

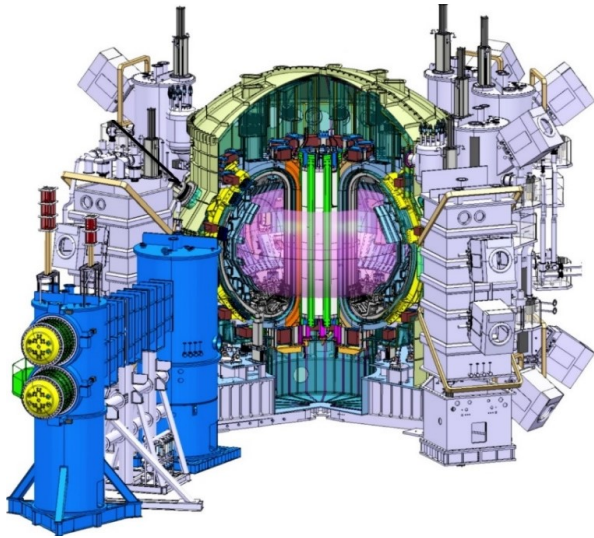


WPSA update and needs

Thrust 2 meeting 30 August 2021

Carlo Sozzi

Key priorities of JT-60SA in the EU programme



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

Long pulse=>**steady state**

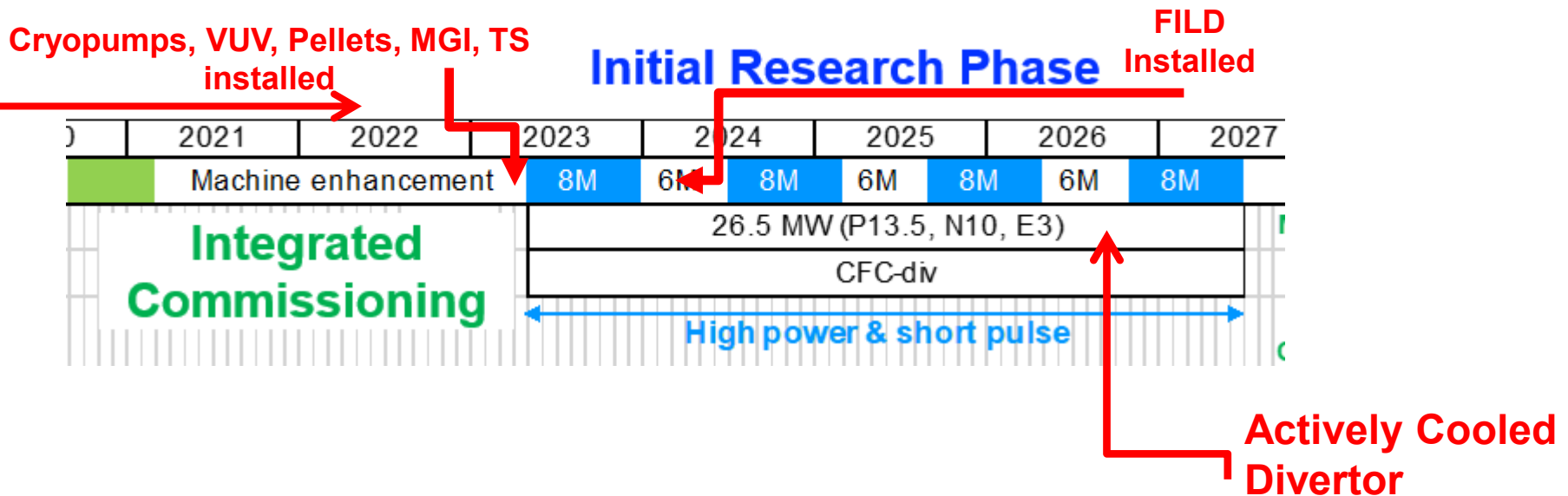
High electron heating, High
energy Negative NBI
=>**energetic particles,**
ITER and DEMO relevant
scenario, plasma
controllability

- Participation of EU scientists to the JT-60Sa scientific programme will be lead by the EU Strategic priorities in the JT-60SA research program as in <https://idm.euro-fusion.org/?uid=2NPW2R&version=v1.1>
 - Development and investigation of **high performance scenarios compatible with future W-PFCs.**
 - Avoidance and mitigation of **disruptions and runaways**
 - **Fast ion** physics
 - Development and validation of high level **real-time control** strategies
- For technology, under the main responsibility of F4E and with the contribution of EUROfusion in terms of scientific motivation and support
 - Development of **cost-effective W-PFC materials;**
 - Development of a **remote handling system** to address specific needs for the device operation phase;
 - An enhancement program for the **toroidal field, cryogenics, power supplies and heating systems;**
 - Consolidation and verification of the **engineering models** to expedite the verification against structural integrity during the operation phase.

JT-60Sa status and planning



- After the EF1 coil incident in March 2021, the Integrated Commissioning is in pause
- Fault identification well advanced. No damage in the main coil and cryostat components
- Repair and improvement ongoing
- Vacuum pumping and IC restart in February 2022.
- Plasma operation expected in spring-summer 2022
- Machine Enhancement 1 planned starting in October 2022
- Start of the Initial research (High Power, short pulse ~ 3-5 sec) phase **delayed => 2024**



Activity (FP9) organized in 4 areas ~ 40 tasks



Project Leader Carlo Sozzi			
JIFS Gerardo Giruzzi	Enhancements Juan Ayllon-Guerola	Code Management Gloria Falchetto	Operations Eva Belonohy
Organization of the JT-60SA International Fusion School	Coordination of Enhancements project	Coordination of code management	Coordination of the operations area
	Phase Contrast Imaging system design and procurement	MHD stability analysis of initial research phase scenarios	Review commissioning and operational processes of EDICAM.
	Doppler Reflectometry system design and procurement	Non-linear MHD modelling	Preparation for participation in machine and plasma operations
	Neutron and Gamma diagnostics design and procurement	Ramp-up modelling of initial phase scenario	Plasma magnetic control. Interface CREATE-EGENE with JT-60SA Experiment Database
	EC Stray Detection system design and procurement	Turbulence modelling of high-beta scenario	Plasma magnetic control. Learning of QST tools.
	Beam Spectroscopy system (BES) design and procurement	Edge transport codes modelling of C scenarios	Installation and update of the camera tomography code.
	Ultra-Fast Reflectometry Upgrade	Edge transport codes benchmark	
	IR imaging system design and procurement	High-energy ions stability study	
	Remote access architecture design and procurement	Disruption modelling	
	G. De Tommasi	RE modelling	
		ECWC tools validation	
		Optimization and simulation of breakdown scenarios	
		Integrated data analysis tools	
		Disruption mitigation/avoidance trigger	
		Camera tomography EDICAM visualization tools	
		Discharge simulator development	E. Joffrin

Experiment Team Leader from EU
Jeronimo Garcia

Experiment Team leader activities

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

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 expertise 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.

More details on the general task content/background on WPSA planning meeting material
<https://indico.euro-fusion.org/event/870/>

Tasks on Edge and divertor modelling



- **Goals: prepare operation scenarios compatible with C Divertor, ACD-C Divertor and in future with W divertor**
 - Investigate conditions for divertor detachment for the initial phase (low n /current drive scenarios in C) and nominal C scenarios with edge/SOL transport modelling codes (SOLEDEG3X-EIRENE (in 2D) and SOLPS-ITER) including impurity seeding impact. https://indico.euro-fusion.org/event/870/contributions/2811/attachments/1049/2092/21_03_18_WPSA_PPM_nb1.pdf
 - Benchmark of EU/JA edge transport codes on C scenario. (More details on SOLPS-ITER / SONIC Benchmark: https://wiki.euro-fusion.org/images/b/b0/JT60SA_Work_SOLPS_KOM_Giulio_Rubino_13072021.pdf)
- More specific dedicated contacts as the tasks advance

Level 1	Level 2	Level 3	Task title	Task coordinator	Deliverable title	Deliverable Owner	Beneficiary	PM	Acceptance criteria
...
SE.CM	M-Modelling	03.Edge and divertor modeling	Edge transport codes modelling of C scenarios	Falchetto	Preliminary report on the modelling of initial phase scenarios with edge/SOL transport codes	G Falchetto(CEA)	CEA	2	Report /publication
SE.CM	M-Modelling	03.Edge and divertor modeling	Edge transport modelling of C scenarios	Falchetto	Preliminary report on the modelling of C wall Scenario 2 with SOLPS-ITER with Ar seeding.	Piotr Chmielewski (IPPLM)	IPPLM	6	Report / publication
SE.CM	M-Modelling	03.Edge and divertor modeling	Edge transport codes benchmark	Falchetto	Report/publication on the benchmark of SOLPS_ITER to SONIC.	G Rubino (ENEA, Tuscia)	ENEA,MPG	3	Report /publication