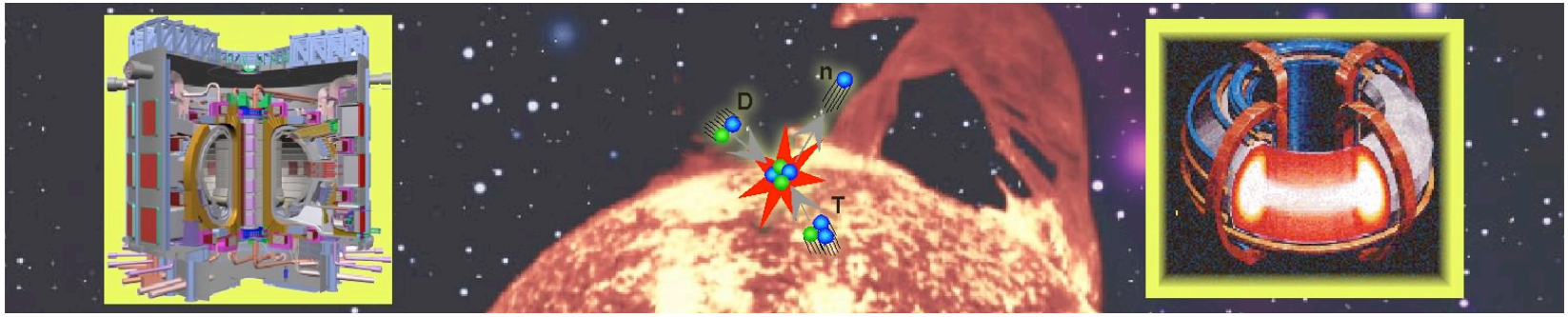
Update about the US Burning Plasma Organization



- *Leadership team*
- *Council & Topical Group activities*
- *ITER design review*
- *Relationship with ITPA*
- *To-do list*

J. W. Van Dam
USBPO Director
& USIPO Chief Scientist

Presented to
FESAC Meeting
March 1, 2007

Original Leadership Team

Directorate:
- *Director*: Ray Fonck
- *Deputy Director*: Tony Taylor

- **Topical Groups** (10)
  - 256 members
- **Research Committee**
  - TG leaders constitute Research Committee

Council:
- *Chair*: James Van Dam
- *Vice-Chair*: Amanda Hubbard
- 12 other members

Administrator: Joan Welc-LePain

Council Resolutions of Appreciation

- **Dec. 15, 2006**
  - On motion, the Council of the US Burning Plasma Organization resolved to express its sincere gratitude to ***Professor Raymond J. Fonck*** for his outstanding service to the US fusion research community in serving as the USBPO Director during the past two years. He worked tirelessly to establish the USBPO, visiting numerous fusion groups around the country and giving presentations at major meetings. He guided the establishment of the Council, the Topical Groups, and the Research Committee. He set up the USBPO web site. He spearheaded the Burning Plasma Workshop in December 2005. He served as the US ITER Chief Scientist and interfaced with the US Department of Energy. In all this and more, he was an excellent leader. The Council has appreciated most highly his extremely valuable work.

- **Feb. 27, 2007**
  - On motion, the Council of the US Burning Plasma Organization resolved to express its sincere gratitude to ***Dr. Tony Taylor*** for his outstanding service to the US fusion research community in serving as the USBPO Deputy Director during the past two years. His advice and involvement in the establishment of the Topical Groups and the Council, his leadership of the Research Committee, and his all-around wisdom and zeal for burning plasma research have been extremely valuable. The Council has appreciated most highly his excellent work.

New Leadership Team (Feb '07)

Directorate:

- *Director*: James Van Dam
- *Deputy Director*: Chuck Greenfield (~May 1)
- *Asst Director for ITER Liaison*: Nermin Uckan

- **Topical Groups** (10)
  - 256 members
- **Research Committee**
  - TG leaders constitute Research Committee

Council:

- *Chair*: Amanda Hubbard
- *Vice-Chair*: Mike Zarnstorff
- 12 other members

Administrator: Emily Hooks

www.burningplasma.org

Council Members

Amanda Hubbard (MIT) — *Chair*
Michael Zarnstorff (PPPL) — *Vice Chair*
Steven Allen (LLNL)
Steven Cowley (UCLA)
Richard Hawryluk (PPPL)
Earl Marmar (MIT)
Gerald Navratil (Columbia)
William Nevins (LLNL)
Martin Peng (ORNL)
David Petti (INL)
Craig Petty (GA)
John Sarff (Wisconsin)
Tony Taylor (GA) — from May 1
George Tynan (UCSD)

Ex-officio participants:

James Van Dam (Texas)
USIPO Chief Scientist
Stanley Milora (ORNL)
USIPO Chief Technologist

DOE/OFES:

Erol Oktay
ITER & International Division
Gene Nardella
ITER Technology Officer

Council Activities

- **Charter & Bylaws**
  - Subcommittee led by G. Tynan
  - Describes how the USBPO is constituted, governed, and operated

- **Director search**
  - Subcommittee led by A. Hubbard
  - Solicited nominations, evaluated candidates, and proposed a trio slate, which the Council approved and sent to OFES

- **Strategic planning**
  - Last year, a BPO Task Force prepared the EPAct Report (reported to FESAC at its June '06 meeting)
  - New subcommittee to be led by E. Marmar
  - Prepare for NRC review of the EPAct Report; feed into new FESAC "DEMO Charge" and long-term planning activities

Topical Groups

Topical Group	Leader	Deputy Leader
MHD, Macroscopic Plasma Physics	Jon Menard (PPPL)	Chris Hegna (UW)
Confinement and Transport	Paul Terry (UW)	Ed Doyle (UCLA)
Boundary	Dennis Whyte (MIT)	Tom Rognlien (LLNL)
Plasma-Wave Interactions	Cynthia Phillips (PPPL)	Steve Wukitch (MIT)
Energetic Particles	Raffi Nazikian (PPPL)	Bill Heidbrink (UCI)
Integrated Scenarios	Chuck Greenfield (GA) — *to be replaced*	Chuck Kessel (PPPL)
Fusion Engineering Science	Nermin Uckan (ORNL)	Richard Nygren (SNL)
Modeling and Simulation	Don Batchelor (ORNL)	Jon Kinsey (Lehigh)
Operations and Control	Dave Humphreys (GA)	Dave Gates (PPPL)
Diagnostics	Rejean Boivin (GA)	Jim Terry (MIT) & Steve Allen (LLNL)

Topical Group (TG) Activities

- **FY07 ITER Physics Tasks**
  - 76 submitted, 14 selected by BPO to work on (work is underway)
- **ITER design review issue cards**
  - Submitted 13 issue cards
- **Recent events (examples)**
  - Diagnostics TG Workshop (Jan '07): leading to ITER diagnostics review
  - Modeling-Simulation TG conference call (Feb)
  - Energetic Particles TG Discussion (April–with TTF Meeting)
  - Plasma-Wave Interaction TG Workshop (May–with RF Conference)
- **Research Committee guidelines**
  - Discussed at 3 video "retreats" in January
  - Operational guidelines document for how to define tasks, approve and prioritize activities, and report results

ITER Physics Tasks

- Active coil system for ELM suppression and RWM stabilization
- ITER disruption mitigation system design and physics understanding
- Tritium retention and H/D/T control
- Requirements for stabilization of (3,2) and (2,1) NTMs
- Limitations to startup flexibility for advanced scenarios
- ELM mitigation
- ICRF antenna performance and coupling studies
- Critical assessment of heating and current drive mix on ITER and impact on achievable scenarios
- Review measurement requirements related to US diagnostic packages
- Evaluate the feasibility of lost and confined fast ion diagnostic systems for ITER
- ITER CODAC architecture design
- ICRF heating and current drive scenarios (time-independent)
- Development of improved pedestal and L-H transition predictive capabilities and impact on ITER design and performance
- Locked-modes and error field correction specification

Example: Integrated analysis of RWM, ELM, and error field coils for ITER

Macroscopic Stability TG (J. Menard, C. Hegna)

- **Questions BPO-MHD task group will attempt to address:**
  - Fundamental questions:
    - Is there a single coil set that can provide good ELM, EF, RWM control in ITER?
    - If it exists, what are the I, V, power/cooling requirements for such a coil set?
  - Related questions:
    - Do blanket/vessel ELM coils provide EF control similar to baseline?
    - Do blanket/vessel ELM coils provide good RWM control--dual usage?
    - Can 4/3 islands from blanket/vessel ELM coils be reduced by baseline EF correction coils? (possible synergy between ELM and EFC coils)

- **Related actions items for Issue Card RWM-1**
  - Assess and document 3 options for RWM control coils:
    - Existing side correction coils--include (large) power supply requirements
    - Port plug coils-> spec. ASAP to **reserve space** for coils on port plugs
    - Combined functions: ex-vessel RWM, ELM, and EFC correction coils
  - Strong overlap with ELM-4 (“ELM suppression by resonant magnetic perturbations”)

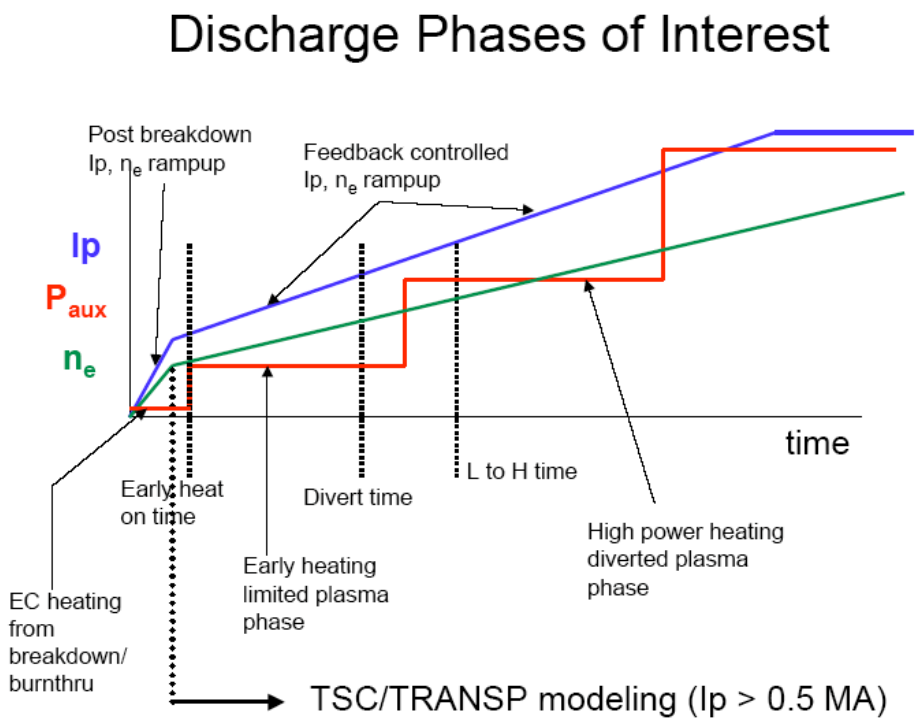
- **Identified as high priority also by ITPA and ITER Design Review**

Example: Startup flexibility for ITER

Integrated Scenarios TG (C. Greenfield, C. Kessel)

- **Main issue**
  - Whether ITER can produce a target plasma suitable for advanced regimes (e.g., hybrid or steady-state)
  - Identified as high priority also by ITPA and ITER Design Review

- **Questions to be investigated:**
  - Verify locations where plasma can be initiated, limitations, plasma size, effect of EC pre-ionization, effect of auxiliary heating (burn through)
  - Determine how quickly plasma can be grown while limited, how soon plasma can be diverted, how soon L-H mode transition can occur, and how fast Ip can be ramped up
  - Determine how much power can be injected while the plasma is resting on the limiter, impact of heating on scenario
  - Determine viable heating sources for growth and ramp-up phases, particularly when the plasma is not full size and/or limited



- **Demonstrate range of safety factor/current profiles that can be produced using 1) heating/CD timing, 2) density ramping, 3) divert time, and 4) L-H mode transition time**

ITER Design Review Urgent Issues

- **ITER Design Review working groups (8)**
  - Example: Design Requirements & Physics Objectives WG (chair: P. Thomas; US reps: R. Hawryluk and R. Stambaugh)
  - 12 urgent DR&PO issues, requested to be addressed by Participant Teams
  - Preliminary design review (May); finalized design review (Nov)

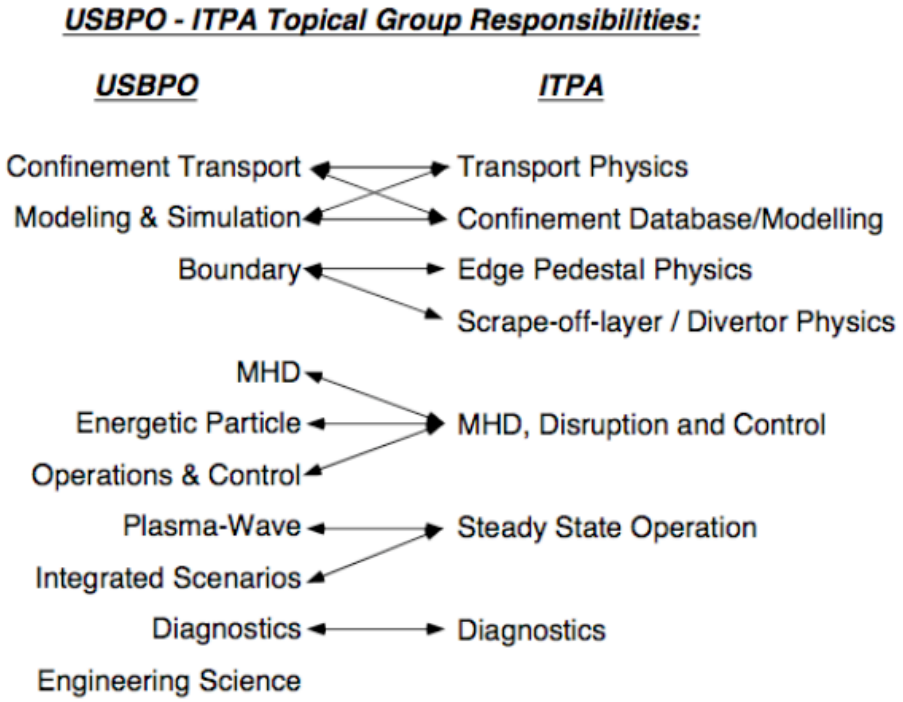
- **USBPO coordination role**
  - TG leaders have recommended names of US scientists qualified to address these issues
  - Also involved in recommendations: VLT for technical issues, ITPA for international

- **Programmatic discussions**
  - US program leaders are considering twin impacts of (1) diversion of effort and (2) additional travel costs
  - DOE providing guidance letter to program leaders
  - At same time, DO&PR working group will give feedback on names

Relationship with ITPA

- **Recent document about integrated relationship**
  - Authored by R. Fonck & R. Stambaugh
  - Being circulated for comments from USBPO and ITPA

- **Summary**
  - USBPO will be the national base and infrastructure for the US part of ITPA; US ITPA members will be a conduit for USBPO to the international arena
  - ITPA Topical Group members will be USBPO members
  - US coordinators for ITPA Topical Groups will work closely with USBPO Topical Group leaders/deputy leaders
  - USBPO will broadly publicize ITPA activities to US community (e.g., web page, e-News)
  - Effectively, a “merger” at the national level



To-Do List

- **Strategic planning**
  - NRC review; FESAC charge(s)
- **Research activities**
  - ITER Design Review urgent issues
  - ITER Physics Tasks (US commitments)
  - Broader burning plasma issues
- **Coordination**
  - ITPA Coordination Committee meeting (June)
- **CODAC**
  - ITER working group (US rep: M. Greenwald)
- **Outreach**
  - APS Spring Meeting (April)
  - Portable, popular presentation for non-fusion audience