

# XD-A application form

## 1 Significance and objective of your research

Describe the significance and objective of your research. Clarify the background, scientific goal, and originality of your approach.

Provide the bibliographic information for the references cited in Section 1, 2, 3 in Section 4. The format of the bibliography and how to cite them in the text should follow the AAS Journals. Examples of in-text citations: “There are several TNOs with perihelion distance greater than 45 au that have clearly experienced planetary scattering [1], and we need to examine the results of a larger range of observations to verify them [e.g. 2, 3].” The above examples show citations by reference number, but citations in author+year format such as “(Grav et al. 2011; Boe et al. 2019)” are also acceptable.

The L<sup>A</sup>T<sub>E</sub>X version of the application form requires B<sub>I</sub>B<sub>T</sub>E<sub>X</sub> in order to create the list of references (note that you will need to prepare the necessary environment to run B<sub>I</sub>B<sub>T</sub>E<sub>X</sub>). Follow the instructions in the `OOREADMEe.txt` file. Make sure that the amount of text does not exceed the page limit for each section.

(The amount of description should not exceed one page)

## 2 Research plan and methods

Summarize your research plan and methods here. Describe the specific outcomes that you expect to achieve during this fiscal year (ending in March). If there are any new or unique perspectives on your research methods, specify them as well. The format of the citation must follow the instruction specified in Section 1.

(The amount of description should not exceed one page)

### 3 Preparation of computational code

(§3.1 and §3.2 combined, do not exceed one page.)

#### 3.1 Development and optimization of computational codes

Describe the current status of the development and optimization of your numerical code. If you are a former user of the computers at CfCA, you need to clarify that the numerical code is expected to run efficiently on this system by showing the scalability of the code. For applying to XD-A, you need to show the scalability up to the production-run parallel size. The format of the citation must follow the instruction specified in Section 1.

#### 3.2 Estimate of the amount of required computing resources

Describe the estimated amount of computing resources required to carry out your proposal (number of nodes, number of CPU cores, amount of memory, the time required for one model calculation, the total computation time for all the model calculations, etc.). “k” denotes 1,000 (ex. 200 k = 200,000) in what follows. Provide the values for each system you wish to use (System M and System P).

(Example) It takes a week to execute a run of our simulation using 10 nodes on System M. With 5 model calculations performed, the total computation time will be 8.4 k nodes hours. Memory usage per node is 50 GB/node.

It takes 2 weeks to execute a run of our simulation using 20 nodes on System P. With 5 model calculations performed, the total computation time will be 33.6 k nodes hours. Memory usage per node is 200 GB/node.

Note that the total computation time value should be given in the form of a node time product (in k nodes hours). For your reference, the following information is based on the operational statistics obtained so far.

| category | appropriate node time product<br>/ (year · user) (k nodes hours) | relative value to the<br>whole resource of XD2000 |
|----------|--|---|
| XD-A     | 50-250   | 2-10%   |
| XD-B+    | 25-130   | 1-5%  |
| XD-B     | 13-60  | 0.5-2.5%  |
| XD-MD    | 6-30   | 0.25-1.3%   |

Note that here you should fill in the value per node (in GB/node) as the memory usage. The amount of memory per node that System M has is 128 GB/node and that of System P is 512 GB/node. Also, provide the numbers you estimated here in the table below as well. Enter 0 for systems you will not use.

|  | System M | System P |
|--|----------|----------|
| total computation time (k nodes × hours) | 8.4      | 33.6     |
| memory amount per node (GB/node)         | 50       | 200      |

(The amount of description should not exceed one page)

## 4 References cited in Sections 1–3

List the references cited in Sections 1–3. Your own research achievement must be listed in Section 5. However, if any of them are cited in Sections 1–3, they should also be listed in this section. Bibliographic information must be complete, and at least include the author name, journal (book) name, volume number (if journal), page number (or article id), and publication year. You may want to add the paper title and DOI of the publication.

- [1] Bannister, M. T., Shankman, C., Volk, K., et al. 2017, *Astron. J.*, 153, 262
- [2] Boe, B., Jedicke, R., Meech, K. J., et al. 2019, *Icarus*, 333, 252
- [3] Grav, T., Jedicke, R., Denneau, L., et al. 2011, *PASP*, 123, 423

(The amount of description should not exceed one page)

## 5 Research results you have achieved so far

If you have previous experience of using CfCA’s open-use computational facilities, list the publications resulting from the activity.

- List only the publications of **your own research results**. Do not bring references from other people’s research that you cited in Sections 1, 2, or 3.
- List separately the results you have obtained primarily through the use of CfCA’s open-use computing facilities (Section 5.1) and those obtained through the use of computing facilities at other institutions (Section 5.2).
- Provide as much detail as possible on the bibliographic information in the literature. Do not abbreviate the volume number or page numbers.
- Include the specific names of the equipment and resources you used.
- The applicant’s name should be written in bold in the list of authors.
- Use “et al.” or other abbreviations as appropriate when there are many authors.

Here are some examples.

### 5.1 Publications achieved through the use of CfCA’s facilities

- **Iwasaki, K.**, Tomida, K., Inoue, T., Inutsuka, S. (2019) The early stage of molecular cloud formation by compression of two-phase atomic gases. *The Astrophysical Journal*, volume 873, 6. (XC30, XC50)
- Takasao, S., Tomida, K., **Iwasaki, K.**, Suzuki, T. K. (2019) Giant protostellar flares: Accretion-driven accumulation and reconnection-driven ejection of magnetic flux in protostars. *The Astrophysical Journal*, volume 878, L10. (XC30, XC50)
- Tsukamoto, Y., **Iwasaki, K.**, et al. (2015) Bimodality of circumstellar disk evolution induced by the hall current. *The Astrophysical Journal*, volume 810, L26. (XC30)

### 5.2 Publications achieved through the use of other facilities

- **Iwasaki, K.** (2015) Minimizing dispersive errors in smoothed particle magnetohydrodynamics for strongly magnetized medium. *Journal of Computational Physics*, volume 302, 359. (JCAHPC/Oakforest-PACS)

(The amount of description should not exceed one page)