**Proposal for a EUROfusion HPC Project –**

**CfP-FSD-AWP24-AC-07**

(for the **Project cycle 8** from 1st March 2024 to 28th February 2025)

|  |  |
| --- | --- |
| **Project Title** |  |
| **Project Acronym**  (up to 8 characters) |  |
| **Category**  [check the relevant research area(s)] | Plasma turbulence and related transport processes  Fast particle physics  Linear, nonlinear and/or extended MHD  Edge physics  Heating and current drive  Integrated modelling of fusion plasmas  Reactor materials  Reactor technology |
| **Is this a continuation of a previous project?** | ( ) yes  ( ) no  If yes, indicate the previous project name: |

**Abstract**

***(150 - 300 words)***

***Principle Investigator (PI):***

|  |  |
| --- | --- |
| *Name of PI:* |  |
| *Institution:* |  |
| *Street Address:* |  |
| *City:* |  |
| *Country:* |  |
| *Nationality:* |  |
| *Email:* |  |
| *Phone / Fax:* |  |

***Collaborator(s):***

|  |  |
| --- | --- |
| *Name(s) of Collaborator(s):* |  |
| *Institution:* |  |
| *Street Address:* |  |
| *City:* |  |
| *Country:* |  |
| *Nationality:* |  |
| *Email:* |  |
| *Phone / Fax:* |  |

*Several collaborators from the same institution may be grouped together. Please duplicate this table if necessary.*

**Computer Resource Requirements and Code Characteristics**

|  |  |
| --- | --- |
| Total amount of requested node hours for the present project (one node corresponds to approximately 2x24 cores) **Conventional Nodes (A3)** |  |
| Total amount of requested node hours for the present project (New Advanced Partition Based on GPUs) **GPU Based Non-Conventional Nodes (C1)** |  |
| Expected average and maximum number of nodes per run |  |
| Expected minimum number of nodes per run based on memory requirements [note that up to196 GB per node (~ 2x24 cores) are available in the conventional partition] |  |
| Temporary disk space required for a single run [for input / output / restart files etc.] |  |
| Permanent disk space required for the entire project [if larger than 10 TB] |  |
| Retention time of the obtained data |  |
| Estimated volumes of data transferred to/from by network |  |
| Name of the code to be used |  |
| Own code / 3rd party code? |  |
| Code publicly available? |  |
| Pure MPI or mixed OpenMP / MPI communication?  Specific libraries |  |
| On which machines is this code currently used for production runs, and how many cores are being employed? |  |
| Example for the strong scaling performance [fixed problem size] of the code |  |
| Expected code scalability for the targeted problems in the present project |  |
| Projects in which the proposed calculations are embedded if applicable (Work Package, E-TASC, Advanced Computing Hubs and Enabling Research Projects) |  |

**Detailed Project Description**

Please address ALL of the points below one by one, keeping in mind the evaluation criteria as given in Annex of this document. The minimum font size that you can use is 12 point and you must adhere to the page limits indicated below. The maximum number of pages you may submit, including references, is 4.5 pages. In the final proposal you may delete the detailed instructions in order to save space.

1. **Describe your research project.** Include a discussion of the scientific questions that you are planning to address and the overall scientific goals of the project. It is important that you describe the novelty, significance, impact and timeliness of the proposal as well as the relationship of the project to key goals of the fusion programme together with its scientific background and any preparatory work including related publications. (This section must be no longer than 1.5 pages)
2. If relevant, provide a concise **summary of the outcome of previous relevant projects** in the proposal, together with references to reports from previous completed projects (approximately ½ page)
3. **Describe your application software and your experience in using HPC resources in the past and how you will manage using the HPC resources you are applying for** in terms of the numerical methods and algorithms that you are planning to use**,** improve or develop (if applicable); the codes, packages or libraries that you need to undertake the project; and how these will enable the research to be achieved. (max. 1 page)
   1. Describe the codes used and or the details of a new code, including specificities of the code with appropriate references.
   2. Describe the experience of the team in regarding the use of HCP resources and how they will be used.
4. **Explain why this project needs to run on an HPC resource**, why EUROfusion High Performance Supercomputer is suitable for the project and how the use of the system will enable the science proposed. You should describe the architecture, machine/system name and the problem sizes that have been used to test for scaling and provide supporting evidence. Please provide a table and scaling plot such as the ones shown below with example data to illustrate the information requested (max. 1 pages). For the Advanced partition (C1), since most performance will come from GPUs, is must be shown that the codes are able to scale on GPU architectures.

|  |  |  |
| --- | --- | --- |
| **# cores** | **absolute timing (s)** | **speedup** |
| 256 | 189.6 | 1.0000 |
| 512 | 99.0 | 1.9154 |
| 1024 | 55.6 | 3.4088 |
| 2048 | 30.8 | 6.1376 |

1. **Justify the number of core hours requested.** This should include information such as run type, wall clock time per step, number of jobs per run type, the number of CPU cores and the total core hours per run type. This information should take the form of a table like the one shown below with example data. Explain how the core hours requested will be used and their relationship to the scientific objectives. (max 1 page).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Run type** | **# Runs** | **# Steps/Run** | **Walltime/Step** | **# CPU cores** | **Total core hours/Type Run** |
| **1** | R1 | s1 | w1 | p1 | R1\*s1\*w1\*p1 |
| **2** | R2 | s2 | w2 | p2 | R2\*s2\*w2\*p2 |
| **3…** | R3 | s3 | w3 | p3 | R3\*s3\*w3\*p3 |
| **…** | … | … | … | … | … |
| **TOTAL** |  |  |  |  | **GRAND TOTAL** |

1. Discuss the routes that you will use for **dissemination of the project,** including foreseen presentations at EUROfusion meetings, conferences, workshops and journal publications (max 0.5 page).

**Annex: Evaluation Criteria**

The final selection will be made according to the scientific and technical merit of the proposals taking into account the following criteria:

(1) Quality / scientific excellence of the proposal (Weight: 40% no threshold)

(2) Impact to the fusion research (Weight: 30% no threshold)

(3) Quality, skills, recognised expertise and competences of the team to carry out the proposal, including the outcome of the projects in previous cycles (Weight: 20% no threshold)

(4) Resource management/efficient use of the resources (Weight: 10% threshold > 2)

Proposals with one or more evaluations below the threshold of 2 (the range of evaluated values is from 0 to 5) in category (4) will fail.

For projects, which are the continuation of a previous cycle of allocation, the peer reviewers will take into account the outcome of that project in making their evaluation. This will be done by making the reports (see section 8) and evaluation reports of related projects to the referees, which will take these into account in the evaluation process, together with the Project proposal.