Helium campaigns on WP TE devices in 2022 – implications for WP PWIE SP B

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He campaigns on the WP TE devices

- Due to high relevance for the non-nuclear phase of ITER, WP TE will organize **helium campaigns on AUG and JET** in the latter half of 2022
  - ✓ AUG: last three weeks of July (6 experimental days, WP TE share 55 pulses)
  - ✓ JET: a two-month period in July-September (~80 sessions for experiments)
  - ✓ Experimental phases followed by a 6-9 month long analysis & modelling
- Most relevant device for SP B community is **AUG and its divertor manipulator**
  - ✓ Almost a full experimental day granted for studying plasma-wall interactions: **erosion of W and evolution of W fuzz**

Machine	2022						2023					
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
AUG												
		He	He analyses				He analyses					
JET												
		C43		He analyses			He analyses					

Overview of the He campaign structure

RT	Name	Reference TFL
RT-He-01	ELMy H-mode operation in He in view of the non-active phase of ITER	Emmanuel Joffrin Athina Kappatou David Keeling
RT-He-02	Qualifying transport in the core and edge of helium plasmas, in preparation of the non-active phase of ITER	Benoit Labit Nicola Vianello
RT-He-03	ELM control in helium H-modes for the non-active phase of ITER	Matteo Baruzzo David Keeling
RT-He-04	Helium plasmas for undestanding detachement physics	Nicola Vianello Marco Wischmeier
RT-He-05	Assessing plasma wall interactions in He plasmas in view of the non-active phase of ITER	Antti Hakola Emmanuelle Tsitrone
RT05	Runaway electron generation and mitigation, *including disruption mitigation in He plasmas* – **extension of a present RT**	Matteo Baruzzo Antti Hakola Emmanuel Joffrin
RT06	ELM mitigation and suppression in ITER/DEMO relevant conditions, *including RMP in He plasmas* – **extension of a present RT**	Antti Hakola Nicola Vianello
RT17	Material migration and fuel retention mechanisms in tokamaks, *including fuel retention mechanisms in He plasmas* – **extension of a present RT**	Antti Hakola Emmanuelle Tsitrone

Red = most relevant for this community

Proposed objectives of the RTs

RT-He-05: Assessing plasma wall interactions in He plasmas in view of the non-active phase of ITER

#	Objective
D1	Assess Be erosion in He plasmas under conditions relevant to the non-active phase of ITER and determine subsequent Be migration towards the divertor; Investigate potential impact of Be migration on divertor conditions and plasma operation.
D2	Assess inter and intra-ELM W erosion and W divertor screening in He plasmas under conditions relevant to the non-active phase of ITER and identify main contributing factors (including impurities and surface roughness).
D3	Compare the Be and W erosion/deposition patterns in He plasmas to those in hydrogenic plasmas and provide ITER with a model-based assessment of global Be migration in ITER PFPO conditions and potential impact on operational domain.
D4	Quantify W fuzz formation and evolution in He plasmas under ITER PFPO relevant conditions and assess their potential impact on plasma operations.

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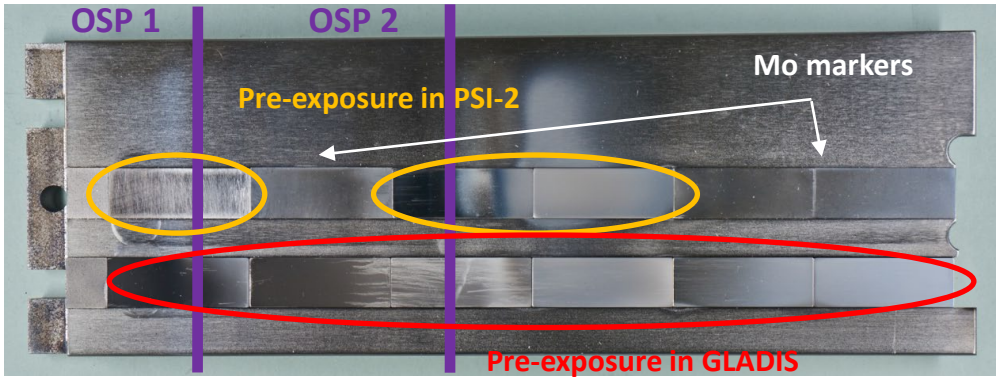
What this implies to SP B?

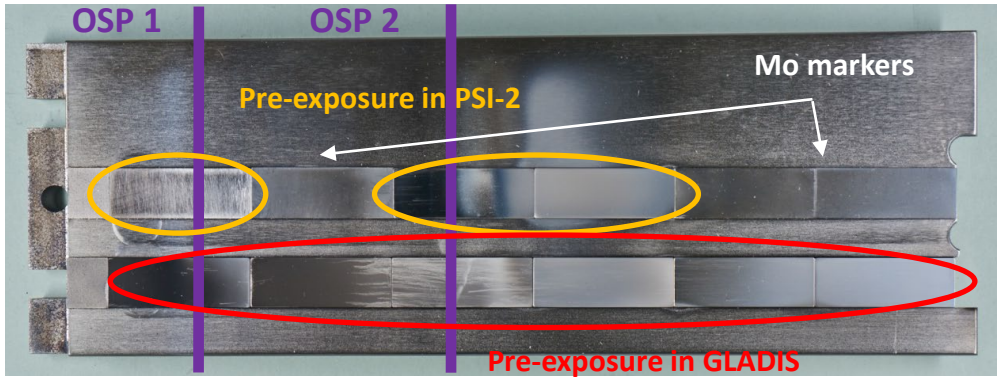
- **Production of new samples** and their pre-characterization
  - ✓ Samples with pre-formed nanostrcutures (PSI-2, GLADIS) to study W fuzz evolution
  - ✓ Samples with marker coatings (Pt w/ Mo interlayers) to assess erosion in He plasmas
  - ✓ W/CFC samples cut from a spare JET tile to study W layer stability and lifetime under He exposure
- **Participation in the experiments** in July – as much as possible
  - ✓ Call for participation to be released next week
- **Post-exposure characterization** of the samples
  - ✓ Contribution of several labs required
  - ✓ Also availability for pre-characterization of selected/reference samples appreciated



Photograph of samples after previous He experiment on AUG (in 2019). In 2022, scope will be extended such that two target tiles will be simultaneously exposed.

Open points to be discussed

- Where to find the **necessary resources**?
  - ✓ Help from SP A to create the nanostructured surfaces?
  - ✓ Help from SP E to obtain and characterize W/CFC samples?
  - ✓ Financial support to produce the most complicated samples (marker coatings?
  - ✓ Adapting the details of everybody's tasks? **NB!** This does not mean implementing any changes in the task descriptions in IMS or in the Annexes of PEP 2022
- Who would be **willing to contribute**? In the past FZJ, JSI, MPG, RBI, VTT
- What needs to be **taken into account for the preparations**? See proposal
  - ✓ https://wiki.euro-fusion.org/wiki/WPTE_wikipages:_Call_for_proposals_2022_He:_headline3_proposal:W_erosion_and_fuzz_properties
- Can we meet the **tight deadline** to have the samples ready and characterized by late June?
- Which **actions are to be taken after the experiment** – in terms of surface analyses?
  - ✓ Who will do and what and when?



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