

**Main Experiments during the C28-C29 Campaigns**

(For detailed information, see Wiki-pages under Task Force E1/E2 of the EFDA-JET users Website)

| S/T              | TF    | Description  | Shifts |
|------------------|-------|--|--------|
| <b>C28a</b>      |       |  |        |
| Ex-1.1.2         | E2    | Initial first wall Be erosion, Be and W material mixing & fuel retention               | 13     |
| <i>Cont_C28a</i> |       | <i>Contingency</i>   | 3      |
| <b>C28b</b>      |       |  |        |
| Ex-1.1.1         | E2    | 1 - Be migration monitoring pulse + preparation  | 2      |
| Ex-1.1.3         | E2    | C & Be migration in all scenarios  | 2      |
| Ex-1.1.5         | E2    | Evaluation of fuel retention in all scenarios  | 4      |
| Ex-1.1.7         | E2    | Divertor W erosion and ELM induced sputtering  | 1      |
| Ex-1.2.1         | E2    | Beryllium Tile Power Handling  | 1      |
| Ex-1.2.3         | E2    | Bulk W Tile power handling   | 1      |
| Ex-2.1.2         | E1    | Qualification of main plasma shape at low power  | 3      |
| Ex-2.1.3         | E1/E2 | Characterisation of L-mode domain  | 2      |
| Ex-2.1.4         | E1    | Wall proximity and shape validation in H-mode  | 1      |
| Ex-2.1.5         | E1    | Develop H-mode baseline at 2.5MA   | 1      |
| Ex-2.1.6         | E1    | Characterisation of ICR heating with ILW   | 3      |
| Ex-2.2.1         | E1/E2 | Determination and control of the intrinsic impurity composition in the full W divertor | 1      |
| Ex-3.1.1         | E1/E2 | ITER main chamber limiter start-up characterisation                                    | 2      |
| Ex-3.1.2         | E2    | Characterisation of detached plasmas   | 2      |
| Ex-3.3.1         | E1/E2 | Disruption physics   | 1      |
| <i>Cont_C28b</i> |       | <i>Contingency</i>   | 5      |
| <b>C28c</b>      |       |  |        |
| Ex-1.1.1         | E2    | 1 - Be migration monitoring pulse + preparation  | 1      |
| Ex-1.1.3         | E2    | C & Be migration in all scenarios  | 2      |
| Ex-1.1.4         | E2    | Material migration to remote areas   | 2      |
| Ex-1.1.5         | E2    | Evaluation of fuel retention in all scenarios  | 4      |
| Ex-1.1.9         | E2    | Particle balance for N injection and development of removal techniques                 | 3      |
| Ex-1.2.3         | E2    | Bulk W Tile power handling   | 1      |

|           |       |  |    |
|-----------|-------|--|----|
| Ex-1.3.1  | E1/E2 | Disruption heat loads                              | 2  |
| Ex-1.3.4  | E2    | 2 - ILW status monitoring + preparation            | 2  |
| Ex-2.1.4  | E1    | Wall proximity and shape validation in H-mode      | 1  |
| Ex-2.1.5  | E1    | Develop H-mode baseline at 2.5MA                   | 1  |
| Ex-2.1.6  | E1    | Characterisation of ICR heating with ILW           | 2  |
| Ex-2.2.2  | E1/E2 | W screening, peaking and control                   | 1  |
| Ex-3.1.3  | E2    | Characterisation of the W divertor in H-mode       | 2  |
| Ex-3.2.1  | E1    | L-H power threshold study with Be/W vs C           | 1  |
| Ex-3.2.2  | E2    | ELM physics studies & energy and heat load scaling | 1  |
| Ex-3.3.1  | E1/E2 | Disruption physics                                 | 2  |
| Ex-3.3.2  | E1/E2 | Disruption mitigation                              | 2  |
| Cont_C28c |       | Contingency  | 10 |

## C29

|           |       |  |   |
|-----------|-------|--|---|
| Ex-1.1.1  | E2    | 1 - Be migration monitoring pulse + preparation  | 1 |
| Ex-1.1.3  | E2    | C & Be migration in all scenarios  | 2 |
| Ex-1.1.4  | E2    | Material migration to remote areas   | 2 |
| Ex-1.1.5  | E2    | Evaluation of fuel retention in all scenarios  | 4 |
| Ex-1.1.6  | E2    | Gas balance analysis with impurity seeding   | 2 |
| Ex-1.1.7  | E2    | Divertor W erosion and ELM induced sputtering  | 3 |
| Ex-1.1.8  | E2    | Long term evolution of W erosion and migration   | 1 |
| Ex-1.1.10 | E2    | Fuel recovery by cleaning & sweeping   | 2 |
| Ex-1.2.1  | E2    | Beryllium Tile Power Handling  | 1 |
| Ex-1.2.2  | E1    | Near upper null operation and characterisation   | 4 |
| Ex-1.2.3  | E2    | Bulk W Tile power handling   | 1 |
| Ex-1.2.4  | E1/E2 | Operation on Stack A (melt reference)  | 2 |
| Ex-1.3.2  | E1/E2 | Fuelling and seeding studies   | 9 |
| Ex-2.1.1  | E1    | 3 - Recovery wall conditioning + preparation   | 1 |
| Ex-2.1.2  | E1    | Qualification of main plasma shape at low power  | 1 |
| Ex-2.1.5  | E1    | Develop H-mode baseline at 2.5MA   | 8 |
| Ex-2.1.7  | E1    | Current profile access and scenario overlap  | 4 |
| Ex-2.2.1  | E1/E2 | Determination and control of the intrinsic impurity composition in the full W divertor | 1 |
| Ex-2.2.2  | E1/E2 | W screening, peaking and control   | 2 |
| Ex-2.2.3  | E1/E2 | Integration of seeding & ELM control techniques  | 4 |

|          |       |  |    |
|----------|-------|--|----|
| Ex-2.2.5 | E1    | Type III ELM scenario up to 2.5MA                  | 2  |
| Ex-2.2.7 | E1/E2 | Pellet ELM pace making                             | 10 |
| Ex-2.2.8 | E1/E2 | EFCC ELM mitigation                                | 3  |
| Ex-2.2.9 | E1/E2 | Comparison of techniques with kicks                | 4  |
| Ex-2.3.1 | E1    | Hybrid scenario development with ILW               | 4  |
| Ex-2.3.2 | E1    | Baseline scenario to high Ip                       | 5  |
| Ex-3.1.3 | E2    | Characterisation of the W divertor in H-mode       | 2  |
| Ex-3.2.1 | E1    | L-H power threshold study with Be/W vs C           | 1  |
| Ex-3.2.2 | E2    | ELM physics studies & energy and heat load scaling | 8  |
| Ex-3.3.2 | E1/E2 | Disruption mitigation                              | 4  |
| Cont_C29 |       | Contingency  | 25 |

## C30a

|           |       |  |    |
|-----------|-------|--|----|
| Ex-1.3.3  | E2    | Characterisation of large-regular ELMs   | 2  |
| Ex-1.3.4  | E2    | 2 - ILW status monitoring + preparation  | 1  |
| Ex-2.1.1  | E1    | 3 - Recovery wall conditioning + preparation   | 1  |
| Ex-2.2.1  | E1/E2 | Determination and control of the intrinsic impurity composition in the full W divertor | 2  |
| Ex-2.2.2  | E1/E2 | W screening, peaking and control   | 2  |
| Ex-2.2.3  | E1/E2 | Integration of seeding & ELM control techniques  | 2  |
| Ex-2.2.5  | E1    | Type III ELM scenario up to 2.5MA  | 2  |
| Ex-2.3.1  | E1    | Hybrid scenario development with ILW   | 9  |
| Ex-2.3.2  | E1    | Baseline scenario to high Ip   | 5  |
| Ex-3.3.3  | E1    | NTM and sawtooth control   | 2  |
| Cont_C30a |       | Contingency  | 20 |

## C30b

|           |       |  |   |
|-----------|-------|--|---|
| Ex-1.1.1  | E2    | 1 - Be migration monitoring pulse + preparation        | 1 |
| Ex-1.1.11 | E2    | Fuel release after transients: disruptions, large ELMs | 2 |
| Ex-1.1.12 | E1/E2 | ICW conditioning                                       | 2 |
| Ex-1.3.1  | E1/E2 | Disruption heat loads                                  | 2 |
| Ex-1.3.4  | E2    | 2 - ILW status monitoring + preparation                | 1 |
| Ex-2.2.4  | E1/E2 | Impurity seeding in preparation for ITER               | 4 |
| Ex-2.2.6  | E2    | Impact of ELM mitigation techniques on H-mode          | 4 |
| Ex-3.2.1  | E1    | L-H power threshold study with Be/W vs C               | 2 |

|                  |       |  |           |
|------------------|-------|--|-----------|
| Ex-3.2.3         | E2    | Pedestal stability   | 4         |
| Ex-3.2.4         | E1/E2 | Pellet fuelling study  | 2         |
| Ex-3.2.5         | E2    | Effect of SOL transport, pedestal & ELMs on impurity transport | 4         |
| <i>Cont_C30b</i> |       | <i>Contingency</i>   | <i>14</i> |

## C30c

|                  |    |  |          |
|------------------|----|--|----------|
| Ex-1.1.3         | E2 | C & Be migration in all scenarios                    | 2        |
| Ex-1.1.8         | E2 | Long term evolution of W erosion and migration       | 2        |
| Ex-1.2.5         | E2 | H-modes prior to LTS retrieval with tracer injection | 20       |
| <i>Cont_C30c</i> |    | <i>Contingency</i>                                   | <i>2</i> |

**Parasitic Experiments during the Campaigns**

(For detailed information, see Wiki-pages under Task Force E1/E2 of the EFDA-JET users Website)

| S/T      | TF | Parasitic Experiment  | Parasitic to                    | Shifts | Week             |
|----------|----|---|---------------------------------|--------|------------------|
| Px-1.1.1 | E2 | Study effect of conditioning cycle, GDC and Be-evaporation on ILW operations                | R1, R2, R3                      |        | Starting week 30 |
| Px-1.1.2 | E2 | QMB data monitoring during the start-up phase of ILW  | R2, R3<br>Ex-1.1.3<br>Ex-1.1.10 | 7      | 39, 43, 5        |
| Px-1.1.3 | E2 | Be Erosion yield determination  | Ex_3.1.1<br>Ex_1.1.2            | 4      | 32, 38           |
| Px-1.1.4 | E2 | Monitoring of fuel recycling, retention and outgassing during the ILW start-up phase of ILW | R2, R3<br>Ex-1.1.3<br>Ex_1.1.2  | 8      | 32, 39, 43       |
| Px-1.1.5 | E2 | W main chamber erosion  | Ex-1.1.3                        | 4      | 43, 50           |
| Px-1.1.6 | E2 | Investigation of tungsten nitride formation   | Ex-1.3.2<br>Ex-1.1.9            | 3      | 41, 50           |
| Px-1.3.1 | E1 | Characterisation of heat loads and W sputtering due to beam shine through                   | R3                              | 3      | 40, 41           |
| Px-1.3.2 | E1 | Initial test of bulk W stack loads during OSP sweeping                                      | R2<br>Ex-1.2.3                  | 2      | 38               |

|          |    |  |                           |   |            |
|----------|----|--|---------------------------|---|------------|
| Px-1.3.3 | E1 | Development of LH arc detection using KL10 visible camera and bolometry signals  | R3, R4<br>Ex-2.1.6        | 2 | 40, 41, 42 |
| Px-1.3.4 | E2 | Pellet induced ELM divertor deposition   | Ex-2.2.7                  | 4 | 3 to 6     |
| Px-2.1.1 | E1 | Document effect of the ILW on breakdown  | R2, R3,<br>R4<br>Ex-2.1.3 | 2 | 37, 38     |
| Px-2.1.2 | E1 | Gas and density scan under new wall condition  | Ex-2.1.3                  | 2 | 38         |
| Px-2.1.3 | E1 | Control of impurities accumulation during current rise in diverted plasmas   | Ex-2.1.7                  | 2 | 6          |
| Px-2.1.4 | E1 | Qualification of LH power up to high power   | R4<br>Ex-2.1.6            | 2 | 42         |
| Px-2.1.5 | E1 | Measurements of LH wave non-linear behaviour using RF probes and reflected power spectra analysis                              | R2, R3,<br>R4<br>Ex-2.1.6 | 2 | 37         |
| Px-2.1.6 | E1 | Influence of core and edge density on LH current drive   | Ex-3.2.4                  |   | C30b       |
| Px-2.1.7 | E1 | Application of the Current Limit Avoidance (CLA) in condition of low disruption probability and low forces at disruption (NP1) | R3, R4                    |   | 40, 41, 46 |
| Px-2.2.1 | E2 | Fuelling and seeding scans for exhaust moderation and detachment in the ILW  | Ex-2.1.5                  | 2 | 47         |
| Px-2.2.3 | E2 | Study of density pump-out due to ELM mitigation techniques   | Ex-2.2.9                  | 4 | 4, 5       |
| Px-2.2.4 | E2 | ELM triggering by vertical kicks: how do vertical kicks work   | Ex-2.2.9                  | 4 | 4, 5       |
| Px-2.2.5 | E1 | Assessment of upgraded HFPI performances (NP3)   | R4                        |   | 46         |
| Px-3.2.1 | E2 | Neutral density profiles studies   | Ex-2.1.4                  | 2 | 38, 42     |
| Px-3.2.2 | E2 | Investigation of the stability of the first ELM  | Ex-2.1.5                  | 1 | 48         |
| Px-3.2.3 | E1 | Mitigation of the 1st ELM  | Ex-2.2.9                  | 2 | 4, 5       |
| Px-3.2.4 | E2 | Response of edge Er to parameters affecting the L-H transition   | Ex-3.2.1                  | 2 | 42, 47     |
| Px-3.2.5 | E1 | H=1 access physics studies in stationary plasmas   | Ex-2.2.6                  |   | C30b       |

|          |    |  |                                  |   |              |
|----------|----|--|----------------------------------|---|--------------|
| Px-3.2.6 | E2 | Pedestal evolution characterisation in between and during ELMs; evaluation of the dynamics of peeling ballooning limits. | Ex-2.1.5<br>Ex-3.2.2<br>Ex-3.2.3 | 8 | 47, 48       |
| Px-3.2.7 | E2 | Impact of the ILW on the edge rotation   | Ex-2.1.5                         | 4 | 47, 48       |
| Px-3.2.8 | E2 | Determine possible presence of a convective component in gas fuelling through the pedestal                               | Ex-3.2.2                         | 2 | 51           |
| Px-3.3.1 | E1 | Disruption causes, detection and prevention strategies   | Ex-2.1.5                         | 4 | 47, 48       |
| Px-3.3.2 | E1 | Monitor TAE damping in ILW scenario  | Ex-1.1.3<br>Ex-1.15              | 6 | 39, 43, 02   |
| Px-3.3.3 | E2 | Runaway studies with gamma-ray and neutron diagnostics   | Ex-1.3.1                         | 2 | 45           |
| Px-3.3.4 | E1 | Validation of the response of the metallic wall to magnetic perturbation   | R4                               |   | 1            |
| Px-3.3.5 | E1 | NTM stability study with rotation and q profile in ILW scenario  | Ex-2.1.7<br>Ex-1.3.2<br>Ex-2.1.5 | 4 | 47, 49, 6, 8 |
| Px-3.3.6 | E1 | Diagnose confine and lost fast-ions (NP2)  | Ex-2.1.6<br>Ex-3.3.3<br>Ex-2.2.8 | 4 | 42, 3        |
| Px-3.3.7 | E1 | Neutron spectroscopy   | Ex-2.3.2                         | 3 | 8            |
| Px-3.3.8 | E2 | Neutron calibration cross-check  | R4                               |   | 46           |
| Px-3.4.1 | E2 | Dust detection after disruption with the HRTS in the ILW   | Ex-3.3.1<br>Ex-1.3.1<br>Ex-3.3.2 | 4 | 45           |
| Px-3.4.2 | E1 | Q-profile determination by consistency between MSE and MHD markers (NP4)   | Ex-2.1.7                         | 4 | 6, 8         |

**Back-up Experiments during the Campaigns**

| <b>S/T task</b> | <b>TF</b> | <b>Description</b>   |
|-----------------|-----------|--|
| Bx-1.1.1        | E1        | Conditioning by using multiple breakdowns  |
| Bx-1.1.3        | E2        | Gas balance analysis in plasmas with ELM mitigation techniques   |
| Bx-1.1.4        | E2        | Long term evolution of Be, C and W erosion flux and concentrations   |
| Bx-1.1.5        | E2        | Long term evolution of Be  |
| Bx-1.2.1        | E2        | Study of Accidental Be Melt Events   |
| Bx-1.2.2        | E2        | Accidental Bulk W Melting  |
| Bx-2.1.1        | E1        | ITER ramp-up/down scenario   |
| Bx-2.1.2        | E1        | Test ITER-like breakdown with ILW  |
| Bx-2.1.3        | E1        | Characterisation of the ICRF coupling variations with gas injection from different machine locations and related SOL modelling |
| Bx-2.3.1        | E1        | Development of high Te pedestal ELM-free scenario  |
| Bx-3.1.1        | E1        | Poloidal mapping of DC potential in front of the ICRF antenna using RCP measurements   |
| Bx-3.2.1        | E2        | Study intrinsic rotation, mode conversion flow drive and momentum transport with full metal wall                               |
| Bx-3.2.2        | E2        | Study of plasma transport in L-mode, at the H-mode threshold   |
| Bx-3.2.3        | E1        | H=1 access physics studies in dynamically evolving plasmas   |
| Bx-3.4.1        | E1        | Diagnosing the deuterium energy distribution function below 1 MeV  |