

WPSA General Meeting. Introduction

4-6 May 2022

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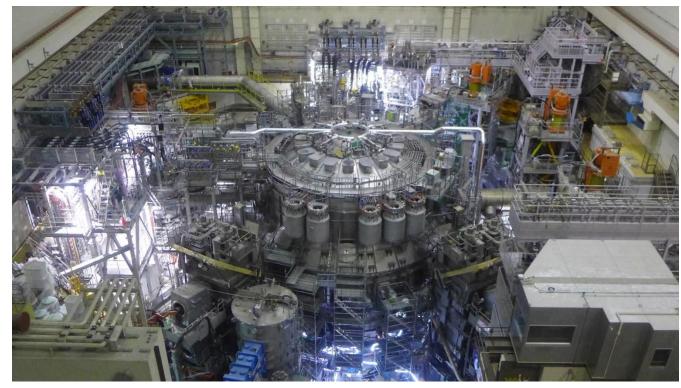
Purpose of the meeting



 The 2022 WPSA General Meeting will focus on the discussion of the scientific work being done within the tasks and deliverables.

Contents:

- scientific discussion on the status of the tasks,
- development plan,
- coordination with QST and experiment team,
- needs of input data,
- publications plan.



Aims:

- Prepare the support to the Integrated Commissioning,
- Progress towards the deployment of validated modelling and analysis tools for operation and scientific exploitation,
- Prepare the selection of future enhancements,
- Support the scientific output of the Integrated Commissioning.

Agenda

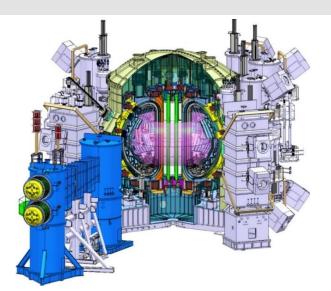


Sessions:

- S1.1 Overview (incl. JT-60SA repair status)
- S1-2: FP8 EU Enhancements
- S1-3: Initial research phase modelling
- S2-1: JT-60SA Experiment Team
- S2-2 Commissioning of EU Enhancements
- S2-3 FP9 Enhancements
- S2-4 Synthetic Diagnostics
- S3-1 Integrated Commissioning and Remote Experimentation
- S3-2 Integrated Commissioning Relevant Physics Topics
- S3-3 Summaries and conclusions (incl. JT-60SA International Fusion School)
- Detailed agenda in: https://indico.euro-fusion.org/event/1996/
- Please upload on indico your presentation (Click on Contribution List, presentation title and then presentation materials)

WPSA: Exploitation of JT-60SA – project objectives





High current, large size, high triangularity shape => High confinement

Long pulse=>steady state

High electron heating, High energy Negative NBI =>energetic particles, ITER and DEMO relevant scenario, plasma controllability

- The main objective is to support the exploitation of JT-60SA through a high level EU participation, fully integrated in the EU fusion programme within the Broader Approach frame
- Maintaining/developing control room experience in a large superconducting machine in view of EU participation in ITER operation
 - play an active role in scientific exploitation and campaigns management
 - participation to the machine integrated commissioning and to plasma operations
 - contributing to a full and efficient access to data and analysis tools, on site and remotely
 - contributing to the machine enhancements plan with the scientific support to specific procurements
- Contribution to specific items of the ITER Research Plan
 - Start-up, Wall conditioning (w and w/o EC)
 - Disruption loads, mitigation, detection, triggering, avoidance...
 - H-mode, L-H transition, ELM control, plasma magnetic control, NBI shine-through
 - Topics in diagnostics R&D (high neutron flux resilience, very high temperature, in-situ calibration...)
- EU Strategic priorities in the JT-60SA research program
 - 1. Development and investigation of high performance scenarios compatible with future W-PFCs.
 - 2. Avoidance and mitigation of disruptions and runaways
 - 3. Fast ion physics
 - 4. Development and validation of high level real-time control strategies

C. Sozzi | WPSA General Meeting | 4 May 2022

1 – WP Organization

EUROfusion

Tools for EU

procured systems

Scientific Exploitation Tasks

Plasma (FP9)

or the first plasma

Support the QST

team related to

lasma operation

and vacuum

Operation of the

EDICAM camera

during the IC

mera Tomography

analysis for the IC

Validate control-

oriented plasma

linear models

REATE) during the

Integrated

coordina

Plasma control and

equilibrium

reconstruction

Magnetic diagnostics

validation and

MHD/Disruption

analysis

Cryogenic and magne

operation analysis

image an

na discharge

Plasma and subsystem operations (E.

Belonohy)

operation

DO - Diagnostics

Operation

RT - Real-time

SSO - Sub

systems

operation

01.Plasma

Operations

01.EDICAM

operation

02.Camera

04 edge TS

05 div VUV

01.EU tools

02.QST tools

01.Pellet

02. MGI

04.NBI

05. ECH

06. Cryo and

03. Divertor Cryo

tomography

SA.EN aims to promote scoping and feasibility studies up to the level of conceptual design for new enhancement projects.

PSO JIFS (G. Giruzzi) O-JIFS Organization

SA.CM aims to provide validated selected simulation tools for application to JT-60SA in support to the preparation of the experimental campaigns, the data analysis and interpretation of the experiments.

SA.OP will support the execution of the experimental campaigns providing expertize in plasma operations, vacuum conditioning, plant commissioning and operation such as the diagnostics, of the heating and of the fuelling systems.

SA.JIFS. aims to develop links between Japanese and EU students and young researchers, completing their training by lectures and practical examples and applications.

7 <u>2</u> 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		Fusion Science	
Project Boa	ard		
	-	WPSA Project Lead	ler
Enhancement projec	cts (J.Ayllon)	adaptation an simulation	nanagement od maintenance, and training Ichetto)
IM- Implementation (FP8)	FE - Scoping and feasibility	OP - Plasma operation oriented tools	01.Discharge simulator
Edge Thomson Scattering design and procurement	Phase Contrast Imaging system design and procurement		02.ECWC tools
VUV divertor design and procurement	Doppler Reflectometry system design		03.Breakdown simulator
FILD design and procurement	Neutron and Gamma diagnostics design		04. Integrated data analysis tools
MGI design and procurement	EC Stray Detection system design		05.Disruption alarm
Cryopumps design and procurement	Beam Spectroscopy system (BES) design and procurement	M- Modelling	01.MHD and control
Pellet launching system design and procurement	Ultra-Fast Reflectometry Upgrade		02.Scenario development and analysis
New sub-systems (FP9)	IR imaging system design		03.Edge and divertor modeling
	Specification of Langmuir probes for the AC C-divertor		04.Fast Particles modelling
	Remote participation tools		05.Disruption and runaway modelling
	Actions for effective remote participation		06. EC Wall Conditioning model validation
white boxe	o: activities	SD- Synthetic	01.Visible imaging analysis tools
foreseen b		diagnostics development	02.FILD Synthetic diagnostics development

started

red text: 2022 changes

green text: completed



Broader Approach Agreement JT-60SA Project leader and EU and JA **Project Managers**

Experiment ream				
riment Team Leader EU Jeronimo Garcia	Topical Groups and	Participa scientis and		
iment Team Leaders from Japan Maiko Yoshida Hajime Urano	Topical Group Leaders	EU cont persor		
	PWI & SOL	NAMES PARTY		

Tomohide

Nakano

(QST Naka

Pedestal Yunfeng Liang Nobuyuki Aiba (QST Naka) Energetic Particles evgen Kazako PP-ERM/KMS Belgium) Gianluca Pucella (ENEA Transport and Confinement Luca Garzotti (UKAEA, UK Takuma Vakatsuki (QS

2 – Status of Grant Milestones & Grant Deliverables (2021)



GA Deliverable No.	Title	Due Date	Status	Details on Status (in case of delays or issues)
D02.01	Appointment of Experiment Leader from EU (after call issued end 2020)	30/04/2021	Completed	
D02 02	Report on the first phase of the Integrated Commissioning (before plasma operations). Results and return of experience, mainly for DTT	31/12/2021	Completed	The completion of the integrated commissioning is delayed. Deliverable dependent on external conditions to which the work package is constrained.
1 1)(1)/(1)3	Report on the initial organisation of the JT- 60SA scientific exploitation	31/12/2021	Completed	

GA Milestone No.	Title	Due Date	Status	Details on Status (in case of delays or issues)
I SA.IVIUI	Participation in the Integrated Commissioning before plasma operations	30/04/2021	Completed	The completion integrated commissioning is delayed. Deliverable dependent on external conditions to which the work package is constrained.

Experiment Team



- JT-60SA Experiment Team (at present: 3 Experiment Team Leaders and 6 Topical group Leaders) now in activity
- First Experiment Team meeting (Kick-Off) with remote participation held on 25-27 April.
- Productive meeting with live discussion and updates on the preparation of the tools for the experimental campaign
- Among the topics discussed
 - Experiment Team Policy and Rules (also for publications)
 - Environment of Participation to Experiment and Data Analysis
 - TGLs presentations
 - Status and features of the Plasma Control System
 - Summaries of EU and JA modelling activities and plans
 - Research items and collaborative works
- More in the dedicated session on Thursday morning
- Close interaction expected with the ET to evolve the WPSA programme
 - Modelling needs
 - Enhancements programme
 - Participation to the plasma operation

Engineering and Research grants



Selected Engineering Grantees related with JT-60SA

EEG21-15	Thomson Scattering	Federico D'Isa	ENEA
EEG21-20	Development of software tools for ECH exploitation (JT-60SA and ITER)	Jelle Slief	DIFFER

- Both contracts started
- Selected Research Grantee (JT-60SA analysis/application part of the work programme)

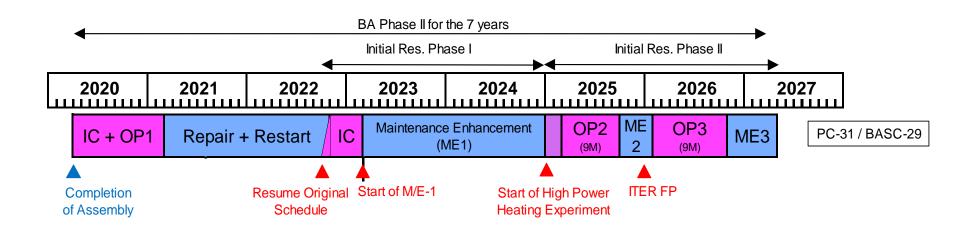
Riccardo Rossi	ENEA	Tor Vergata Uni versity of Rome	Development and implementation of a physics-based multi-machine plasma instability detection and classification system for disruption avoidance, prevention, and mitigation
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contract expected to start soon

Objectives for 2022



- Advance with the Remote Access (SA.M.02 Grant Milestone in 2022)
- Complete the procurements of FP8 projects and prepare installation in 2023-2024
- Progress towards the deployment of validated modelling and analysis tools for operation and scientific exploitation
- Contribute to the Integrated Commissioning II (SA.D.02 Grant Deliverable 2022)
- Support the IC analysis
- Prepare the Enhancement program after 2025, in interaction with the ET and F4E (SA.D.04 Grant Deliverable 2022)



Announcement: in person WPSA Planning Meeting in September





- 5 9 September 2022 Budapest
- Main Building of the Hungarian Academy of Sciences (Széchenyi István sqr. 9)
- Local Organizer: Plasma Physics Department, Centre for Energy Research

- Website and Registration form available soon
- Please give a feedback on the interest for in person participation