

Call for proposals for BA simulation projects in JFRS-1 (2023/4/1 to 2024/3/31)

Deadline for answers: Friday, 10th February 2023

1. Preface

The Broader Approach (BA) activities entered the BA Phase II in April 2020 building on the successful results of the BA Phase I (from June 2007 to March 2020). The objectives of the International Fusion Energy Research Centre (IFERC) in BA Phase II are to support ITER, JT-60SA and IFMIF/EVEDA and to consolidate the know-how for the development of future fusion reactors (DEMO). In line with the objectives, F4E together with EUROfusion and QST continuously promote simulations in the Computational Simulation Centre (CSC), as part of the IFERC project activities (IFERC-CSC).

For this purpose, the high performance computer resource JFRS-1 in Rokkasho is provided by QST as a Japanese host contribution to BA Phase II. Therefore, this resource is available to implement EU and Japan projects and EU-JA joint projects in FY 2023 (from April 2023 to March 2024) as well as in FY 2022. Resources are reserved for projects targeting priority areas relevant to the objectives of the IFERC project, and the projects must address issues relevant to fusion development programmes such as ITER, JT-60SA, DEMO or IFMIF/EVEDA.

2. Scope of simulation projects

In order to promote the HPC simulation projects smoothly, with this call for proposals, we would like to invite scientists and engineers to propose project(s). Projects must address issues relevant to

- ITER,
- JT-60SA,
- DEMO,
- IFMIF/EVEDA.

The issues in primary categories will be as follows:

- Divertor physics:
(improved models, detached conditions, poloidal asymmetry, plasma surface interactions, heat load, etc.),
- Edge physics:

(improved confinement, L-H transition, Edge Localised Modes, 3D effects such as Resonant Magnetic Perturbations, etc.),

- Disruption:
(overall modelling, effects of runaway electrons and mitigation systems, etc.),
- Plasma turbulence and related transport processes:
(core or edge turbulence, transport barrier, etc.),
- Fast Particle physics:
(influence of Alfvén Eigenmodes on Fast Particle confinement and/or burning plasma, etc.),
- Integrated modelling of fusion plasmas:
(overall modelling, application to burning plasma, etc.),
- Heating and current drive:
(NBI, ECH, ICRF, etc.)
- Reactor materials:
(irradiation effects on reactor materials, structural materials [Reduced Activation Ferritic Martensitic steels], functional materials [neutron multiplier, tritium breeder], divertor materials [W], etc.)
- Reactor technology:
(nuclear analysis, neutronics, etc.).

3. Specification of the available computer system

The computer available in JA is Japan Fusion Reactor Simulator 1 (JFRS-1) in the Rokkasho Fusion Institute of QST. JFRS-1 is the Cray XC50 supercomputer with 1,370 conventional CPU nodes, and each compute node has 2 Intel Xeon Gold 6148 (2.4GHz/20C) processors and 192GB of memory. The peak performance of JFRS-1 is 4.2 PFlops.

The total amount of available node hours for this call in JFRS-1 is 9,000,900 node-hours. Please note that the above-mentioned total amount of available node hours will be shared among the selected proposals.

4. Eligibility for proponents and participants in projects

The Principal Investigator, and co-Principal Investigator if any, of each project must have a contractual link with some recognised fusion research organisation in EU or JA, and be empowered in this organisation to propose this kind of project. In the case of scientists not belonging to such organisations, they can participate in the project only as

collaborators and their participation in the project must be covered by a formal agreement. Also, the Principal Investigator, and co-Principal Investigator if any, will ensure that the total amount of node-hours allocated to all the scientists belonging to neither EU nor JA research organizations in a project is limited to a maximum of 50% of the node-hours allocated to the project. The acceptance of recognised fusion research organisations will be under the responsibility of the Implementing Agencies.

5. Proposal and selection

The proposal should detail the objectives of the project, the relationship of the project to issues of ITER, JT-60SA, DEMO and IFMIF/EVEDA, and the required resources following the attached “Application form for BA sim. in JFRS-1_2023.docx”.

In the proposal, it must be described in detail the justification/rationale for the use of the resources requested, by including the information in terms of expected number of runs, number of nodes used, and elapsed time per run and the relationship to the scientific objectives; without proper justification/rationale for the use of resources the project will be rejected.

Proposals will be selected according to a peer review process defined by the Joint Allocation Committee; only proposals, which are technically fit for the JFRS-1, will be kept while the final selection will be made according to the scientific and technical merit of the proposals taking into account the following criteria:

- (1) Relevance to issues of fusion development programmes: ITER, JT-60SA, DEMO and IFMIF/EVEDA, and clearness of research plan (40%, threshold: 2),
- (2) Quantitative justification of the requested computer resources and relationship to the objectives (20%, threshold: 2),
- (3) Scientific excellence including innovation potential (20%, threshold: 2),
- (4) EU/JA collaborative aspects (20%),

where proposals with one or more evaluations below the threshold of 2 (the range of evaluated values is from 0 to 5) in categories (1), (2) and (3) will fail. Note that the criterion (4) has no threshold, and a well evaluated project contains a Principal Investigator from one side and a co-Principal Investigator from the other side, and has clearly defined benefits of a EU/JA joint collaboration together with the roles of both EU and JA researchers.

Remark: for proposals using data from experimental facilities (including the usage of data from ITER, JT-60SA, DEMO and IFMIF/EVEDA), a collaboration agreement should be concluded separately. In such cases, please contact the authority managing the

data.

6. Presentation and publication of obtained results

The participants must agree to acknowledge EUROfusion and QST when the results of the projects are presented and published. A suitable acknowledgement is as follows: “This work was carried out (partially) using supercomputer resources, JFRS-1 provided under the EU-JA Broader Approach collaboration in the Computational Simulation Centre of International Fusion Energy Research Centre (IFERC-CSC).”

7. User Access and Export control

Japan and European Union countries are parties to the Wassenaar Arrangement, which ensures an Export Control with respect to high level, possible dual-use technology components, including supercomputer technical information, knowledge, set-up, and user access. For the purpose of obtaining user access, all prospective users will have to provide personal information such as nationality and the place of abode, which will be used only for this purpose.

This process is completely independent of the selection process for research projects by the Joint Allocation Committee. This process will be done separately and in parallel with the selection process, enabling the checking to be followed by F4E and QST that will have to be completed before account opening after the project is granted. The JA management staff will notify EU applicants for using the JFRS-1 of details of this process through e-mail after receiving the application forms.

8. Contact points

The proposals should arrive at the Joint Allocation Committee (alloc-com@iferc.org), by **Friday, 10th, February 2023**. Adopted projects will be implemented from 1st April 2023 to 31st March 2024. Questions on the call for proposals should be sent to the Joint Allocation Committee (alloc-com@iferc.org).

After completion of the project, a short written report (i.e. 1-2 pages) presenting the main results is required and shall be sent to the Joint Allocation Committee (alloc-com@iferc.org) by the end of May 2024. If applicable, this report will be taken into account when assessing a continuation of the future simulation projects in the BA framework.