

**Workshop (W60) on “Burning Plasma Physics and Simulation”**  
**4-5 July 2005, University Campus, Tarragona, Spain**  
**Under the Auspices of the IEA Large Tokamak Implementing Agreement**

**Scope of the Workshop**

The Workshop will concentrate on burning plasma research in the areas of Plasma Transport and Confinement, MHD Stability and Fast Particle Confinement, Integrated Modelling of Burning Plasmas, and Diagnostics and Control for Burning Plasmas. In each of these areas, the Workshop should:

- review the status of burning plasma research;
- identify the need for further research; and
- propose a road map for burning plasma research.

**Venue, Dates and Accommodation**

The Workshop will take place in University Campus, Tarragona, Spain. It will start at 09:00hrs on Monday 4 July 2005 and finish at 17:00hrs on Tuesday 5 July 2005.

For those planning to attend the EPS meeting in Tarragona (27 June-1 July 2005) and paying the EPS conference fee the hotel and travel reservations can be made through the EPS website.

For those planning to attend the Workshop W60 *only*, travel and hotel information can be found on the EPS website (<http://eps2005.ciemat.es>) but booking would have to be made directly to the hotels, etc.

**Organising Committee for IEA Large Tokamak IA**

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**PROPOSED OUTLINE PROGRAMME**

**Session I: Transport and Confinement in Burning Plasmas (primarily for experimentalists and theoreticians; integrated modelling is addressed under Session III; MHD and fast particle confinement are addressed under Session II)**

- DT experiments in JET and TFTR, including trace tritium experiments as a diagnostic tool for particle transport studies, NB current deposition studies, etc;
- effect of  $\alpha$ -particles on turbulence and anomalous transport; channeling of  $\alpha$ -particle energy (electron vs. ion heating); heat and particle transport studies in candidate operating scenarios for ITER;
- experimental simulation of fast  $\alpha$ -particle populations by ICRH acceleration of helium NBI; absorption of Lower Hybrid power by fast particles including alpha particles;
- gyro-kinetic descriptions of burning plasmas;
- helium exhaust, carbon and beryllium migration, tritium retention and removal in candidate operating scenarios for ITER.

**Session II: MHD Stability and Fast Particle Confinement (experiment, theory and modelling)  
(Joint Session to be elaborated with ITPA MHD Topical Group)**

- experimental evidence of fast particle thermalisation, redistribution, confinement and loss in candidate operating scenarios for ITER;
- fast particle driven MHD (eg. AEs, fishbones, sawtooth stabilisation, NTMs, MHD spectroscopy);
- fast particle redistribution (eg. by MHD, TF ripple, turbulence, current holes).

**Session III: Integrated Modelling for Burning Plasmas (MHD and fast particle confinement are addressed under Session II)**

- review progress towards a comprehensive theory/model for burning plasmas in ITER, DEMO;
- $\alpha$ -particle distributions in velocity and space (including  $\alpha$ -particle redistribution and losses due to direct ripple losses, ripple-banana stochastic diffusion, current hole and potato orbits) and  $\alpha$ -particle heating;
- burning plasmas in optimised shear/hybrid scenarios, dynamic evolution and positional stability of ITBs, current profile alignment including bootstrap current evolution;
- transient and bifurcative phenomena in burning plasmas (dynamics of L-H transitions and edge-core coupling, ITB formation and evolution, thermal stability in optimised shear/hybrid scenarios), including the approach to burning conditions with additional heating;
- impurity and helium ash accumulation (including impurity penetration through SOL, ETB and ITB);
- more speculative issues, such as  $\alpha$ -channelling.

**Session IV: Diagnostics and Control for Burning Plasmas**

- diagnostic needs and current developments (eg. diagnostics for fast particle thermalisation, re-distribution and loss; neutron yields, fluxes, spectra and tomography; helium ash and helium pumping efficiency; plasma isotopic composition; erosion, redeposition and tritium retention; and other specific diagnostic challenges for burning plasmas);
- advances in integrated plasma control and dedicated control (eg of MHD instabilities);
- specific measurement challenges associated with real time control requirements in burning plasmas (eg. sensors, actuators and modelling for D-T mixture control, burn control, current and pressure control with  $\alpha$ -particle driven sources).

**Session V: Road Map for Burning Plasma Research**

- the final Session of the Workshop could be a broader discussion structured by the Session chairs with the aim of defining a road map for burning plasma research;
- the precise structure of the discussion should be developed in consultation with the Session chairs in the run-up to the Workshop – it should not be a repetition of the summary discussions which form part of each of the other Sessions.