-14

[FESAC](#)

Gaithersburg, MD

Jan 18-23

[8th IEA International Wksp on SiC/SiC](#)

Daytona Beach, FL

Mar 2-4

4th Workshop on Stochastic Fusion Plasmas

Julich, Germany

Mar 31-Apr 2/3
Joint Transport & Confinement and Integrated Operational Scenarios ITPA TG Mtg
Naka, Japan

Apr 6-8
ITER Export Control Working Group Mtg
Washington, DC

Apr 20-22
ITPA Pedestal & Edge Physics Topical Group Mtg
Cadarache, France

Apr 20-24
ITPA Diagnostics Topical Group Mtg
St. Petersburg, Russia

Apr 21-24
ITPA Energetic Particles Topical Group Mtg
Daejeon, South Korea

Apr 28-May1
Transport Task Force Workshop
San Diego, CA

May 2-5
Sherwood Theory Fusion Conference/APS April Mtg
Boulder, CO

May 5-8
ITPA Sol & Divertor Topical Group Mtg
Utrecht Amsterdam, FOM Rijnhuizen

May 11-14
[12th International Wksp on Plasma-Facing Materials & Components for Fusion Applications](#)
Julich, Germany

May 25-30
STAC, MAC CPWG
TBD

May 31-Jun 5
ICOPS-SOFE 2009 Conference
San Diego, CA

Jun 14-18
[ANS Annual Mtg](#)
Atlanta, GA

Jun 24-26
[18th Conf on RF Power in Plasmas](#)
Gent, Belgium

Jun 29-Jul 3

[14th International Conference on Emerging Nuclear Energy Systems \(ICENES-2009\)](#)

Ericeira, Portugal

Jul 12-16

[17th International Conference on Nuclear Engineering \(ICONE 17\)](#)

Brussels, Belgium

Jul 15-16

ITPA Coordinating Committee Mtg

Cadarache, France

Sept 7-12

[14th International Conf on Fusion Reactor Materials \(ICFRM-14\)](#)

Sapporo, Japan

Sept 21-24

14th International Symp on Laser-Aided Plasma Diagnostics (LAPD-14)

Castelbrando, Treviso, Italy

Oct 5-7

ITPA Transport & Confinement Topical Group Mtg

PPPL, US

Oct 6-8

ITPA Pedestal & Edge Physics Topical Group Mtg

Princeton, New Jersey

Oct 11-16

9th International Symp on Fusion Nuclear Technology (ISFNT-9)

Dalian, China

Oct 24-29

9th International Conference of Tritium Science and Technology

Nara, Japan

Nov 2-6

51st APS-DPP Mtg

Atlanta, GA

Nov 8-12

[ANS Annual Mtg](#)

Washington, DC

Fusion Research-related events can also be seen on the USBPO web at <http://burningplasma.org/events.html>.