ITER Physics Work Packages

ANNUAL WORK PLAN 2015 & WORK PLAN 2016-2018

CALL RESPONSE FORM for the Work Package

WPJET2: JET PLASMA–FACING COMPONENTS

# IDENTIFICATION

|  |  |
| --- | --- |
| **Work Package ID** | WP15-IPH-JET2 |
| **BENEFICIARY** | Beneficiary Name |
| **CONTRACTUAL CONTACT PERSON** | Name / Email / Phone |
| **TECHNICAL CONTACT PERSON** | Name / Email / Phone |

# REFERENCED DOCUMENTS

The following documents provide descriptions for the technical content, key deliverables, milestones, foreseen facilities, opportunities for industrial innovation and training/development opportunities for each Work Package. It is essential that the relevant sections are considered before completing this Call for Participation:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ***Document Title*** | ***Version*** | ***Section(s)*** | ***Page(s)*** |
|  | GRANT AGREEMENT, ANNEX 1: WORK PLAN FOR THE IMPLEMENTATION OF THE FUSION ROADMAP IN 2014-2018 |  |  |  |
|  | ANNUAL WORK PLAN 2015 – Issue 3 | 25 Sep 2014 | 2.2.2 | 32-34 |
|  | WPJET2 PROJECT MANAGEMENT PLAN | 15 Apr 2014 |  |  |

# INTRODUCTION

This document is to be used in conjunction with the EUROfusion ECoM System in order for a Research Unit to respond to the EUROfusion Call for Participation in Work Plan 2014 – 2018 [1], particularly for the Annual Work Plan 2015 [2]. This call is a partial call for work additional to that which was covered in the call for the Annual Work Plan 2014 which included an expression of interest for activities in 2015-2018. The Call in WPJET2 for 2015 covers activities in three research areas. It is in accordance with the PMP accepted by the Project Board in April 2014 when sub-project leaders were also approved. **In filling out the sections below, the Research Units shall restrict themselves to the additional activities indicated**.

The purpose of this document is:

* To set out the required roles and associated competencies that are foreseen in order to execute the Project and to help the Project/Task Force Leader with planning.
* To allow Research Units to indicate where they have appropriate resources and competences.
* To allow Research Units to indicate a proposed resource level in professional-person-years per year (ppy/y) in 2015 and their interest and potential contributions to the Work Plan 2016-2018.
* To provide the required input for ECoM.

Finally, please note that no provision for allocation of mission resources is made in the present Call. These will be allocated as detailed in the Project Management Plan (PMP). The indicative budget is 6 to 7 % of the foreseen manpower per project per year (+ missions to Rokkasho IFERC site, Japan, reimbursed on the basis of real costs; flight cost reimbursement limited to the ceiling level). However, each Research Unit may fill the box at the end of this document to include its comments on the envisaged needs concerning missions for participation in this Work Package.

# GUIDANCE NOTES FOR SUBMISSION OF THE RESPONSE TO THE CALL

The following notes describe the procedure for completing this document and the related ECoM submission:

1. Fill in the appropriate information in the Identification table in section 1 above.
2. Read the relevant sections (see section 2) of the Work Plan 2014-2018 and Annual Work Plan 2015.
3. In section 5:
   1. indicate the appropriate human resources and competences available within your Research Unit to participate in the Work Plan 2015 (section 5.1)
   2. if foreseen give a list of activities to subcontract (section 5.2)
   3. supply names and contact details of potential contributors from your Research Unit and Third Parties (section 5.3)
   4. indicate proposed support for hardware but also procurements or use of facilities
4. The total proposed human resources (terracotta box from section 5.1) and hardware (blue box from section 5.4) for the 2015 work plan should also be entered into ECoM in the relevant boxes.
5. In section 6, indicate your interest and potential contributions to the Work Plan deliverables for 2016-2018, including the estimates for ppy
6. In section 7, quote up to 5 publications in the field relevant for the Work Package published by your Research Unit or Third Parties
7. In section 8, give any additional comments or describe requirements your Research Unit would like to express and that are necessary to contribute to this Work Package.

# DESCRIPTION OF INSTITUTION’S PARTICIPATION IN 2015 WORK PLAN

### 5.1 Personnel

Briefly describe the relevant competences of the proposed staff and their experience relevant for the **deliverables in 2015 Work Plan.** The particular staff members expected to participate in the work package may be indicated. Briefly describe any additional support the institution or the candidate's research group can provide or other related activities that may strengthen the proposal. The Call covers three research areas in WPJET2.

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| **Competency required for this Work Package** | | **Brief description of relevant competences and experience**  ***Statement on capabilities of handling/machining Be- and T- contaminated samples (Yes or No).***  ***Proposed work (maximum 200 words)*** | **ppy 2015[[1]](#footnote-1)** |
| **Technical and/or Research Activity** | **Description** |
| ***Material Erosion and Deposition*** | | | |
| Sample preparation for analysis: cutting tiles after the 2013-2014 operation. | Please indicate capability of handling and machining Be- and/or T-containing samples from plasma-facing components:   * Cutting Be * Cutting W * Cutting /coring W-coated CFC * Cutting steel and/or Inconel | Capabilities:  Proposed Work: |  |
| Surface analysis of W-coated CFC divertor tiles | Sample handling (please indicate capability of handling Be- and/or T-containing samples and maximum sample size)   * Accelerator-based analysis: NRA for D, Be, C, N, O, RBS, PIXE * Micro-beam RBS and NRA for D, Be, C, O, N. * SIMS * HIERDA * SEM, EDX, WDX * Metallography * AMS for Be-10 analysis | Capabilities and max. sample size:  Proposed Work: |  |
| Surface analysis of solid W divertor tiles (lamellae) | Sample handling (please indicate capability of handling Be- and/or T-containing samples and maximum sample size)   * Accelerator-based analysis: NRA for D, Be, C, N, O, RBS, PIXE * Micro-beam RBS and NRA for D, Be, C, N, O. * SIMS * HIERDA * SEM, EDX, WDX * Metallography | Capabilities and max. sample size:  Proposed Work: |  |
| Surface analysis of solid Be limiter tiles | Sample preparation (please indicate capability of handling Be- and/or T-containing samples and maximum sample size)   * Accelerator-based analysis: NRA for D, Be, C, N, O, RBS, PIXE * Micro-beam RBS and NRA for D, Be, C, N, O. * SIMS * HIERDA * SEM, EDX, WDX * Metallography * AMS for Be-10 analysis | Capabilities and max. sample size:  Proposed Work: |  |
| Surface analysis of Inconel inner wall cladding tiles | Sample preparation (please indicate capability of handling Be- and/or T-containing samples and maximum sample size)   * Accelerator-based analysis: NRA for D, Be, C, N, O, RBS, PIXE * Micro-beam RBS and NRA for D, Be, C, N, O. * SIMS * SEM, EDX, WDX * Metallography * AMS for Be-10 analysis | Capabilities and max. sample size:  Proposed Work: |  |
| Plasma impact on tile shape modification | Sample preparation (please indicate capability of handling Be and T-containing samples and maximum sample size)   * Profilometry | Capabilities and max. sample size:  Proposed Work: |  |
| Surface analysis of Wall probes: Louvre clips; QMB cover and crystal; rotating deposition collector, inner wall inserts, plates from the dust collectors | * Accelerator-based analysis: NRA for D, Be, C, N, O, RBS, PIXE * Micro-beam RBS and NRA for D, Be, C, N, O. * SIMS * HIERDA * SEM, EDX, WDX | Capabilities and max. sample size:  Proposed Work: |  |
| Determination of fuel content in tiles and/or wall probes by thermal techniques | Sample preparation (please indicate capability of handling Be and T-containing materials, sample type and maximum size)   * TDS (TPD) * LIDS | Capabilities and max. sample size:  Proposed Work: |  |
|  |  |  |  |
| ***Dust*** | | | |
| Analysis of dust samples collected on sticky carbon pads from the tile surfaces and also particles trapped in dust collectors | Sample handling (please indicate capability of handling Be and T-containing samples)   * SEM, EDX, WDX * Micro-beam: NRA for D and Be, RBS and PIXE | Capabilities:  Proposed Work:  *(Note: Dust will be collected by vacuum cleaning, but such samples will not be available for studies before October 2015. They can probably be studied in the 2016-2018 programme.)* |  |
| ***First Mirror Test*** | | | |
| Post-exposure analysis of mirrors | Sample handling (please indicate capability of handling Be and T-containing samples)   * Spectro-photometry for total, diffuse, specular reflectivity 300 - 1600 nm * Accelerator-based analysis including micro-bam: NRA for D, Be, C, N, O, RBS, HIERDA, PIXE * SEM, EDX, WDX * SIMS * XPS |  |  |
|  |  | **TOTAL**  *(to be entered also in ECoM –row A)* |  |

### 5.2 List of proposed activities to subcontract

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### 5.3 Indicative list of potential contributors

List potential contributors (members of your Research Unit or Third Party) to be involved in this Work Package. Give details of at least one person who can act as a contact person for the Project Leader.

|  |  |  |
| --- | --- | --- |
| **Name** | **Email** | **Phone Number** |
| **Contact Person:** |  |  |
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### 5.4 Hardware description

If support for hardware but also procurements or use of facilities is requested, please give a brief description and the associated costs.

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| --- | --- | --- | --- |
| **Indicative list of hardware, consumables, procurements and use of facilities** | | **Brief description of the relevant expertise, facilities & approximate breakdown of costs** | **Costs 2015 (k€)** |
| **Name** | **Description** |
| He-3 for deuterium and beryllium analysis with nuclear reactions: NRA  100% |  |  |  |
| Shipment of Be- and T- contaminated materials  100% |  |  |  |
| Detectors for NRA  100% |  |  |  |
| Accelerator |  |  |  |
| Microscopy with EDS, WDS |  |  |  |
| Metallography lab. |  |  |  |
| Profilometry |  |  |  |
| TDS, LIDS |  |  |  |
|  |  |  |  |
|  |  | **TOTAL**  ***(to be entered also in ECoM –row B)*** |  |

### 5.5 Proposed facilities & corresponding costs per unit

List any facilities that were proposed under *“Hardware description”* and indicate the cost per day for each facility listed.

|  |  |
| --- | --- |
| **Proposed facilities** | **Cost per day (k€)** |
| Accelerator |  |
| SIMS laboratory |  |
| Microscopy with EDX, WDX (handling of Be- and T- contaminated materials) |  |
| Hot Cells |  |
| Controlled area for Be, W, W/CFC, Inconel tile cutting |  |
| Spectro-photometers (handling of Be- and T-contaminated materials) |  |

# EXPRESSION OF INTEREST IN FUTURE WORK PLAN 2016-2018

### 6.1 Personnel

In the areas of the new activities indicated above, please indicate your interest and potential contributions to the future Work Plan 2016-2018 deliverables, including the indicative ppy envisaged. Describe the additional support the institution or the candidate's research group can provide or other related activities that may strengthen the activity in the future.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Competence** | **Indicative human resource budget profile (ppy)** **[[2]](#footnote-2)** | | | |
| **2016** | **2017** | **2018** | **2015-2018 TOTAL** |
| ***Material Erosion and Deposition*** | | | | |
| Sample preparation: tile cutting |  |  |  |  |
| Analysis of limiter and divertor tiles: Microscopy with EDX, WDX |  |  |  |  |
| Analysis of limiter and divertor tiles: Accelerator methods (please specify) |  |  |  |  |
| Metallography: cross-sectional analysis |  |  |  |  |
| SIMS |  |  |  |  |
| Surface profilometry |  |  |  |  |
| Analysis of deposition monitors |  |  |  |  |
| ***Dust*** | | | | |
| Microscopy with EDX, WDX |  |  |  |  |
| Ion beam analysis with micro-beam |  |  |  |  |
| Fuel determination by thermal desorption |  |  |  |  |
| Chemical analysis by wet chemistry methods |  |  |  |  |
| ***Mirrors*** | | | | |
| Analysis of mirrors |  |  |  |  |
| Mirror cleaning  *(activity will depend on the ITER decision)* |  |  |  |  |
| **Total** |  |  |  |  |

**Additional support and related activities (see above, max 200 words):**

### 6.2 Hardware description

Please indicate the expected hardware support requests and associated costs to achieve Work Package deliverables in the Work Plan 2014-2018.

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| --- | --- | --- | --- | --- |
| **Indicative list of hardware, procurements and use of facilities** | **Proposed hardware (k€)** | | | |
| **2016** | **2017** | **2018** | **2015-2018 TOTAL** |
| Accelerator |  |  |  |  |
| Microscopes with EDX, WDX |  |  |  |  |
| Metallography laboratory |  |  |  |  |
| Hot Cells |  |  |  |  |
| Controlled area for Be, W, W/CFC, Inconel tile cutting |  |  |  |  |
| Spectro-phometers (handling of Be- and T-contaminated materials) |  |  |  |  |

**Brief outline of available facilities and justification of spending profile (max. 200 words):**

# Summary of relevant publications

Please indicate the publications most relevant for this Work Package, up to a maximum of 5, published by your Research Unit in the last 5 years.

|  |  |  |
| --- | --- | --- |
| **Title** | **Author(s)** | **Year of Publication** |
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# ADDITIONAL COMMENTS AND REQUIREMENTS

Please add, if necessary, additional comments or describe requirements your Research Unit would like to express and that are necessary to contribute to this Work Package.

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| --- |
| See the comments under section 6.1. Individuals are not named at this stage. |

1. To also include resources made available by Linked Third Parties or Third Parties providing in-kind contribution [↑](#footnote-ref-1)
2. To also include resources made available by Linked Third Parties or Third Parties providing in-kind contribution [↑](#footnote-ref-2)