



U.S. Burning Plasma Organization e-News
July 15, 2008 (Issue 22)

CONTENTS

Director's Corner	Jim Van Dam
Announcements	
• US ITER Solicits Nominations for International ITER Positions	Ned Sauthoff
Reports	
• USBPO Council Election Results	Amanda Hubbard
This Month's Feature Article	
• In-Vessel Control Coil Design Activity for ITER	Rich Hawryluk
Upcoming 2008 Burning Plasma-related Events	

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

ITPA Topical Groups: Last month we reported about the selection of the new leaders and deputy leaders for the seven ITPA Topical Groups. More recently, the ITER Organization has announced which of its scientists will serve as co-deputy leaders for the topical groups. Therefore, here is the complete table of the new leadership:

ITPA Topical Group	Leader	Deputy Leader	ITER Co-Deputy Leader
Diagnostics	Rejean Boivin (US)	Hyeon Park (KO)	Alan Costley
Pedestal	Howard Wilson (EU)	Naoyuki Oyama (JA)	Alberto Loarte
Divertor and SOL	Bruce Lipschultz (US)	Emanuelle Tsitrone (EU)	Michiya Shimada
MHD Stability	Abhijit Sen (IN)	Edward Strait (US)	Yuri Gribov
Energetic Particles	Sibylle Guenter (EU)	Koji Shinohara (JA)	Vladimir Mukhovatov (pro tem)

Transport and Confinement	Stan Kaye (US)	Shaojie Wang (CN)	Wayne Houlberg
Integrated Operation Scenarios	Shunsuke Ide (JA)	Adrianus Sips (EU)	Joseph Snipes

The new ITPA leadership will participate in the annual meeting of the ITPA Coordinating Committee, to be held June 30-July 1, 2008, in Cadarache.

Each of the ITER Partners may identify up to 7 scientists to be members of each of the 7 topical groups. These members are expected to attend the two meetings held every year, in the spring and the fall, by their respective topical group. (Note that scientists other than the "official" topical group members may also attend these meetings.) The USBPO circulated a call for suggestions of names of interested persons to serve as US members in these groups (including self-nominations). The selection process, to be completed in July, will take into account expertise, interest, institutional balance, etc.

ITER Council: The second official meeting of the ITER Council was held June 17-18, 2008, in Aomori, Japan, near the location that the Japanese had once proposed as a host site for ITER. The Heads of the seven delegations to the ITER Council meeting all emphasized the importance of ITER in the context of urgent world energy needs. The members of the ITER Council also took special note of the significant progress on the design review activities that had been made since the first ITER Council Meeting in November 2007. (Scientists from the US national program have been and still are playing major roles in this progress, and we thank them for their valuable efforts!) The Council approved the new *Project Specifications* document, which is a top-level description of the scientific goals and technical parameters for the ITER facility; the associated lower-level documents provide a reference design to be further optimized. The Council agreed to the revised *Overall Project Schedule* with a target date of 2018 for first plasma as a reference schedule for planning purposes. Also, the Council received the revised *Project Plan and Resources Estimates* document from the ITER Organization. Regarding the latter, the Council determined to follow the recommendation of the Management Advisory Committee to set up an independent international group of experts, headed by Dr. Frank Briscoe (EU), to assess the proposed resource estimates. It also charged the ITER Organization and the Domestic Agencies to prepare proposals for minimizing costs and risks. The Council, in addition, approved the conditions for the accession of an eighth Partner during the early ITER construction phase and agreed to start formal talks with Kazakhstan as a potential new Party to the ITER Agreement on this basis, subject to approval by all of the Member governments. In the interim, Kazakhstan will be allowed to participate as observers in meetings convened by the ITER Organization.

📣 Announcements

US ITER Solicits Nominations for International ITER Positions

Dear Colleague:

ITER's Director General Nominee (DGN) Kaname Ikeda has recently requested that the seven ITER parties nominate candidates for the International ITER Team's open positions. This U.S. ITER solicitation for nominations from the U.S. community serves as one source for U.S. nominations and invites community self-nominations. The U.S. ITER Project Office is collecting all U.S. nominations and will work with the Department of Energy in preparing and forwarding the U.S. nominations to DGN Ikeda. The International ITER Team will then review candidates nominated by all the ITER parties and make a final selection from the candidates from all the parties. Applicants are limited to applying for only three positions included in the list below.

Professional Staff New - Deadline for applications July 9, 2008

[Contract Administrator](#) (ADM-043)

[Senior Contract Administrator](#) (ADM-044)

[Responsible Officer for recruitment and training plans](#) (ADM-045)

[Software Engineer](#) (CHD-048)

[Scientific Officer, Equilibrium and Control Fusion Science and Technology / Science](#) (FST-018)

[Cryoplant Engineer](#) (CEP-075)

[Quality Audit Manager](#) (SAS-013)

[Design Engineer -Tokamak / Internal Components](#) (TKM-064)

Professional Staff Repost - Deadline for applications July 30, 2008

[Cooling Water Chemistry Engineer](#) (CEP-010)

[Radiological Monitoring Engineer](#) (CEP-065)

[Risk Management Officer](#) (PRO-043)

Professional Staff Replacement - Deadline for applications July 3, 2008

[Senior Vacuum Engineer](#) (CEP-021)

[Civil Engineer - Section Leader, Site Layout and Infrastructure](#) (CCS-004)

Professional/Support Staff New - Deadline for applications July 9, 2008

[Assistant Controller](#) (ADM-041)

[Administrative Assistant for the Finance Division](#) (ADM-042)

[Civil Engineer - Steel and Concrete Structures](#) (CCS-019)

[Heating & Current Drive Drawing Office Liaison Officer](#) (CHD-045)

[Diagnostic Technical Officer](#) (CHD-046)

[Administrative Assistant](#) (CHD-047)

[Computational Support Specialist, Integrated Modeling Fusion Science and Technology / Science](#) (FST-017)

[Fuelling Integration Technical Engineer](#) (CEP-076)

[Administrative Assistant to Communication Office](#) (ODG-019))

[Technical Engineer - Assembly Procurement](#) (TKM-065)

[Senior Designer & Technician](#) (TKM-066)

[Senior Designer & Technician](#) (TKM-067)

Technical Support Staff Repost - Deadline for applications July 30,2008

[Civil Engineering Technician - Steel and Concrete Structures](#) (CCS-016)

[Project Management Assistant for In-Kind Procurement Project Office](#) (PRO-046)

[Records Assistant Project Office / Technical Coordination](#) (PRO-056)

The U.S. ITER Project Office invites individuals and institutions to nominate U.S. candidates through a special web site dedicated to this solicitation, <http://www.usiter.org> and select Jobs and International Organization Positions. This website has additional information on these positions and the current understandings on terms and conditions for employment.

(https://erie.ornl.gov/iter_ddgs/documents/terms.cfm)

Applicants are kindly requested to provide the following documents in Microsoft Word:

1. Motivation/Cover Letter
2. Curriculum Vita/Resume
3. ITER Personal History Form-the ITER Organization requires electronic submission of a Personal History form by all candidates for secondment and staff positions. Although we collect the form, it will be used solely by the ITER Organization and not by DOE, ORNL, the U.S. ITER Project Office, or UT-Battelle.

YOUR COMPLETION AND SUBMISSION OF THE PERSONAL HISTORY FORM CONSTITUTES YOUR CONSENT TO:

- Storage of the form at ORNL in accordance with DOE cyber security procedures; and
- Our forwarding the form in electronic format to the ITER Organization in France; and
- Use and management of the form by the ITER Organization in accordance with its practices and policies.

Ned R. Sauthoff, Project Manager
U. S. ITER Project Office

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

Reports

USBPO Council Election Results

As announced last month, the first USBPO election was held to fill two open seats on the Council, starting the process of regular rotation specified in the Charter and Bylaws. A slate of seven candidates from the fusion community was chosen from member nominations by a subcommittee led by Craig Petty. All Regular Members of USBPO (defined as those US researchers who have joined one or more Topical Groups) were invited to vote online.

We were very pleased with the response – votes were received from 140 (51%) of the 273 Members contacted. The two candidates receiving the most votes were Martin Greenwald (MIT) and Edmund Synakowski (LLNL). We are pleased to welcome them to the Council. Two other open slots will be filled by appointment of the Director.

Thanks are due to USBPO Communication Director James DeKock (U. Wisconsin), and Administrator Emily Hooks (U. Texas) for their considerable efforts in setting up the election website, which was hosted at U. Wisconsin, so that it ran smoothly and ensured security and confidentiality. We also thank the members of Council whose terms are ending, for their excellent service in the first two years of the Council: Steve Allen (LLNL), Steve Cowley (UCLA), Gerald Navratil (Columbia), Dave Petti (INL), Earl Marmar (MIT) and Craig Petty (GA). The Council serves to represent the fusion community and advise the USBPO Director, including setting policies and procedures, so there has been a lot of activity in this formative phase. Further information on the Council, including minutes of some past meetings, may be found at <http://burningplasma.org/council.html>.

Amanda Hubbard
Chair, USBPO Council

Feature Article

In-Vessel Control Coil Design Activity for ITER

by R. Hawryluk

Since about six months ago, the separate studies of the physics bases and requirements for in-vessel coils have been united into an activity to develop an integrated design for all the coils. The current design of the in-vessel coils provides capability to vertically stabilize the plasma, to apply resonant magnetic perturbations (RMP) in the plasma edge to stabilize ELMs, and also to provide feedback control for the resistive wall mode (RWM). The coils may, in principle, also provide faster radial feedback control as well as error field control but the capability of the coils for these functions has not been fully

analyzed. This work has been the product of a major international collaboration with contributions not only from ITER Organization (IO) but also the laboratories and universities supporting the Domestic Agencies of the international partners.

The in-vessel coils address three critical ITER design issues. (1) The control of vertical displacements is substantially improved with the installation of the in-vessel coils supporting the elongation requirements for ITER and greatly decreasing the likelihood of vertical displacement events. Experimental results from C-Mod, DIII-D and NSTX on vertical stability have provided valuable input in developing the physics requirements. (2) Unmitigated Edge Localized Modes (ELMs) in ITER, which could lead to severe erosion and damage of plasma facing components, is a major concern. The application of resonant magnetic field perturbations has been shown to suppress ELMs on DIII-D. The choice of field spectrum and magnitude of the perturbation for ITER is based on a combination of experimental results from DIII-D, as well as theoretical analysis by scientists at CEA, Culham, GA, LLNL, and PPPL. Though good progress has been made in using RMPs to stabilize ELMs, further work is underway to understand how the perturbed magnetic field interacts with the plasma enabling the suppression of ELMs. In recognition of the importance of this issue, the ITPA has developed a research plan for evaluating a number of different approaches to stabilize ELMs, engaging US and international scientists. (3) Results from DIII-D and NSTX have demonstrated that the application of non-axisymmetric fields can be successfully used to control error fields as well as feedback stabilize the resistive wall mode when the plasma operates beyond the static no-wall ideal MHD stability limit. For the steady-state operating mode on ITER, the plasma is predicted to operate beyond this limit. By using the multi-mode spectrum capability of the proposed ITER in-vessel coils as well as increasing the frequency response of the power supplies modestly beyond what is required for ELM control, the Columbia team using the VALEN code predicts that the resistive wall mode can be stabilized in ITER up to values of $\beta_N \sim 3.6$.

In support of the physics requirements, the IO has been leading a design team, including U. S. engineers and scientists from GA, ORNL, PPPL and SNL, to perform a scoping study of the engineering design and issues. These coils are located behind the blanket shield module and mounted off the vacuum vessel wall. Since these coils will need to be maintained during ITER operations, they must be capable of remote disassembly and reassembly in a nuclear environment. The figure below shows the current design for one of the nine vacuum vessel sectors. In each vessel sector, there will be three coils, an equatorial coil and a top and bottom coil, for a total of 27 coils to provide the magnetic spectrum for the application of RMP and feedback control of RWMs. In addition, there is a toroidal coil above and another below the midplane to create a vertical stabilization coil pair. The present effort is strongly concentrated on developing the vacuum vessel interface requirements in order to enable the vacuum vessel procurement to begin. If the coils are approved, research and development for the coil insulation will be undertaken in parallel with a detailed engineering design.

This effort on in-vessel control coils is a good example of collaboration by concerned scientists and engineers from multiple institutions to address and solve urgent ITER needs.

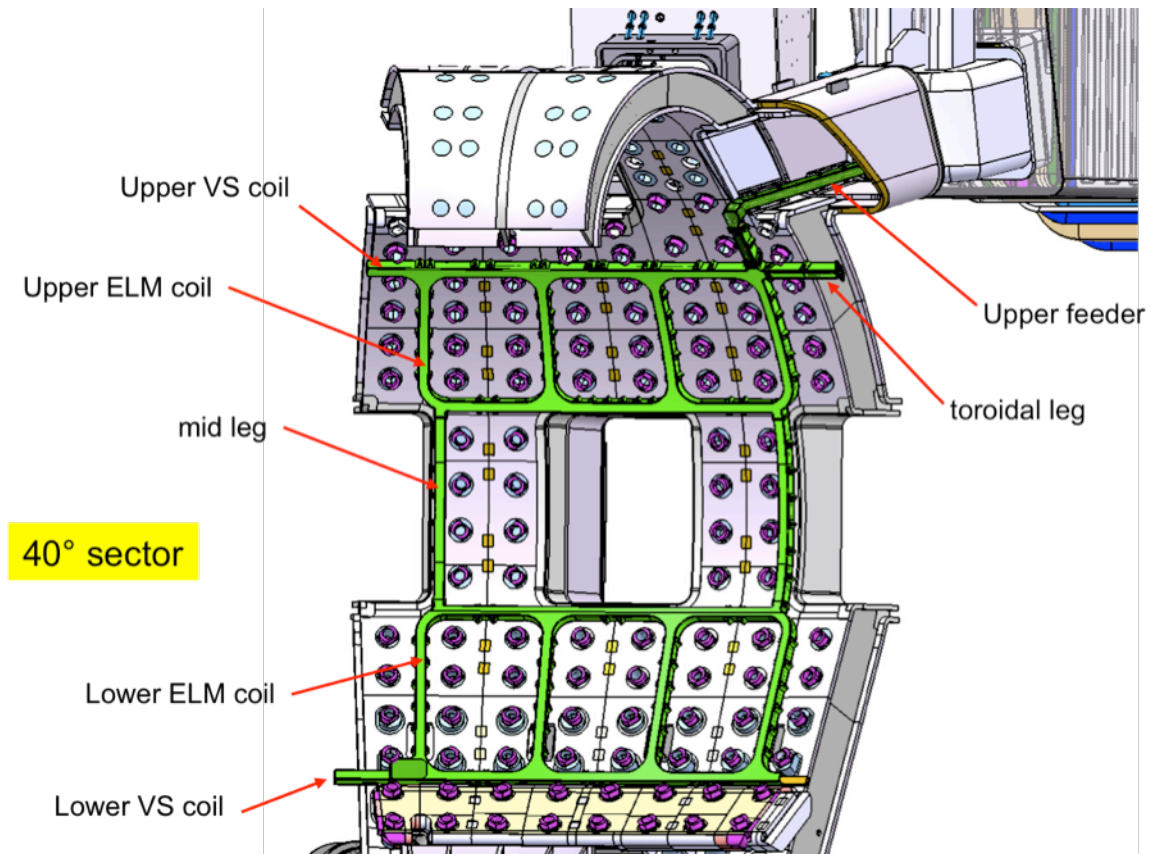


Illustration of the current design of the in-vessel coils to stabilize ELMs and the vertical displacement events, shown for a 40° vacuum vessel sector. For the coils above and below the midplane, the two vertical bars inside the coils represent water-cooling manifolds.

2008 BPO-Related Meetings

Jul 6-11

[17th Int'l Conf on High-Power Particle Beams \(BEAMS'08\)](#)

Xi'an, China

Jul 13-20

[37th Scientific Assembly of the Committee on Space Research and Associated Events \(COSPAR 2008\)](#)

Montreal, Canada

Jul 15-19

[19th Europhysics Conf on the Atomic and Molecular Physics of Ionized Gases \(ESCAMPIG-2008\)](#)

Granada, Spain

Jul 27-Aug 2

[7th International Wksp on Strong Microwaves: Sources and Applications](#)

Nizhny Novgorod, Russia

Aug 25-29

[24th Summer School & International Symp on the Physics of Ionized Gases](#)

Novi Sad, Serbia

Sep 1-4

[13th EU-US TTF Wksp](#)

Copenhagen, Denmark

Sep 8-12

[Int'l Congress on Plasma Physics](#)

Fukuoka, Japan

Sep 15-18

ITPA SolDiv Topical Group Mtg

Japan

Sep 15-19

[25th Symp on Fusion Technology \(SOFT\)](#)

Rostock, Germany

Sep 22-27

[Int'l Conf & School on Plasma Physics & Controlled Fusion and 3rd Alushta Int'l Wksp on the Role of Electric Fields in Plasma Confinement in Stellarators and Tokamaks](#)

Crimea, Ukraine

Sep 25-27

[18th IAEA Technical Mtg on Research using Small Fusion Devices](#)

Crimea, Ukraine

Sep 28-Oct 2

[18th ANS Topical Mtg on the Technology of Fusion Energy](#)

San Francisco, CA

Sep 29-Oct 2
[coNuSS 2008](#)
Belgrade, Serbia

Oct 12-18
[22nd IAEA Fusion Energy Conf - 50th Anniversary of Controlled Nuclear Fusion Research](#)
Geneva, Switzerland

Oct 20-25
[11th Int'l Conf on Electrostatic Precipitation \(ICESP-XI\)](#)
Hangzhou, China

Oct 20-22
ITPA Transport & Confinement Topical Group Mtg
Milan, Italy

Oct 20-22
ITPA MHD Stability, Energetic Particles, & Integrated Operation Scenarios Topical Group Mtgs
Lausanne, Switzerland

Nov 9-13
[ANS Winter Meeting](#)
Reno, NV

Nov 17-21
[50th APS-DPP](#)
Dallas, TX

Nov 17-21
ITPA Diagnostics Topical Group Mtg
IPR, India

Nov 23-25
MHD Control Wksp
Austin, TX

Dec 9-12
18th International Toki Conference
Toki-City, Japan

Dec 11-13
ITPA/IEA Joint Experiment Coordination Mtg
MIT

Please submit your 2008 events to Emily Hooks at ehooks@mail.utexas.edu.

For more Fusion Research-related events, visit the USBPO Upcoming Events page online at <http://burningplasma.org/events.html>.