FSD Project Board 30 October 2024

# Enhancement and Commissioning of JT-60SA (WPSA)


## Carlo Sozzi

**With contributions of Gloria Falchetto, Matteo Iafrati, Juan Ayllon, Jeronimo Garcia, Alessandra di Bastiano (PSO)**

ISTP-CNR (ENEA)



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# WPSA Project structure

**WPSA**
Enhancements and Commissioning of JT-60SA
**WP organization**

**PSO**
**Alessandra Di Bastiano (ENEA)**

**Project Management**
**PL: Carlo Sozzi (ENEA)**

**Tasks**

**Enhancements area** aims to promote scoping and feasibility studies up to the level of conceptual design for new enhancement projects, and assist the procurement when approved.
**Coordinator: Juan Ayllon-Guerola (CIEMAT)**

**Code Management** aims to provide verified simulation and analysis tools for application to JT-60SA in support to the preparation of the experimental campaigns, data analysis, interpretation of diagnostics and experiments.
**Coordinator: Gloria Falchetto (CEA)**

**Operations** supports the commissioning activities and execution of the experimental campaigns providing expertise in plant and plasma operations, vacuum conditioning, real-time control, diagnostics, heating and fuelling systems.
**Coordinator: Matteo Iafrati (ENEA)**

Overall long-term objective of WPSA:

support for the scientific exploitation of JT-60SA cooperating with Fusion For Energy within the Broader Approach – Satellite Tokamak Project (BA-STP) framework

coherently with the needs and the priorities of the European Fusion Roadmap.

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**W JT-60SA**
EUROfusion activities in preparation of the transition to W wall and divertor
**Coordination across WPs**

**JIFS**
JT-60SA International Fusion School
**Advice & Support**

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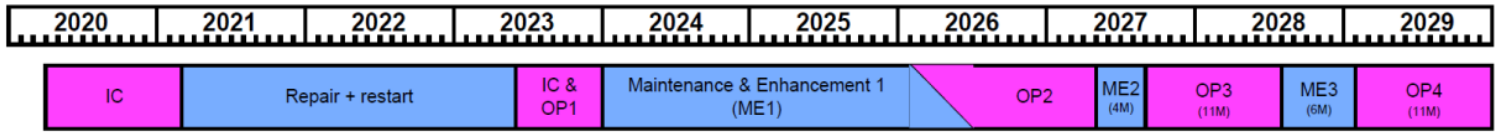
# JT-60SA status and mid-term plan

Main objectives of 2024-25 ME1 shutdown

- completion of the insulation reinforcements on the poloidal coils (mainly EF1 and CS modules)
- installation of extensive set of new key components and subsystems in preparation of the next operational campaign OP2 (P-N NBI, ECRF launchers, in-vessel coils, stabilizing plate, divertor, diagnostics, analysis cluster…)




OP2 objectives

- Commissioning with H plasmas for D plasma operation
  - Break down and plasma formation studies
  - Commissioning NB injectors into plasma, including monitoring of shine-through vs energy (esp. N-NBI)
  - Step-by-step increase of plasma current up to 5.5 MA
  - Test of plasma control schemes: current, position, density, heating
- ITER risk mitigation
  - Studies of L-H transition (H and D and possibly addition of He)
  - Disruption/ Runaway Generation and mitigation studies (including MGI)
- Scenario development
  - Initial integrated scenarios development towards ITER standard H-mode
  - OP2 Baseline, OP2 Hybrid, OP2 ITB
- BA-STP technical objective: demonstration of Poloidal Field Coils operation at the rated design value (20kA) during OP2 after the insulation reinforcement performed in 2022-2024.

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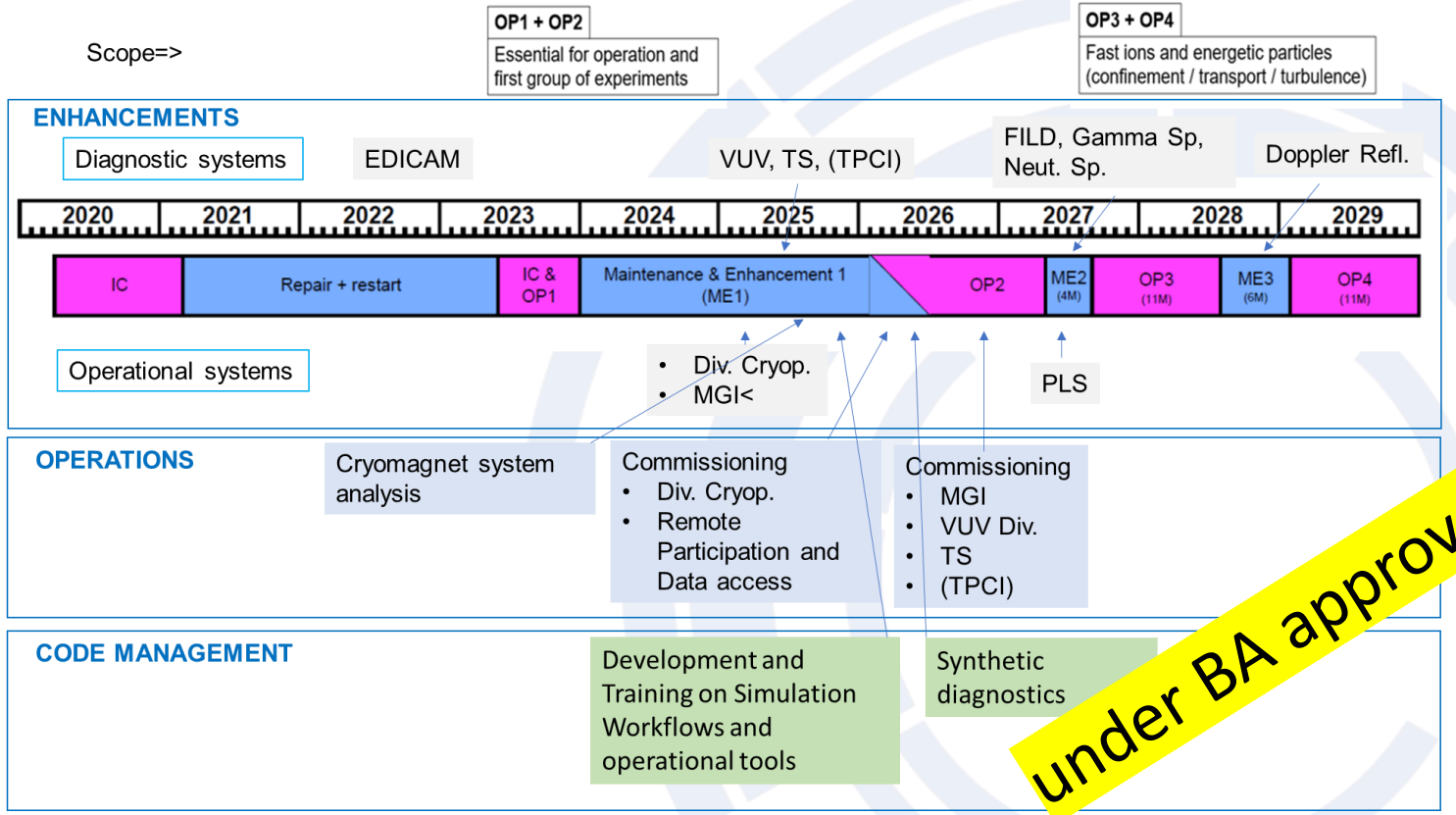


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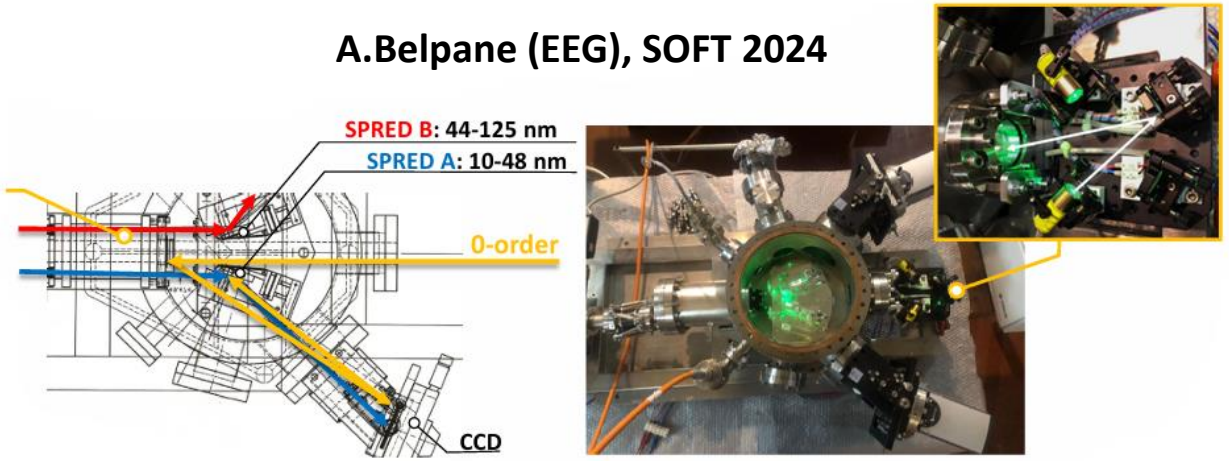
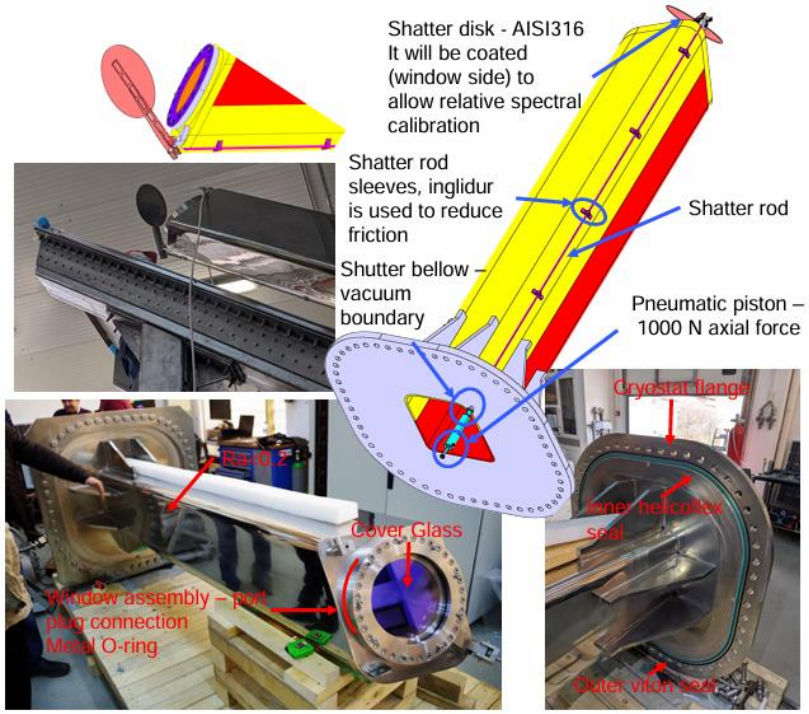
# Recent achievements

- Enhancements projects built and under final acceptance & shipping to Naka
  - Divertor VUV
  - Thomson Scattering.

**A.Belpane (EEG), SOFT 2024**



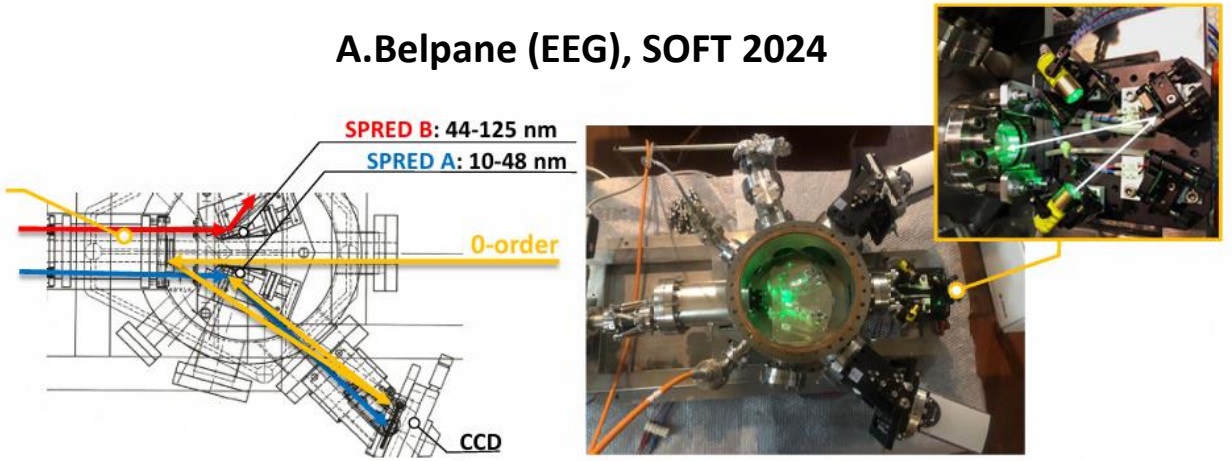

**F.D'Isa (EEG), SOFT 2024**



# Recent achievements

- Enhancements projects built and under final acceptance & shipping to Naka
  - Divertor VUV
  - Thomson Scattering.
- Subsystems delivered previously in 2024 and being tested on site (F4E, QST, EufiF assistance)
  - Massive Gas Injection
  - Divertor Cryopumps
- Approved for the detailed design phase in preparation of the Design Review process
  - Gamma Ray Spectrometer
  - Doppler Reflectometry
- TPCI is under final Design Review (Dec 2024)
- FILD is completing the detailed design (Dec 2024)

**A.Belpane (EEG), SOFT 2024**

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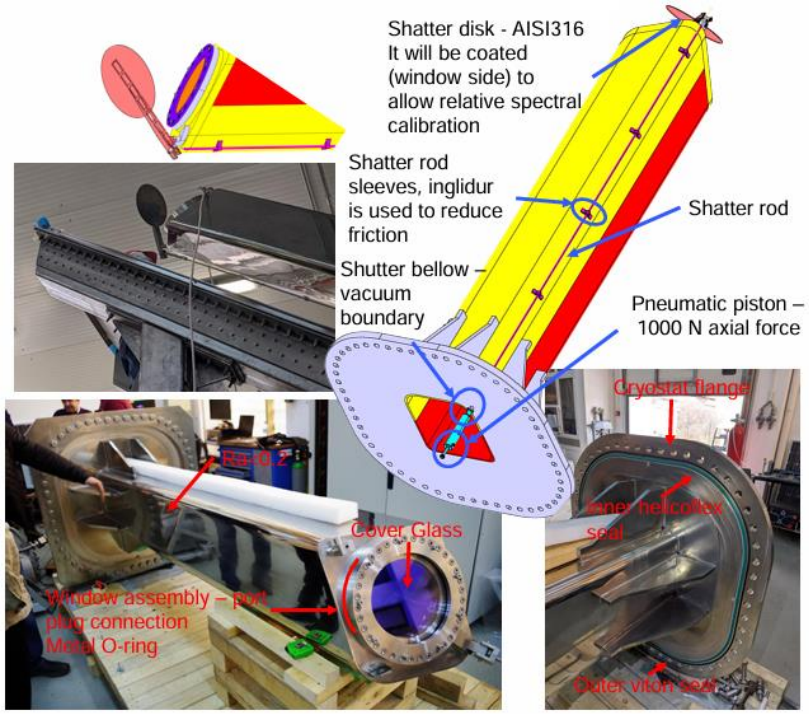

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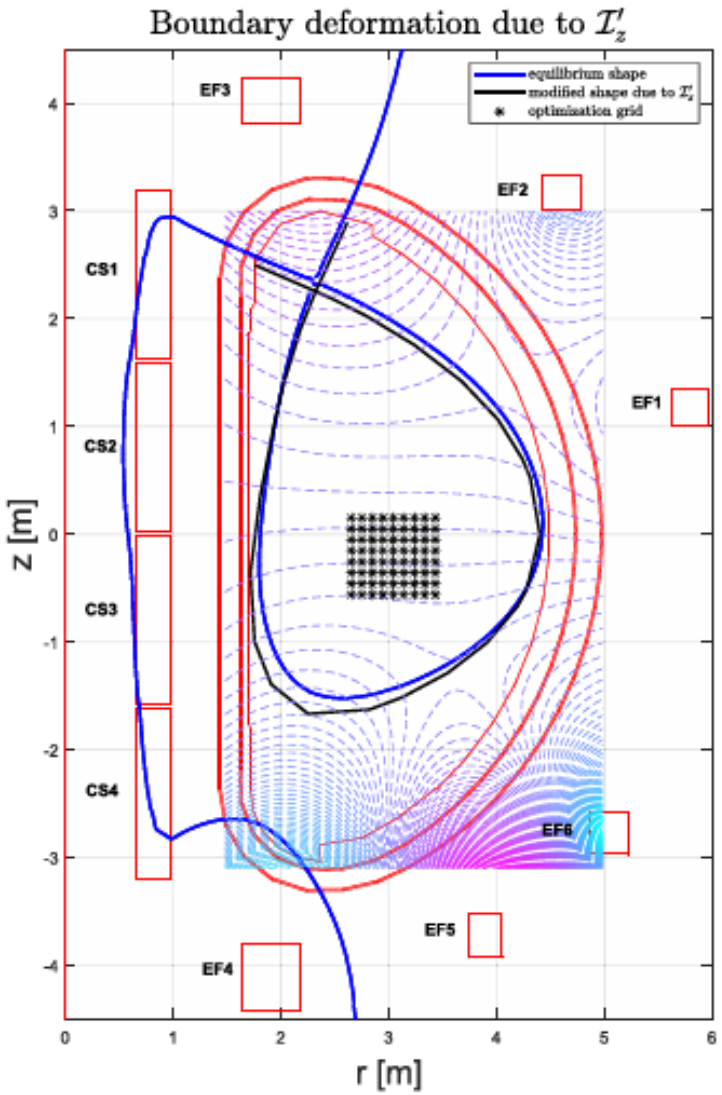
  - Reconstruction algorithms of magnetic measurements for plasma current, plasma centroid position and shape
  - Plasma magnetic control of elongated plasmas with superconductive coils

**G. De Tommasi NF2024**



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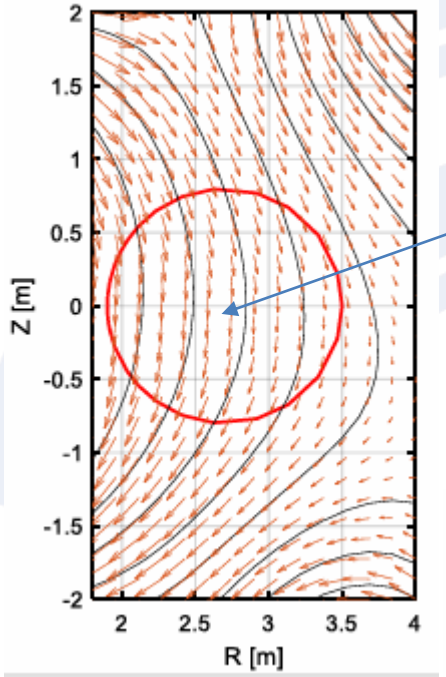
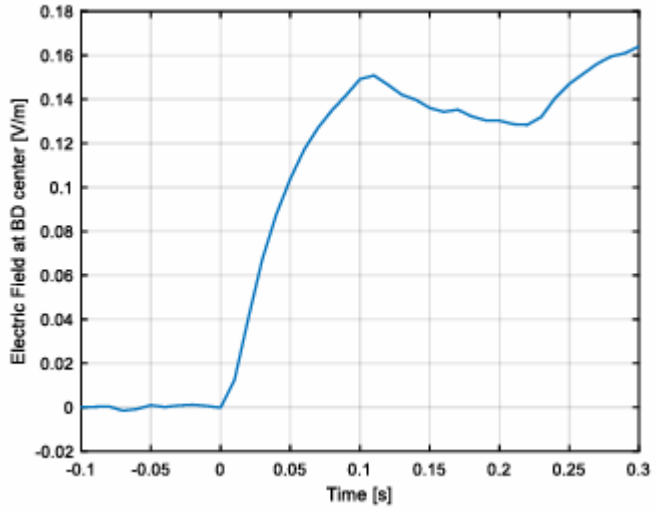
  - dynamically updated time-dependent quantities, (minor and major plasma radius, internal inductance, plasma position shift, poloidal magnetic field)
  - improved interface with the experimental data (timing, ECRH parameters).




Shot #670

$t_{BD} = 90\ ms$

Electric Field 0.15 V/m



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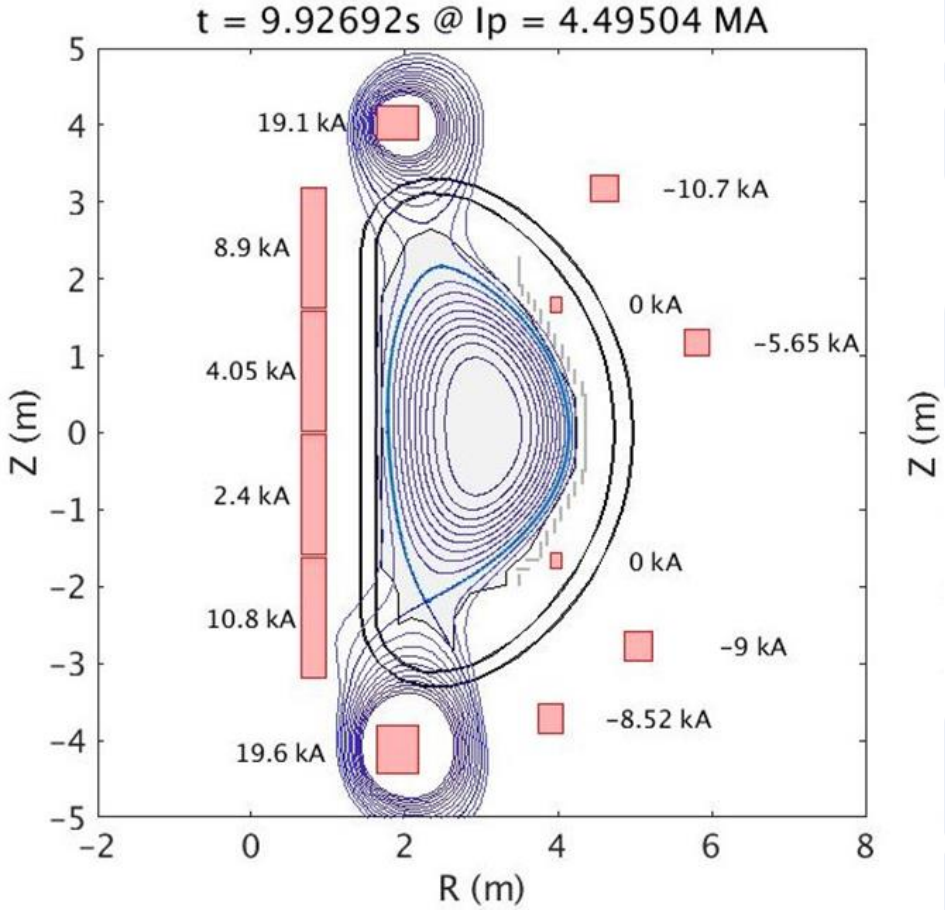
- Discharge simulator
  - New numerical methods without boundary conditions to couple the Grad-Sharanov equation (2D) with the current diffusion (1D) using the evolution of the diamagnetic function F
  - New coupling between NICE and METIS has been developed to overcome numerical instability.



# High level objectives

- Prepare and assist machine integration of the EU-led diagnostic systems (OP, ENH) in 2025/26
- Prepare commissioning and first operation of the EU-led systems for “delivering” to the scientific community (Experiment Team) (OP) in 2026/2027
- Prepare and verify a suite of tools and codes for the Scientific Exploitation, including operation-oriented and control room tools, synthetic diagnostics, simulation workflows (CM) for the subsequent validation on data or benchmarking with/in WPTE
- Support new users in data access and first level analysis, leveraging experience gained during commissioning (training)
- Develop feasibility, design, assist procurement of new subsystems according with the JT-60SA scientific plan (ENH), in particular starting in 2025: diagnostics for plasma edge and plasma-wall interaction
- Contribute to the preparation and execution of the 3rd edition of the JIFS school

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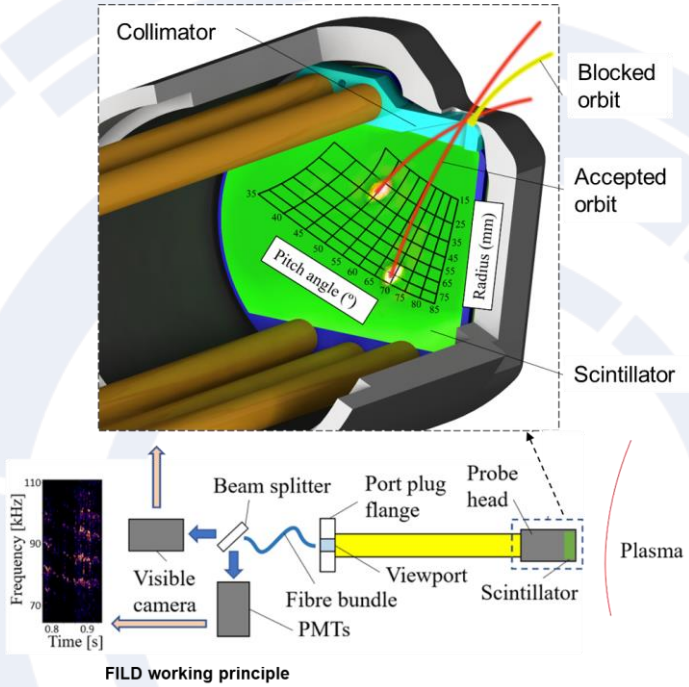
- Establish a plan for the EU contribution to the transition to W divertor and wall. This might include several lines of work and collection of information of activities performed in other EuroFusion WPs

- Definition of the scientific priorities for the C phase and for the W phase and W-related preparation experiments in the C phase of JT-60SA (WPTE)
- Core and impurity transport (WPTE)
- Modeling of heat load on PFCs (WPTE)
- Modeling for PFCs shape optimization (WPPWIE)
- Test of PFCs (WPPWIE)
- Development and qualification of PFCs (WPDIV)
- Diagnostics upgrade for W monitoring, wall and divertor protection
- Upgrade of the heating systems
- Upgrade of the protection system
- Review of the wall cleaning systems and procedures
- Review of the gas injection system

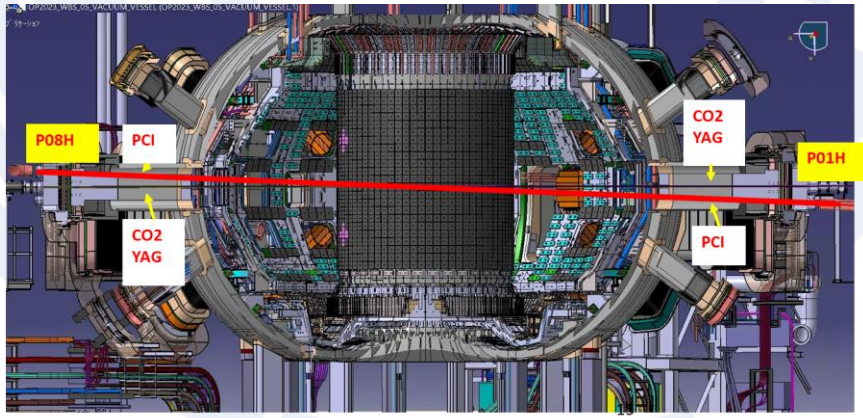
# Detailed objectives: enhancements

- Feasibility study
  - Comprehensive set of diagnostics to support SOL, Edge and PWI studies
  - Multiple EDICAM. Partial or total substitution of standard visible cameras
- Advanced feasibility
  - Neutron S/M. Completion of feasibility study, preliminary design and transition to implementation phase.
  - EC-Stray. Follow-up of the development of ITER detector for adaptation to JT-60SA. Propose complementary solution for fast detection.
- Detailed Design in preparation of the Design Review process
  - Doppler Reflectometer (2-/3- port access) for core-edge-SOL and toroidal correlation
  - Gamma Spectrometer. Completion of preliminary design and transition to implementation phase.
- Pre-assembly and lab test
  - PLS fueling source and centrifuge expected to be delivered at the IPP-Garching pellet lab in the first half of 2025
- Manufacturing (with F4E)
  - TPCI. Manufacturing completion and installation preparation (advance to ME1 under consideration)
  - FILD. Manufacturing and preparation of the acceptance test.

**FILD detector head**



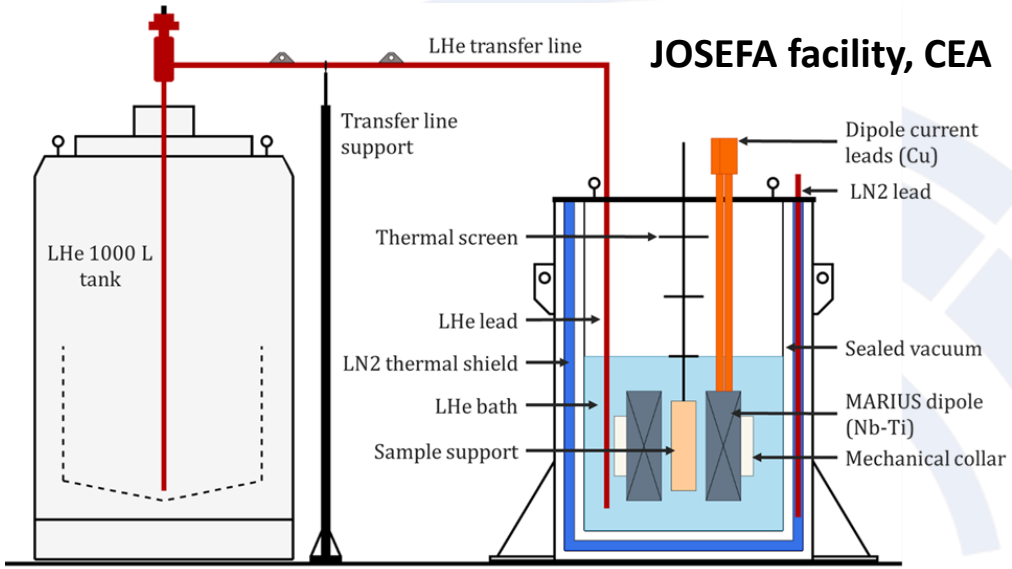

FILD working principle



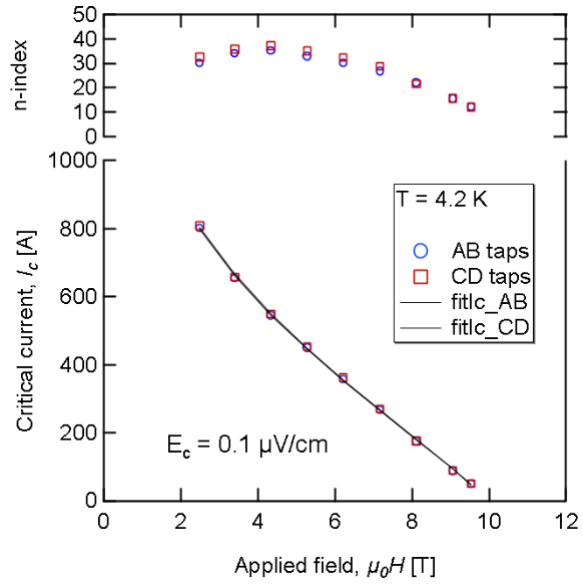

**TPCI layout**

# Detailed objectives: operations

- Prepare installation procedure, commissioning procedure and foreseen impact on plasma operation for the commissioning of
  - Thomson Scattering
  - VUV divertor spectrometer
- Assist installation of the Divertor cryopumps.
- Lab characterization of superconductive strand and of the Cold Cathod Gauges probes for protection of the superconductive coils.
- Improvement and test of remote access for maintenance of a passive diagnostics.
- Technical implementation of the IMAS mapping of JT-60SA data.



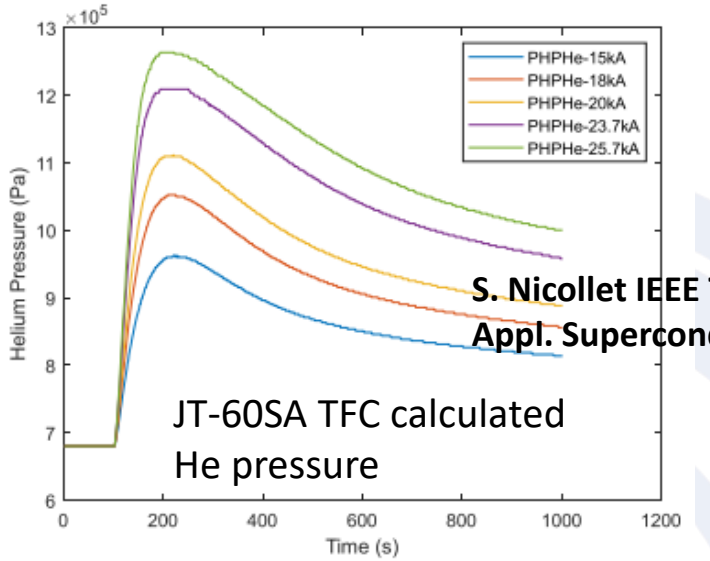

**JOSEFA facility, CEA**




**$I_C$ tests on NbTi at VSM, ENEA**

# Detailed objectives: code management

- Complete the development of the model of the cryomagnetic system for
  - hot spot in various plasma conditions
  - cooling circuit for CS and poloidal coils
  - simulation of of the AC losses in the poloidal coil circuit




**S. Nicollet IEEE Trans. Appl. Supercond. 2024**

# Detailed objectives: code management

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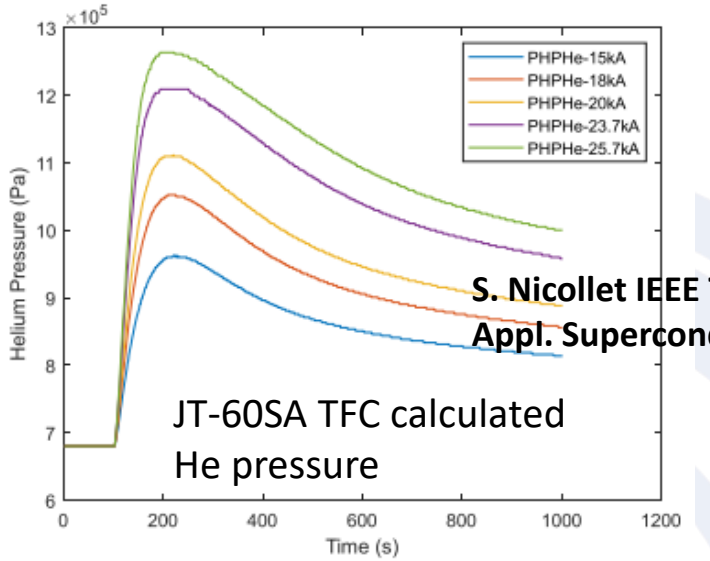
  - hot spot in various plasma conditions
  - cooling circuit for CS and poloidal coils
  - simulation of of the AC losses in the poloidal coil circuit
- Develop the breakdown model for the trapped particle magnetic configuration.
- Introduce kinetic controllers in the discharge simulator and produce a full numerically stable simulation for 4.6MA scenario (baseline) and for 2.6MA scenario (hybrid)
- Complete the development of synthetic diagnostics for Fast Ion Losses Detector, Divertor VUV and Thomson Scattering.
- Training for the MHD stability and Energetic Particles workflows

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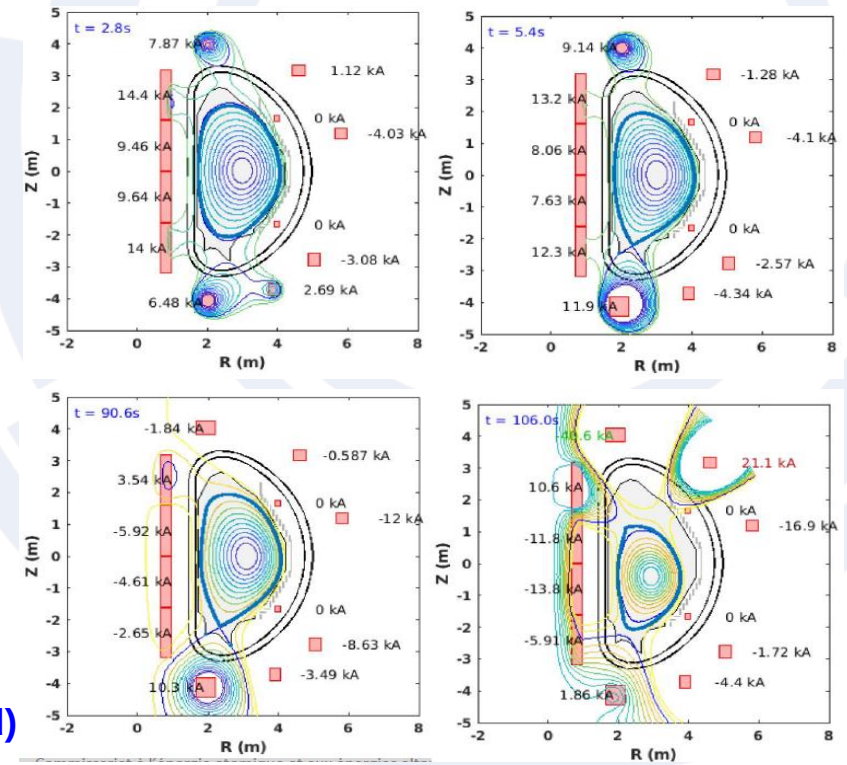


**Scenario 4.2 (Hybrid)**

# Grant Agreement Milestones

*Table 6-1: Grant Agreement Milestones*

| GA Milestone No. | GA Milestone Title | Due Date [mm/yyyy] |
|---|---|---|
| SA.M.01 | Participation in the Integrated Commissioning before plasma operations | June 2021 √ |
| SA.M.02 | Start of the EU-REC project | Apr. 2022 √ |
| SA.M.03 | Decision on plan and resources of EU enhancements for BA Phase II – 2025-2029 | June 2023 √ |
| SA.M.04 | Call to start EU enhancement programme for 2025-2029 | Sept.2023 √ (1) |
| SA.M.05 | Start of the new EU enhancement projects (TBD) | Nov. 2023 √ (2) |
| SA.M.06 | Participation to the development of scenario at high plasma current in H-mode** | Dec. 2025* |

- (*)Milestones dependent on external conditions to which the workpackage is constrained, see Risk Table (WPR-04)
- (**) To be cancelled in the next GA Amendment: The campaign participation is moved to under WPTE. Therefore this GM, closely connected to the operation of JT-60SA, shall be cancelled here. Since the operation will not happen before 2026 it is proposed to include this line in the extension of the GA under WPTE for 2026.

(1) Milestone completed in March 2024

(2) Milestone partially completed in July 2024. One system under the enhancement program (Neutron spectroscopy) required more preparation time. The call for the implementation of a second enhancement (EC stray radiation detection system) did not receive offers for implementation. Gamma rays, Doppler reflectometry, Fast Ion Losses Detection, Tangential Phase Contrast Imaging diagnostics proceed as planned (with minor delays not impacting the JT-60SA time plan)

# Grant Agreement Deliverables

*Table 6-2: Grant Agreement Deliverables*

| GA Deliverable No. | GA Deliverable Title | Due Date [mm/yyyy] |
|---|---|---|
| SA.D.01 | Appointment of Experiment Leader from EU (after call issued end 2020) | Apr. 2021 √ |
| SA.D.02 | Report on the first phase of the Integrated Commissioning (before plasma operations). Results and return of experience, mainly for DTT | Dec. 2021 √ |
| SA.D.03 | Report on the initial organisation of the JT-60SA scientific exploitation | Dec. 2021 √ |
| SA.D.04 | Documented plan of EU enhancement programme for BA Phase II– 2025-2029 | Dec. 2022 √ |
| SA.D.05 | Delivery and final tests of EU-REC completed | Jun. 2024 (1) |
| SA.D.06 | Installation of the EU systems before the OP2 campaign. | Dec. 2024 (2) |
| SA.D.07 | Report on participation to the OP.2 campaign. Results and return of experience | Dec 2025 (3) |
| SA.D.08 | Final Report on the Integrated Commissioning (including plasma operations) | Dec. 2023√ |
| SA.D.10 | Delivery of EU procurements (TBD) for the OP3 campaign completed. | Dec. 2025* (4) |

(*)Deliverables dependent on external conditions to which the workpackage is constrained, see Risk Table (WPR-04)

(1) Expected delivery date is June 2025. Scope of this deliverable has been redefined. It includes:

- test of remote connection from an EU site with interaction with local systems (e.g. software maintenance of a passive diagnostics)
- test of the tools for data access and remote participation after the upgrade being performed within the JT-60SA project

(2) Installation of the EU lead systems (except Pellet Launching System) before the OP2 campaign will be performed, but the installation date is delayed according with the timeline of JT-60SA, therefore expected delivery date is December 2025.

(3) This deliverable is dependent on external conditions to which the workpackage is constrained. OP2 campaign is delayed to 2026-27. Therefore it is proposed to be cancelled in the next GA Amendment: The campaign participation and all related work is moved to under WPTE. Therefore this GD, closely connected to the operation of JT-60SA, shall be cancelled here. Since the operation will not happen before 2026 it is proposed to include this line in the extension of the GA under WPTE for 2026.

(4) This deliverable is dependent on external conditions to which the workpackage is constrained. Start of the OP3 campaign is postponed to 2027.

# 2025 Detailed Objectives: Enhancements Area Tasks

| Enhancement | Objective | Team |
|---|---|---|
| FILD | • Manufacturing and acceptance tests preparation<br>• PA signature | CIEMAT-UniSev<br>J. Ayllon-Guerola |
| TPCI | • Manufacturing completion and installation preparation<br>• PA signature | EPFL-SPC<br>S. Coda |
| Doppler Reflectometer | • Completion of design for manufacturing<br>• PA preparation and signature | CIEMAT<br>e. de la Luna |
| Neutron Diagnostics | • Completion of feasibility study and transition to implementation phase<br>• Completion of preliminary design | VR, ENEA, UKAEA<br>M. Cecconello |
| Gamma-Ray Spectrometer | • Completion of feasibility study and transition to implementation phase<br>• Completion of preliminary design | ENEA-UniMilano<br>M. Nocente |
| Neutronics Assessments | • Support F4E on preparation of CAD models for systems to be included in Neutronics Simulations | IPP-LM<br>B. Bieńkowska |
| EC-Stray detection system | • Support the development of JT-60SA stray sensors | MPG, ENEA |

# 2025 Detailed Objectives: Enhancements Area Tasks

| Enhancement | Objective | Team |
|---|---|---|
| VUV Spectrometer | • Completion of assembly at lab, acceptance tests and calibration. | ENEA-CRFX<br>M. Valisa |
| Pellet Launching System | • Support pellet injection system integration and local commissioning | IPP-MPG<br>P. Lang |
| EDICAM | • Additional EDICAMs feasibility study | EK-CER<br>T. Szepesi |
| Edge diagnostics<br>and other proposals | • Feasibility studies of edge diagnostics:<br>○ Low Energy Neutral Particle Analyzer (LENPA)<br>○ Quartz Micro Balance (QMB)<br>○ Surface Thermo-Couples (STC)<br>○ Fiber Bragg Grating<br>○ IR/Vis cameras<br>○ SOL current<br>○ X array (low energy)<br>○ LIDS/LIBS<br>○ Divertor Thomson scattering<br>○ ... | call |
| | | |

# 2025 Detailed Objectives: Operations Area Tasks

- Installation procedures
- Boundary documents
- Requirements for commissioning in plasma
- Technical assistance

| Subsystem operation | Objective | Team |
|---|---|---|
| Thomson Scattering | • Reception at Naka site and preparation for installation during 2026<br>• Preparation of the commissioning | ENEA-CRFX<br>R. Pasqualotto, F. D'Isa |
| VUV Spectrometer | • Delivery to Naka site for installation during 2026<br>• Preparation of the commissioning | ENEA-CRFX<br>M. Valisa, A Belpane (EEG) |
| Pellet Launching System | • Preparation of the pellet on-site commissioning | IPP-MPG<br>P. Lang |
| EDICAM | • Electronics upgrade to enhance performance | EK-CER<br>T. Szepesi |
| Divertor cryopumps | • Assistance to installation | KIT<br>T. Giegerich<br>V. Hauer, |
| TPCI | • Preparation of the installation (if in ME1 confirmed) | EPFL<br>S. Coda |

# 2025 Detailed Objectives: Operations Area Tasks

| Operation-related activity | Objective | Team |
|---|---|---|
| Cryo-magnets analysis and material/components tests | • Characterization of superconductive strands and conductors<br>• Software tools for QVC analysis<br>• Cold Cathode Gauges tests | CEA, ENEA |
| Real time equilibrium and plasma control | • JT-60SA analysis and modelling tools | ENEA (CREATE) |
| Remote participation, data access, IMAS wrapper | • Improvement of remote access (e.g. EDICAM)<br>• IMAS interfaces for JT-60SA including training | CEA, ENEA (CREATE), EK-CER |
| H&CD systems: Operational requirements in W | • Evaluation of JT-60SA NBI Operation with Tungsten Wall | MPG |
| Test and training of operational tools, wall conditioning | • Training on operational tools and report on conditiong and RGA upgrade | CEA, ENEA |
| | | |

# 2025 Detailed Objectives: Code Management Tasks

General assumption:

- development and verification of tools supported by WPSA (e.g. made available on the EuF gateway)
- Validation (on data) and exploitation supported by WPTE
- Agreements for installation and use outside EU to be managed (International Collaboration?)

| Operation oriented tools | codes | 2025 |
|---|---|---|
| Discharge simulator | NICE-METIS + CREATE-NL controllers (implementing JT-60SA specifics) + EGENE Artaud Mattei | Test case and documentation on the closed loop simulator => training to users (ET) |
| Breakdown simulator | BKD0+GRAY for kinetics & EC power absorption + CREATE-BD for magnetics D Ricci M Mattei | => Apply for analysis OP1, OP2 (ET), transfer to TSVV15 (PDT) |
| Energetic particle workflow | ATEP (in IMAS/validated on AUG) Lauber (IPP) + ASCOT (VTT) | => ET/WPTE when IMAS installed on Naka server |
| MHD stability workflow | MHD stability chain (in IMAS by ITM/CD R Coelho) | => ET/WPTE when IMAS installed on Naka server |
| Cryo & magnets modelling | TACTICS ; THEA; STREAM SIMCRYOGENICS<br>Le Coz, Nicollet, Bonne (CEA) | => Development and calculations EF of hot spot and plasma scenarii sequences<br>=> Development and calculations with TACTICS Models for one EF (to be defined following priority)<br>=>Development and Calculations with of Loop 2 (CS/EF) with bath model and smoothing of heat loads<br>=>Development and of CS and EF, with AC losses, |
| EC (propagation, absorption, emission) tool | GRAY, SPECE<br>(Figini, Baiocchi, ENEA-CNR) | Tool made available for running simple cases of interest for operation and diagnostics |

# 2025 Detailed Objectives: Code Management Tasks

| Synthetic diagnostics | codes | 2025 |
|---|---|---|
| FILD synthetic diagnostics | FILDSIM<br>Manolo G-M+ EEG univ Sevilla | Full diagnostics simulation |
| Div VUV synthetic diagnostics | ENEA (RFX) | Full diagnostics simulation |
| TS synthetic diagnostics | ENEA (RFX) | Full diagnostics simulation |
| **Enhancements preparation (W)** | | |
| PFCs shape optimization | SOLPS-ITER with advanced fluid neutral (AFN) models and Monte Carlo (Leuven Univ, **through PWIE**) | Reference cases, parameter scan and shape derivatives, possibly optimization |

# Resources

| | A | B | C | G | H | K | L | M | X | AB | AC | AD | AE | AF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Work Pack | Beneficiary | Year | PM @ 50% | PM @ 70% | Total PM | Salary (k€) | Total PM cost [k€] | Total Missions Cost [ | Indirect Costs [k€] | Total Resources (k€) | Total Cons. Contr. (k€ | Total Commission Co | Description |
| 11 | SA-SE.OP | EK-CER | 2025 | 3 | 0 | 3 | 34,2 | 8,55 | 0 | 2,1375 | 10,6875 | 5,34375 | 5,878125 | SA.SE.OP- EH-CER staff costs 2025 |
| 12 | SA-SE.OP | KIT | 2025 | 2 | 0 | 2 | 89,8 | 14,96666667 | 0 | 3,741666667 | 18,70833333 | 9,354166667 | 10,28958333 | SA.SE.OP - KIT staff costs 2025 |
| 13 | SA-SE.OP | IAP | 2025 | 7 | 0 | 7 | 58,9 | 34,35833333 | 0 | 8,589583333 | 42,94791667 | 21,47395833 | 23,62135417 | SA.SE.OP - IAP staff costs 2025 |
| 14 | SA-EN | Not Allocated | 2025 | 24 | 0 | 24 | 75 | 150 | 0 | 37,5 | 187,5 | 93,75 | 103,125 | ENH-SA staff costs Call |
| 15 | SA-EN | EK-CER | 2025 | 3 | 0 | 3 | 34,2 | 8,55 | 0 | 2,1375 | 10,6875 | 5,34375 | 5,878125 | SA-EN EK-CER staff cost 2025 |
| 16 | SA-EN | MPG | 2025 | 31 | 0 | 31 | 93,2 | 240,7666667 | 0 | 60,19166667 | 300,9583333 | 150,4791667 | 165,5270833 | SA-EN MPG staff cost 2025 |
| 17 | SA-EN | EPFL | 2025 | 20 | 0 | 20 | 137,4 | 229 | 0 | 57,25 | 286,25 | 143,125 | 157,4375 | SA-EN EPFL staff cost 2025 |
| 18 | SA-EN | VR | 2025 | 12 | 0 | 12 | 81,9 | 81,9 | 0 | 20,475 | 102,375 | 51,1875 | 56,30625 | SA-EN VR staff cost 2025 |
| 19 | SA-EN | CIEMAT | 2025 | 33 | 0 | 33 | 65,5 | 180,125 | 0 | 45,03125 | 225,15625 | 112,578125 | 123,8359375 | SA-EN staff cost 2025 |
| 20 | SA-EN | ENEA | 2025 | 17 | 0 | 17 | 68,4 | 96,9 | | 24,225 | 121,125 | 60,5625 | 66,61875 | SA-ENH ENEA staff costs 2025 |
| 21 | SA-EN | IPPLM | 2025 | 4 | 0 | 4 | 38,1 | 12,7 | | 3,175 | 15,875 | 7,9375 | 8,73125 | SA-ENH IPPLM staff costs 2025 |
| 22 | SA-SE.CM | CIEMAT | 2025 | 2 | 0 | 2 | 65,5 | 10,91666667 | 0 | 2,729166667 | 13,64583333 | 6,822916667 | 7,505208333 | SE.CM - CIEMAT staff costs 2025 |
| 23 | SA-SE.CM | ENEA | 2025 | 13 | 0 | 13 | 68,4 | 74,1 | 0 | 18,525 | 92,625 | 46,3125 | 50,94375 | SE.CM - ENEA staff costs 2025 |
| 24 | SA-SE.CM | IPPLM | 2025 | 0 | 0 | 5 | 38,1 | 15,875 | 0 | 3,96875 | 19,84375 | 0 | 10,9140625 | IPPLM Accompanying research 2025 |
| 25 | SA-SE.CM | CEA | 2025 | 5 | 0 | 5 | 92,7 | 38,625 | 0 | 9,65625 | 48,28125 | 24,140625 | 26,5546875 | SE.CM - CEA coordinator and staff costs 2025 |
| 26 | SA-SE.CM | MPG | 2025 | 1 | 0 | 1 | 93,2 | 7,766666667 | 0 | 1,941666667 | 9,708333333 | 4,854166667 | 5,339583333 | SE.CM - MPG staff costs 2025 |
| 27 | SA-SE.CM | IST | 2025 | 1 | 0 | 1 | 58,7 | 4,891666667 | 0 | 1,222916667 | 6,114583333 | 3,057291667 | 3,363020833 | SE.CM - IST staff costs 2025 |
| 28 | SA-SE.CM | Not Allocated | 2025 | 1 | 0 | 1 | 75 | 6,25 | | 1,5625 | 7,8125 | 3,90625 | 4,296875 | SE.CM - staff costs not allocated 2025 |
| 29 | | | | 303.50 | 10.80 | 319.30 | 1,871.700 | 2,092.556 | 503.000 | 648.889 | 3,350.745 | 1,859.741 | 1,842.910 | |

# Missions

| Year | When (MM/YYY) | Type | Role | Purpose | Quantity | Mission days EU | Total days UE | Travels UE N. | Mission days JA | Total days JA | Travels JA N. | Total costs mission | Second. mm | Total Second mm | Travels Secon. N. | Total costs secondment | Indirect costs | Total resources | Total CC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2025 | | Mission | task holders, ETL, TGL, AC, PL, PSO | WPSA GPM | 30 | 5 | 150 | 1 | | 0 | | 40500 | | 0 | | | 10125 | 50625 | 35437.5 |
| 2025 | | Mission | AC,PL | Research Meeting | 10 | | 0 | | 7 | 70 | 1 | 41000 | | 0 | | | 10250 | 51250 | 35875 |
| 2025 | | Mission | ETL, TGL | Research Meeting | 10 | | 0 | | 7 | 70 | 1 | 41000 | | 0 | | | 10250 | 51250 | 35875 |
| 2025 | | Mission | TG member | Exp campaign | 10 | | 0 | | 90 | 900 | 1 | 225000 | | 0 | | 0 | 56250 | 281250 | 196875 |
| 2025 | | Mission | JIFS | JIFS | 20 | | 0 | | 15 | 300 | 1 | 75000 | | 0 | | | 18750 | 93750 | 65625 |
| 2025 | | Mission | CM | Discharge sim | 3 | 30 | 90 | 1 | | 0 | 0 | 19050 | | 0 | | | 4762.5 | 23812.5 | 16668.75 |
| 2025 | | Mission | CM | Break down sim | 2 | 6 | 12 | 1 | | 0 | | 3100 | | 0 | | | 775 | 3875 | 2712.5 |
| 2025 | | Secondme | TGL | Exp campaign | 1 | | 0 | | | 0 | | | 6 | 6 | 1 | 40453.72 | 0 | 40453.72 | 40453.72 |
| 2025 | | Mission | Enhancement JA | FILD | 1 | | 0 | | 8 | 8 | 1 | 4350 | | 0 | | 0 | 1087.5 | 5437.5 | 3806.25 |
| 2025 | | Mission | Enhancement JA | TCPI | 2 | | 0 | | 8 | 16 | 1 | 8700 | | 0 | | 0 | 2175 | 10875 | 7612.5 |
| 2025 | | Mission | Enhancement JA | Dopp. Refl | 2 | | 0 | | 8 | 16 | 1 | 8700 | | 0 | | 0 | 2175 | 10875 | 7612.5 |
| 2025 | | Mission | Enhancement JA | Neutron Diagn. | 1 | | 0 | | 8 | 8 | 1 | 4350 | | 0 | | 0 | 1087.5 | 5437.5 | 3806.25 |
| 2025 | | Mission | Enhancement JA | Gamma Ray | 1 | | 0 | | 8 | 8 | 1 | 4350 | | 0 | | 0 | 1087.5 | 5437.5 | 3806.25 |
| 2025 | | Mission | Enhancement JA | Pellet | 2 | 10 | 20 | 1 | | 0 | 1 | 4700 | | 0 | | 0 | 1175 | 5875 | 4112.5 |
| 2025 | | Mission | Operation | TS | 2 | 10 | 20 | 1 | | 0 | 1 | 4700 | | 0 | | 0 | 1175 | 5875 | 4112.5 |
| 2025 | | Mission | Operation | TS | 6 | | 0 | | 20 | 120 | 1 | 44100 | | 0 | | 0 | 11025 | 55125 | 38587.5 |
| 2025 | | Mission | Operation | VUV | 2 | | 0 | | 10 | 20 | 1 | 9700 | | 0 | | 0 | 2425 | 12125 | 8487.5 |
| 2025 | | Mission | Operation | EDICAM | 2 | | 0 | | 10 | 20 | 1 | 9700 | | 0 | | 0 | 2425 | 12125 | 8487.5 |
| 2025 | | Mission | Operation | Cryopumps | 2 | | 0 | | 16 | 32 | 1 | 12700 | | 0 | | 0 | 3175 | 15875 | 11112.5 |
| 2025 | | Mission | Operation | Cryo-magnets | 2 | | 0 | | 20 | 40 | 1 | 14700 | | 0 | | 0 | 3675 | 18375 | 12862.5 |
| 2025 | | Mission | Operation | Cryo-magnets | 2 | 10 | 20 | 1 | | | | 4700 | | | | | 1175 | 5875 | 4112.5 |
| 2025 | | Mission | Operation | RT | 1 | | 0 | | 10 | 10 | 1 | 4850 | | 0 | | 0 | 1212.5 | 6062.5 | 4243.75 |
| 2025 | | Mission | Operation | HCD -NBI | 1 | 5 | 5 | 1 | | | | 1350 | | 0 | | | 337.5 | 1687.5 | 1181.25 |
| 2025 | | Mission | Operation | REC | 2 | | 0 | | 10 | 20 | 1 | 9700 | | 0 | | 0 | 2425 | 12125 | 8487.5 |
| 2025 | | Mission | Operation | Conditioning | 1 | | 0 | | 10 | 10 | 1 | 4850 | | 0 | | | 1212.5 | 6062.5 | 4243.75 |
| 2025 | | Mission | PL/Acs | managment | 10 | 5 | 50 | 1 | | | | 13500 | | 0 | | | 3375 | 16875 | 11812.5 |
| | | | | | | | | | | | | | | | | | | total mission | 304806.25 |