

EUROFusion – WPSA General Mtg. – 04 May 2022

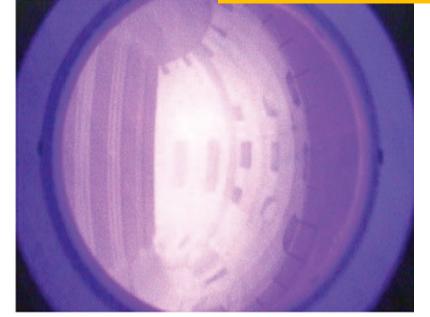


What happened since March 2021 ?



2021/03/02 20:14 56

2 March 2021 – First ECRF plasma achieved





9 March 2021 – Double Fault to ground on EF coil terminals



TF terminals insulated with pre-preg GK on the tokamak



Cylindrical EF terminals reinforced with wet-wrapped GK on the tokamak





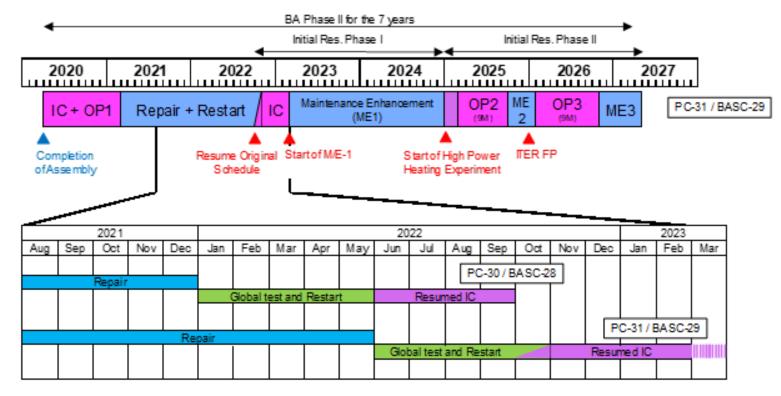
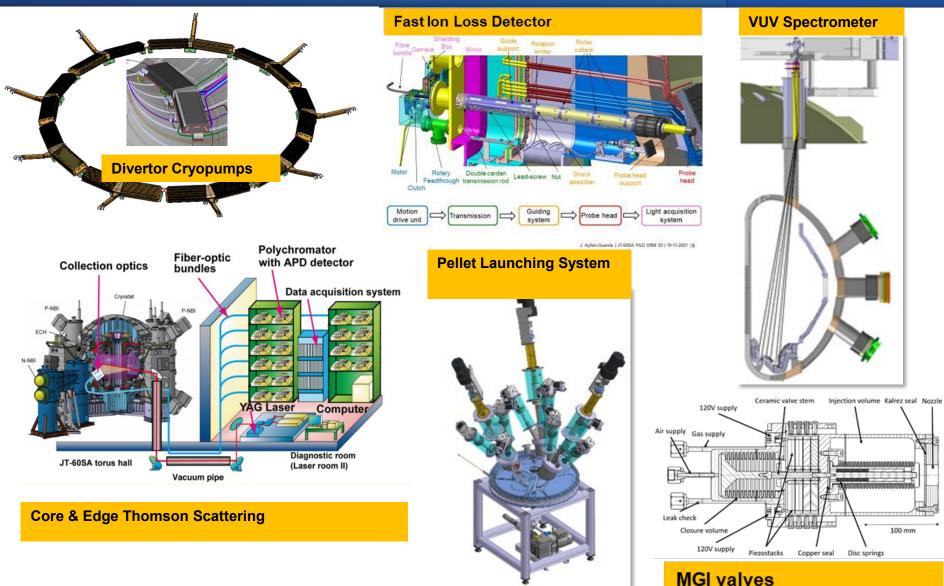


Fig. 4-2. Updated schedule of operation, machine enhancements and maintenance in BA Phase II.



EU- Phase II Machine Enhancements F4E – EUROFusion

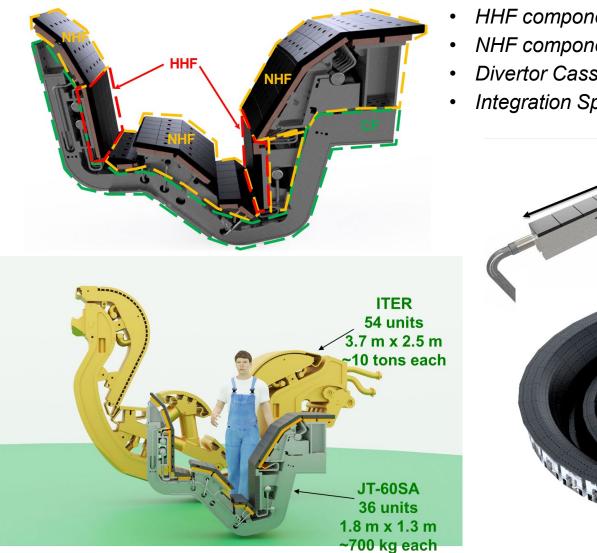




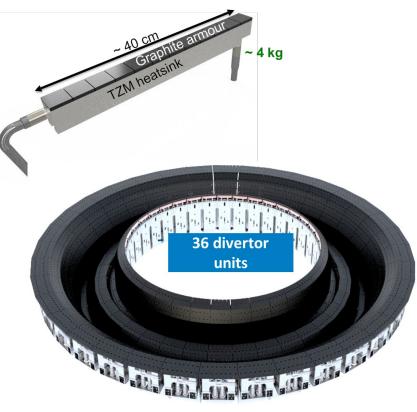


Actively Cooled Divertor



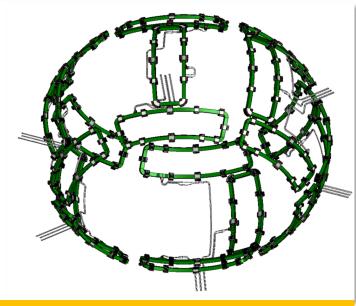


- HHF components tender completed.
- NHF components tender started
- Divertor Cassettes specs finalised
- Integration Specs In preparation



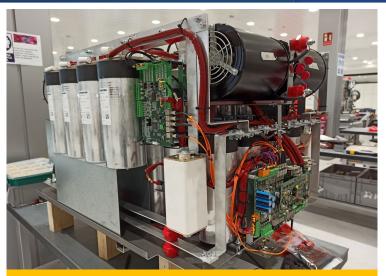
Other Machine Enhancements (F4E)



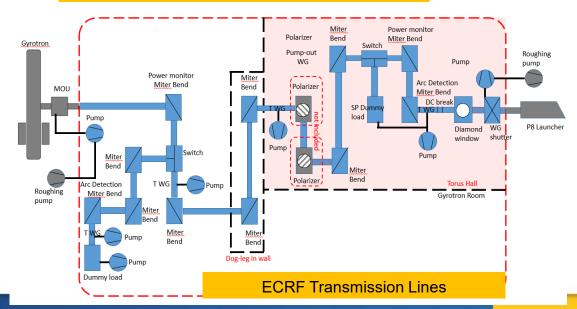


Error Field Compensation Coils





HVMPS power module prototype

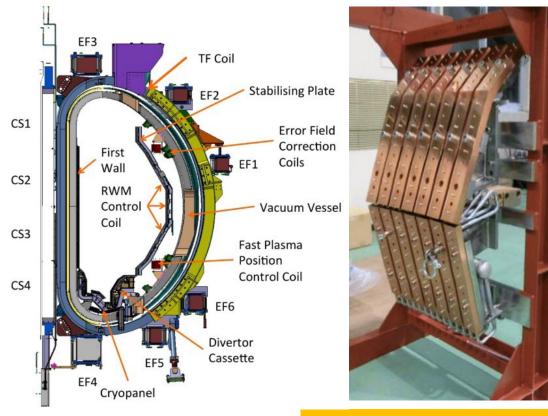




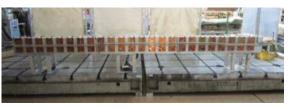




- Design/analysis, mock-up test of in-vessel components are in progress.
- Fabrication of stabilizing plate, divertor cassette inner target, first wall heat sink, RWMC, AT probe, and so on have been or to be started.



Divertor cassette inner target (under assembly)





First wall heat sink



Tokamak Device (JA)



Some work originally planned at M/E-1 has been being anticipated.

- Upper vertical ports (even No.) were installed and all the nine were mounted onto the Vacuum Vessel and jointed with the Cryostat by the end of Jan. 2022
- Piping in basement for the primary water-cooling system were developed from the primary water-cooling building to just underneath of the *tokamak hall*.



Installing the port into the tokamak (P-14)



Completion of the upper vertical port installation



Piping developed to just underneath of the tokamak hall.



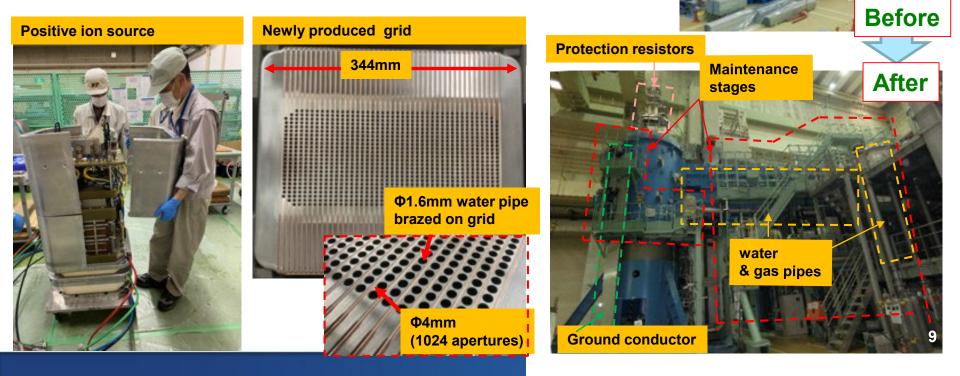
Progress toward NBI restart



N-NBI beamline

Preparatory work to restart of the NBI was proceeded. Main activities in Q4/2021 and Q1/2022 are as follows.

- Overhaul of eight positive ion sources of the total of 16 were completed. Precise brazing technology to fix thin water tubes (Cu) on grids (Mo) are re-established for this work.
- In the negative ion based-NBI (N-NBI) beamline, water & gas pipes, maintenance stages around the ion sources, resistors and ground conductor was successfully reassembled based on careful investigation of equipment after long-term storage.







- Procurements being implemented as scheduled.
- Reschedule of assembly/installation is needed, but still in time for OP2.

| | Shifted | 1 | OP-1 | | | Repair | | | | r <mark>OP-</mark> | | | | N | | | | OP | -2 M/E- | | -2 | |
|--------|--|----------------|-------------|------|-------|--------|------|----------|----------|--------------------|--------------|------------------------|-------------|-------|--------------|---------|------|-------------------|---------|-------|------|----|
| | Original | | OP-1 | | | M/ | | | | M/E-1 | | | | OP | M/ | M/E-2 0 | | OP-3 | | M/E-3 | | |
| | | _ | 2020 | | | 2021 | | | 2022 | | | | | 2023 | 2024 | | | | | 2025 | | |
| | | 2Q | 3Q | 4Q [| 1Q | 2Q | 3Q | 4Q | 1Q | 2Q 3 | SQ | 4Q | 1Q | 2Q 30 | 2 4Q | 1Q | 2Q | 3Q | 4Q [| 10 2 | 2Q 3 | JQ |
| | PA signed (14 September 2020) | | - 4 | | | | | | | | | | | _ | | | | | | | | |
| Del 1 | CO ₂ polarimeter system (31 March 2024) | Procurement | | | | | | | Assembly | | | <mark>☆Commissi</mark> | | | • * | | | | | | | |
| Del 2 | Visible TV camera system (31 March 2024) | Procurement | | | | | | | | | Ass ☆Commiss | | | • * | | | | | | | | |
| Del 3 | Electron Cyclotron Emission system (31 March 2024) | Procurement | | | | | | Assembly | | | | ☆Com | missi | • * | | | | | | | | |
| Del 4 | Divertor Langmuir Probe system (31 March 2024) | Procurement As | | | | | | Assembly | | | | ☆Com | missi | • * | | | | | | | | |
| Del 5 | Bolometer system (31 March 2024) | Procurement | | | | | | A | ssei | mbly | bly ☆Commiss | | | • * | | | | | | | | |
| Del 6 | Visible Spectrometer & D_{α} emission monitor systems (31 March 2024) | | Procurement | | | | | | | | Ass | ☆Com | missi | • * | | | | | | | | |
| Del 7 | Vacuum Ultra Violet spectrometer system (31 March 2024) | | | | | | | | | Procu | ren | nent | Ass | ☆Com | missi | • * | | | | | | |
| Del 8 | Thomson Scattering system (31 March 2024) | Procurement | | | | | | | | | Ass ☆Commiss | | | • * | | | | | | | | |
| Del 9 | Charge exchange recombination spectroscopy system (31 March 2024) | | Procurement | | | | | Assembly | | | r - | ☆Com | missi | • * | | | | | | | | |
| Del 10 | Soft X-ray intensity measurement system (31 March 2024) | | | | | | | | | Procu | ren | nent | Ass | ☆Com | missi | • * | | | | | | |
| Del 11 | Motional Stark Effect polarimeter system (31 March 2024) | Procurement | | | | | | A | Assembly | | | ☆Com | missi | • * | | | | | | | | |
| Del 12 | Neutron Monitor system (31 March 2024) | Procurement | | | | | | Assembly | | | | ☆Com | missi | • * | | | | | | | | |
| Del 13 | Tracer-Encapsulated Solid Pellet system (31 March 2024) | | Р | | | | ocur | eme | nt | A | Assembly | | | ☆Com | missi | • * | | | | | | |
| Del 14 | Diagnostics common system (31 March 2025) | | Procurement | | | | | | | Ass ☆Commissi | | | | oning | | | | * | | | | |
| Del 15 | Infrared TV camera system (wide-angle) (31 March 2025) | | | Pro | ement | | | | Assembly | | | | ☆Com | onin | | | | * | | | | |
| | Infrared TV camera system (Narrow-angle, divertor) (31 March 2025) | | | | | | | | | Procurement | | | | | Assembly ☆Co | | | <mark>om</mark> m | | | | |
| Del 16 | Neutron profile monitor system (31 March 2025) | | | | | | | | | | | Proc | Procurement | | | Asse | mbly | ☆Co | omm | * | | |



Summary



- Complex repair activities close to completion.
- Restart of commissioning in Summer 2022.
- With an optimistic view, it could be possible to have all magnetic system fully commissioned by October 2022 and first plasma operation may be achieved between October 2022 and February 2023.
- EU activities (with important collaborations between F4E and EUROFusion Laboratories) are progressing with the objective to deliver in time for assigned milestones (a great effort will be needed to be ready for OP 2!)
- JA Activities progressing in parallel also with reasonable chances to match deadlines for OP2