WP PWIE SP B.2 & B.3 kick-off meeting

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VTT

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The views and opinions expressed herein do not necessarily reflect those of the European Commission.

Goals and agenda of the meeting

The goals of the meeting are to

- Introduce and discuss the tasks attached to each Research Unit under SP B.2 and SP B.3,
- Identify possible gaps and opportunities for collaboration, and
- Decide on concrete next steps, to be reviewed in the autumn

09:00	Introduction to PWIE and SP B
09:15	Presentations of SP B.2 and SP B.3 task holders – please focus on the question ”What will be done in 2021 and what is needed from others/EUROfusion” Please be brief: each presentation is 8 min + 2 min for quick feedback
11:05	Discussion
11:30	End of the meeting

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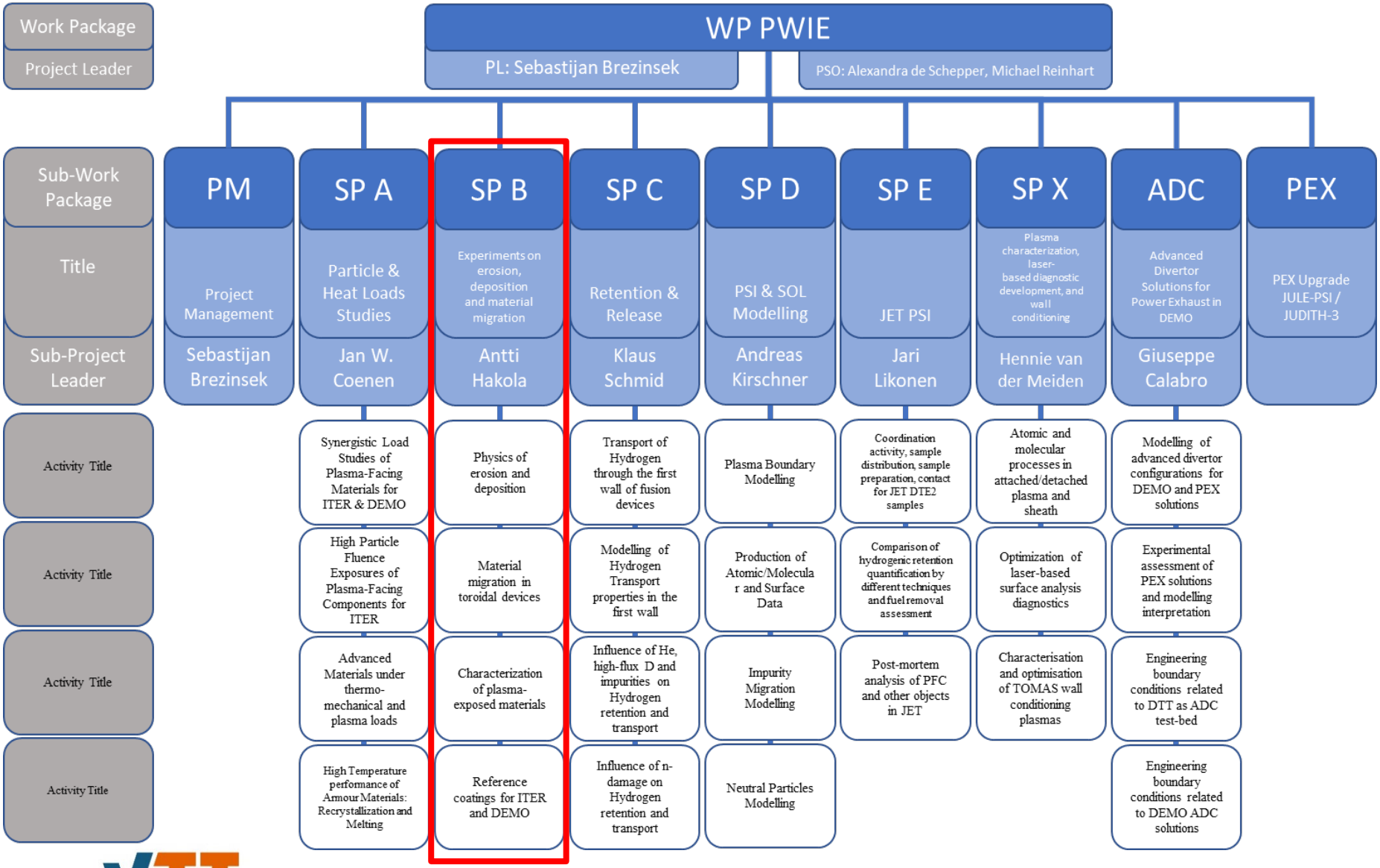
In this meeting we’ll discuss **material migration, erosion, and deposition phenomena in toroidal device** from the **experimental point of view.** Modelling efforts are channelled under SP D.

Everybody is invited to contribute to the discussions, also those who are not task holders of any of the SP B.2/B.3 activities!

Structure of PWIE and SP B



SP B focus points in 2021

I: Experimental determination of effective tungsten sputtering yields on different types of rough surfaces in pure and mixed plasmas and comparison with laboratory experiments (ITER+DEMO) → SP B.1, SP B.2, SP B.4

II: Provision of the gross and net erosion balance of W PFCs in L- and H-mode plasmas in tokamaks with the aid of marker probes (ITER) → SP B.2, SP B.3

III: Completion of surface analyses of W marker tiles exposed in the deuterium campaign C3, first assessment of the erosion/deposition balance on W PFUs in WEST after the He campaign → SP B.2, SP B.3

IV: Production of reference layers for the benefit of SP B and other subprojects → SP B.4

Why to have two different activity areas SP B.2 and SP B.3?

Both SP B.2 and SP B.3 deal with **analysis of samples/components coming from European tokamaks or stellarators** – thus having similarities but also differences

What is common between SP B.2 and SP B.3?

- ❑ Analysis of samples extracted from AUG, WEST, and W7-X
- ❑ Identification of erosion and deposition patterns on the samples
- ❑ Same groups with same tools involved in both activity areas

What are the differences?

- ❑ SP B.2 focuses on analysis of marker coatings or other samples from dedicated erosion/migration experiments
- ❑ SP B.3 concentrates on analyses of other interesting tiles and components removed from AUG, WEST, or W7-X – as well as samples from other SPs
- ❑ In SP B.2, the analysis should exclusively reveal erosion/deposition/migration patterns
- ❑ In SP B.3, also other investigations can be carried out (like analysis of arc traces, cracks, or other surface changes as well as fuel-retention patterns)

2021 Deliverables SP B.2

Deliverable ID:	Deliverable Title:
D001	Erosion, re-deposition, and fuel-retention patterns on selected WEST PFUs after C3, C4, and C5 campaigns (CEA)
D002	Erosion and re-deposition rates as a function of surface roughness/morphology changes in controlled L- and H-mode plasma experiments (JSI)
D003	Balance between gross and net erosion of plasma-facing materials in controlled L- and H-mode plasma experiments (VTT)
D004	NRA, SEM, and FIB characterization of marker samples and coatings from selected plasma experiments on AUG, WEST, and W7-X with conclusions (FZJ)
D005	RBS, NRA, SEM, and CLSM characterization of marker samples and coatings from selected plasma experiments on AUG with conclusions (MPG)
D006	RBS, NRA, SEM, and CLSM characterization of marker samples and coatings from selected plasma experiments on W7-X with conclusions (MPG)
D007	RBS, NRA, SEM, and CLSM characterization of marker samples and coatings from selected plasma experiments on WEST with conclusions (MPG)
D008	RBS, NRA, ERDA, and MEIS/LEIS characterization of marker samples and coatings from selected plasma experiments on AUG, WEST, and W7-X with conclusions (VR)
D009	SEM, TEM and FIB characterization of selected samples from experiments on AUG, WEST, and W7-X (IPP_LM)
D010	ERDA, RBS, NRA and PIXE characterization of selected samples from experiments on AUG, WEST, and W7-X as well from laboratory and linear plasma experiments (RBI)

2021 Deliverables SP B.3

Deliverable ID:	Deliverable Title:
D001	Database on ageing, erosion, and fuel-retention behavior of selected WEST PFUs (CEA)
D002	SEM, FIB, NRA, and LIBS characterization of selected WEST and W7-X wall tiles and plasma-exposed reference samples (FZJ)
D003	SEM, TEM and FIB characterization of selected WEST PFUs and plasma-exposed reference samples (IPPLM)
D004	RBS and NRA characterization of selected WEST PFUs and plasma-exposed reference samples (IST)
D005	Surface analyses of selected AUG and WEST wall tiles (JSI)
D006	RBS, NRA, SEM, and CLSM characterization of selected AUG, WEST, and W7-X wall tiles and components as well as samples from MAGNUM-PSI (MPG)
D007	RBS, SEM, XRD and XRF characterization of selected Be reference coatings and plasma-exposed samples (NCSRD)
D008	RBS, NRA, ERDA, LIBS, and SIMS characterization of selected AUG, WEST and W7-X wall tiles and plasma-exposed reference samples (VTT)

2021 Resources SP B.2

Deliverable Owner	Beneficiary	PM
M. Diez	CEA	2
M. Rasinski	FZJ	2
E. Fortuna-Zalesna	IPPLM	2
S. Markelj	JSI	3
K. Krieger	MPG	2
M. Mayer	MPG	2
M. Balden	MPG	2
I. Bogdanovic Radovic	RBI	3
P. Petersson	VR	2
A. Hakola	VTT	2
Total		**22**

Device	Beneficiary	Days	Related Deliverable
Accelerator	FZJ	3	D004
Accelerator	JSI	5	D002
Accelerator	MPG	8	D005, D006, D007
Accelerator	RBI	5	D010
Accelerator	VR	5	D008
Accelerator	VTT	2	D003

2021 Resources SP B.3

Deliverable Owner	Beneficiary	PM
M. Diez	CEA	2
M. Rasinski	FZJ	2
E. Fortuna-Zalesna	IPPLM	3
E. Alves	IST	2
M. Panjan	JSI	1
M.. Mayer	MPG	5
K. Mergia	NCSRD	2
A. Hakola	VTT	2
Total		20

Device	Beneficiary	Days	Related Deliverable
Accelerator	IST	5	D004
Accelerator	MPG	7	D007
Accelerator	NCSRD	5	D006
Accelerator	VTT	2	D010
Accelerator	FZJ	1	D002

2021 Tasks SP B.2

1. Determine erosion, re-deposition, and fuel-retention patterns on **WEST PFUs after C3, C4, and C5** campaigns: project coordination and surface analyses, including melting patterns for SP A (CEA)
2. Determine influence of **surface morphology on erosion and re-deposition** patterns of marker samples and coatings (AUG, WEST): project coordination as well as broad-beam and microbeam RBS/NRA (JSI)
3. Determine **gross and net erosion of marker samples and coatings** (AUG, WEST) and migration of impurities in edge plasmas (AUG, WEST, W7-X): project coordination and surface analyses (VTT)
4. Coordinate erosion and migration **experiments and related surface analyses on W7-X**; perform surface analyses for erosion/deposition, fuel-retention, and surface-modification patterns (incl. melting patterns for SP A) on samples from AUG, WEST, and W7-X (FZJ).
5. Coordinate erosion and migration **experiments and related surface analyses on AUG** and perform surface analyses for erosion/deposition, fuel-retention, and surface-modification patterns (incl. melting patterns for SP A) on samples from AUG (MPG)
6. Perform surface analyses for erosion/deposition, fuel-retention, and surface-modification patterns on **samples from W7-X** (MPG)
7. Perform surface analyses for erosion/deposition, fuel-retention, and surface-modification patterns on **samples from WEST** (MPG)
8. Perform detailed surface analyses for **fuel-retention and impurity-deposition patterns** on marker samples and other samples from specific plasma experiments (AUG, WEST, W7-X) (VR)
9. **Microscopy studies of marker samples and other samples** from specific plasma experiments (AUG, WEST, W7-X) (IPPLM - jointly with FZJ and MPG)
10. Ion-beam measurements (broad-beam and microbeam) of **marker samples and other samples from specific plasma experiments** (AUG, WEST, W7-X), comparison to linear devices and lab experiments (RBI)

2021 Tasks SP B.3

1. Carry out **post-exposure analyses of selected PFUs from WEST** Phase 1 and pre-characterize selected PFUs for Phase 2: project coordination and surface analyses (CEA)
2. Project coordination for W7-X analyses; Determine **surface changes** on selected WEST and W7-X wall tiles, reference coatings from plasma exposures in PSI-2, and from recrystallization studies under SP A in MAGNUM-PSI (FZJ)
3. Determine **surface changes** on selected WEST PFUs and reference coatings from plasma exposures in MAGNUM-PSI, PSI-2, and GyM (IPPLM)
4. Determine **erosion, deposition, and fuel retention profiles** on selected WEST PFUs and reference coatings from plasma exposures in MAGNUM-PSI, PSI-2 and GyM (IST)
5. Determine **erosion, deposition, and fuel retention profiles** on selected AUG and WEST wall tiles (JSI)
6. Project coordination for AUG analyses; Determine **surface changes as well as erosion, deposition, and fuel retention profiles** on selected AUG, WEST, and W7-X wall tiles and other components as well as samples from recrystallization studies under SP A in MAGNUM-PSI (MPG)
7. Determine **composition and surface structure** of reference coatings and test coatings from plasma exposures in MAGNUM-PSI, PSI-2 and GyM (NCSRD)
8. Determine **erosion, deposition, and fuel retention profiles** on selected AUG, WEST and W7-X wall tiles as well as reference coatings from plasma exposures in MAGNUM-PSI, PSI-2 and GyM (VTT)

Contact info and next steps

- Your SP B contact
  Antti Hakola (antti.hakola@vtt.fi)
- Project leader
  Sebastijan Brezinsek (s.brezinsek@fz-juelich.de)
- Project Support Officer
  Michael Reinhart (m.reinhart@fz-juelich.de)
- PMU Coordination Officer – starting in late 2021
  David Douai (david.douai@cea.fr)

- ✓ Approval of the Project Execution Plan (PEP)
  Mid- till end of June
- ✓ Refining task descriptions, in separate meetings or by email
  From June till mid-July
- ✓ Intermediate report and midterm meeting - **October**
- ✓ Annual meeting and report on Deliverables – **TBD**

Minutes and slides of the meeting at https://indico.euro-fusion.org/event/1153/