WEST within EUROfusion

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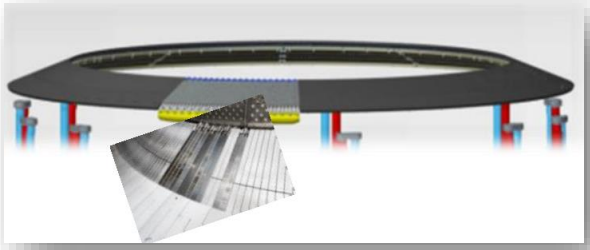
Outline

- **EUROfusion and WEST phase 1**
  ➔ Up to mid 2019
- **EUROfusion and WEST upgrade (to actively cooled, ITER-like PFUs) ➔ 2019-2020**
- **EUROfusion and WEST Phase 2**
  ➔ 2020 and FP9 (2021-2027)



Phase 1: mix of actively cooled ITER-like & inertial W coated PFU

Phase 2: high heat flux & fluences on 360o actively cooled ITER like divertor

EUROfusion & WEST phase 1 ➔ Up to mid 2019

- **July 2014: Panel in charge of the inclusion of WEST as EUROfusion facility**
  - " ...recommend that Phase 1 (2016/2017) of the WEST facility which involves **a single actively cooled divertor module is funded at a level of 10-15 run days per yea**r based on the assumption that the predicted performance is achieved... we also strongly recommend that it is located within the PFC project ..."

- **2018 - 2019**
  - WEST was included as EUROfusion facility in Work Package "Plasma Facing Component" led by Sebastijan Brezinsek
  - 27 sessions in Deuterium (7 to be performed in 2019) and 15 sessions in Helium (to be performed in 2019) were supported by EUROfusion (contribution to machine operation, manpower & missions for participating to experiments and related analysis)

See … part before

EUROfusion & WEST phase 1 ➔ Up to mid 2019

- **Main contribution to Mission 2 “Heat-Exhaust Systems”**
  - Headline “Prepare efficient PFC operation for ITER and DEMO”

- **EU Commission Grant deliverables related to WEST in 2019-2020**
  - Predictive modelling, design and plasma exposure of shaped, unshaped, or damaged W PFCs in WEST, so as to test code predictions for ITER W divertor monoblock design. (Dec. 2019)
  - Execution of He plasmas in WEST and associated studies related to He-W interaction with ITER-relevant PFUs. Associated PSI, plasma modelling and laboratory experiments. (Dec. 2020)
  - Approval of WEST Key Performance Indicators for divertor upgrade

EUROfusion & WEST upgrade (to actively cooled, ITER-like PFUs) ➔ 2019-2020

- **2016, WEST upgrade proposal was reviewed by the Plasma EXhaust (PEX) group, looking at gaps in EUROfusion 's capabilities**
  - Full actively cooled divertor, ITER –like PFUs
  - Long pulse capability,
  - PFU dedicated instrumentation
  - Edge Thomson scattering diagnostic
- **2017: EUROfusion GA agreed that WEST proposal filled PEX gaps & would contribute to:**
  - The characterisation of Integrated performance of PFUs under plasma conditions
  - The assessement plasma effects on ITER component design
  - The systematic studies of seed impurities
  - The Interpretation with plasma edge codes (quantitative match)
  - Development / control of steady-state scenario with a high fraction of radiated power in long pulse

EUROfusion & WEST upgrade (to actively cooled, ITER-like PFUs) ➔ 2019-2020

- **Nevertheless PEX Assessment Panel reported:**
  - "… uncertainty of finding a suitable plasma scenario, the relevance of the open divertor, the compatibility of the heating systems, the effect of the anticipated tungsten contamination, and the uncertainty of achieving relevant size ELMs pose a risk on achieving many of the stated physics and technological targets…."

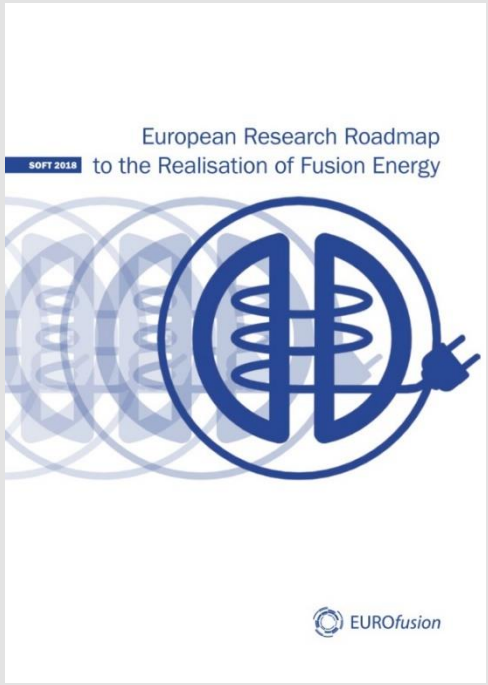
- **EUROfusion financial commitment (range 7 ME*) subject to the achievement of 5 Key Performance Indicators (KPIs)**
  - KPI#1: Obtain a 2s ELMy H-mode
  - KPI#2: Show that the input power required to get 10MW.m^{-2} on the divertor target is lower than 10MW
  - KPI#3: Couple 1MW of ICRF power in H-mode with the new antenna in the tungsten environment
  - KPI#4: Perform a pulse with a 30s flat-top duration
  - KPI#5: Perform a 10 s diverted ELMy H-mode with at least 5MW.m^{-2} on the divertor target

* Including addition for edge Thomson Scattering

EUROfusion & WEST Phase 2 ➔ FP9 (2021-2027)

https://www.euro-fusion.org/eurofusion/roadmap/

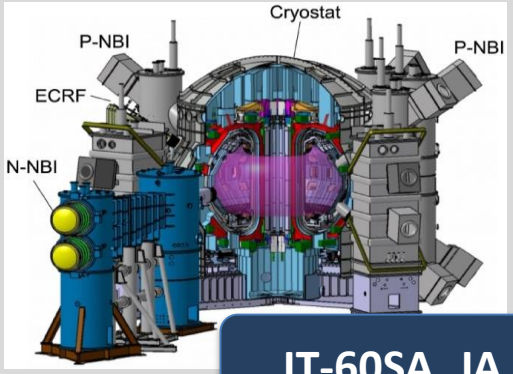
- **EUROfusion is preparing the request for a new EU grant in the Framework Programme (referred as FP9)**
  - Fully in line with the (new) ROADMAP
  - Need to define new Grant Deliverables…
  - Need to optimise the implementation…
  - Need to estimate the budget …
- **Request content to be reviewed by EUROfusion STAC prior to GA approval**
  - 1st draft to be ready in July 2019
  - 2nd draft with finance and detailed 2020 program to be ready by Dec. 2019



EUROfusion & WEST Phase 2 ➔ FP9 (2021-2017)

- **For WEST, we need to define in the coming weeks/ months**
  - To which Grant Deliverables WEST will contribute to ?
    - Input to ITER and DEMO R&D though mission 2 and mission 1?
  - How WEST will be implemented (EUROfusion PFC facility? Medium size tokamak?)
  - 1st draft of FP9 budget elaborated assuming EUROfusion contribution at the level of 15 sessions /year for WEST

JET, UK

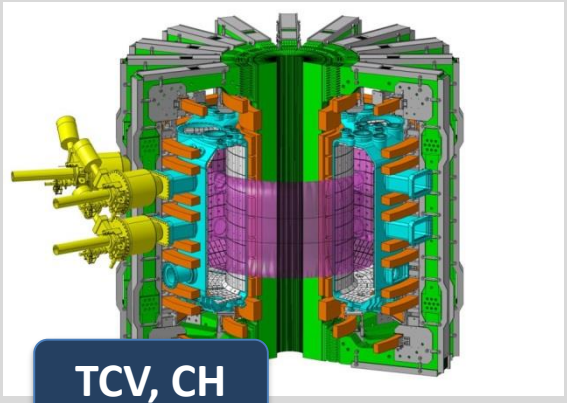


JT-60SA, JA

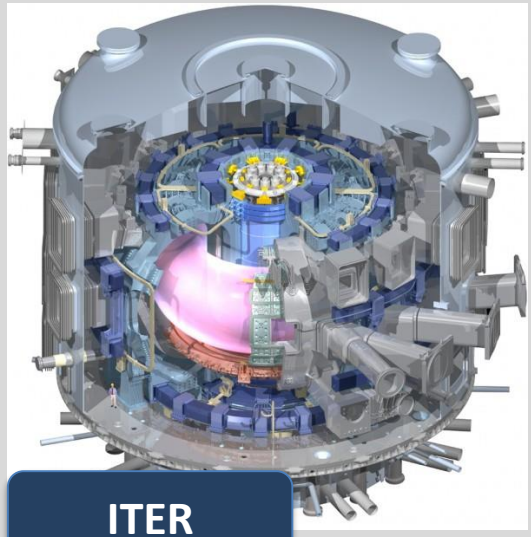
ASDEX Upgrade, DE

Thank you for your attention

WEST, France



TCV, CH



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MAST Upgrade, UK